NETWORKED LEARNING 2020

PROCEEDINGS FOR THE TWELFTH INTERNATIONAL CONFERENCE ON NETWORKED LEARNING

Proceedings for the Twelfth International Conference on Networked Learning 2020

May 18-20 2020, Online

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Cover photo: Michael Yde Katballe

Conference Series: Networked Learning Conference Proceedings, Twelfth Issue

ISBN: 978-87-971741-0-4

www.networkedlearning.aau.dk

Aalborg University (AAU), 2020

Joint Organisers:

Aalborg University (Denmark), University of Wollongong (Australia), University of Southern

Welcome from the Networked Learning Conference series Co-Chairs

Usually this welcome letter would have been prepared before the conference, and we would be welcoming you to the (hopefully) sunny and smiling city of Kolding in Denmark. You would be holding the printed book of abstracts in your hands and be on your way to the auditorium in the fancy, modern building housing Southern University of Denmark (SDU) in Kolding. You would be wondering about the strange luminous tubes on the walls occasionally lighting up (and pleasantly amazed to find they are clocks and that there is a different way of representing a clock with tubes on each floor). You would eventually go to a different floor and get lost in the triangular building in an attempt to find your session, and you would have enjoyed a dinner in the Koldinghus Castle, and you would have…

However, as we all know now, the COVID-19 pandemic upset and is still upsetting our 'would haves' and nothing is like it used to be, and perhaps it never will be. In 2020, we therefore, for the first time ever, held the Networked Learning Conference as a fully online conference. Judging from our own experience, and from the positive feedback we have received from many of you (thank you) it also turned out to be quite a successful conference.

The decision to have an online conference saw a surge in interest and participation in Networked Learning.

As a result, the conference increased its global outreach and managed to retain this interest throughout the event as indicated by the total attendance of 220 people during the conference – more than twice as many as for the physical conferences. As chairs we are very pleased with this turnout, as we need to think about the sustainability of our great community. We will therefore take into account how we can design future Networked Learning Conferences to include wider participation, as well as plan new types of Networked Learning events. The biennial Networked Learning Conference will always be the main event, but in the in-between years we are planning to organise new (hybrid/online) activities to promote Networked Learning on other continents and to address emerging topics and new research directions at focused events around dedicated themes. These events, is our intention, will support the development of papers to be presented at the Networked Learning Conferences.

For hosting this year's challenging conference we are grateful to the (g)local organisers Nina Bonderup Dohn, Stig Børsen Hansen, Jens Jørgen Hansen for their tireless efforts organising the conference and to Pernille Dahl Kragh for administrative support. We would like to take the opportunity to thank them all for their commitment. This extends also to our excellent keynotes Lesley Gourlay, Ben Williamson and Rikke Toft Nørgaard, who managed to deliver engaging, thought-provoking and interesting presentations that stimulated much interaction during the sessions and beyond (social media).

We should also like to send a very big thank you to Christopher Kjær – the Adobe Connect Ninja – who was an invaluable help in organizing and preparing the online sessions, as well as acting as support throughout the conference together with the SDU tech team (Rasmus Poulsen, Lasse Gøransson, Casper Bjørnøe, Aleksander Grzegorz Duszkiewicz). Also a special thanks to CanopyLab (Sahra-Josephine Hjorth and Lise Andersen- Alstrup) for sponsoring and providing free access to their social learning platform before and during the conference.

An additional thanks to Nina Bonderup Dohn, who as an ongoing member of the scientific committee and steering committee of the conference, has also been the editorial lead in putting together selected papers from the Networked Learning Conference 2018 for the Research in Networked Learning book series. This has resulted in the book Mobility, Data and Learner Agency in Networked Learning (edited by Nina Bonderup Dohn, Petar Jandrić, Thomas Ryberg and Maarten de Laat) which is available from Springer in print or online. Thanks also to the book series editors Vivien Hodgson and David McConnell who have both contributed with insightful comments and critique. As Vivien and David are now stepping down as book series editors, it seems in place to thank them extensively for their enormous and successful work on setting up and managing the book series. The book series editorship will now be picked up by Maarten de Laat, Nina Bonderup Dohn and Thomas Ryberg.

A very special thanks to Morten Kure Kattenhøj, who has taken it upon his shoulders to act as the conference administrator with the support also from Charlotte Hyldgaard. Stepping in as conference manager at such challenging times is a demanding task, which Morten has managed extremely well. Thank you very much Morten!

We would also like to thank all the people involved in the peer-review process, without your help, we would not have been able to select suitable papers for this year's conference. Likewise, we would like to thank all authors, presenters and participants. Without your commitment and interest in the domain of Networked Learning, this conference would not have been possible.

Finally, we are pleased to announce that the 2022 Networked Learning Conference will be held in Sundsvall, Sweden at the Mid Sweden University with Jimmy Jaldemark, Marcia Håkansson Lindqvist, Peter Mozelius, Lena-Maria Öberg as the conference organising committee.

Thomas Ryberg & Maarten de Laat
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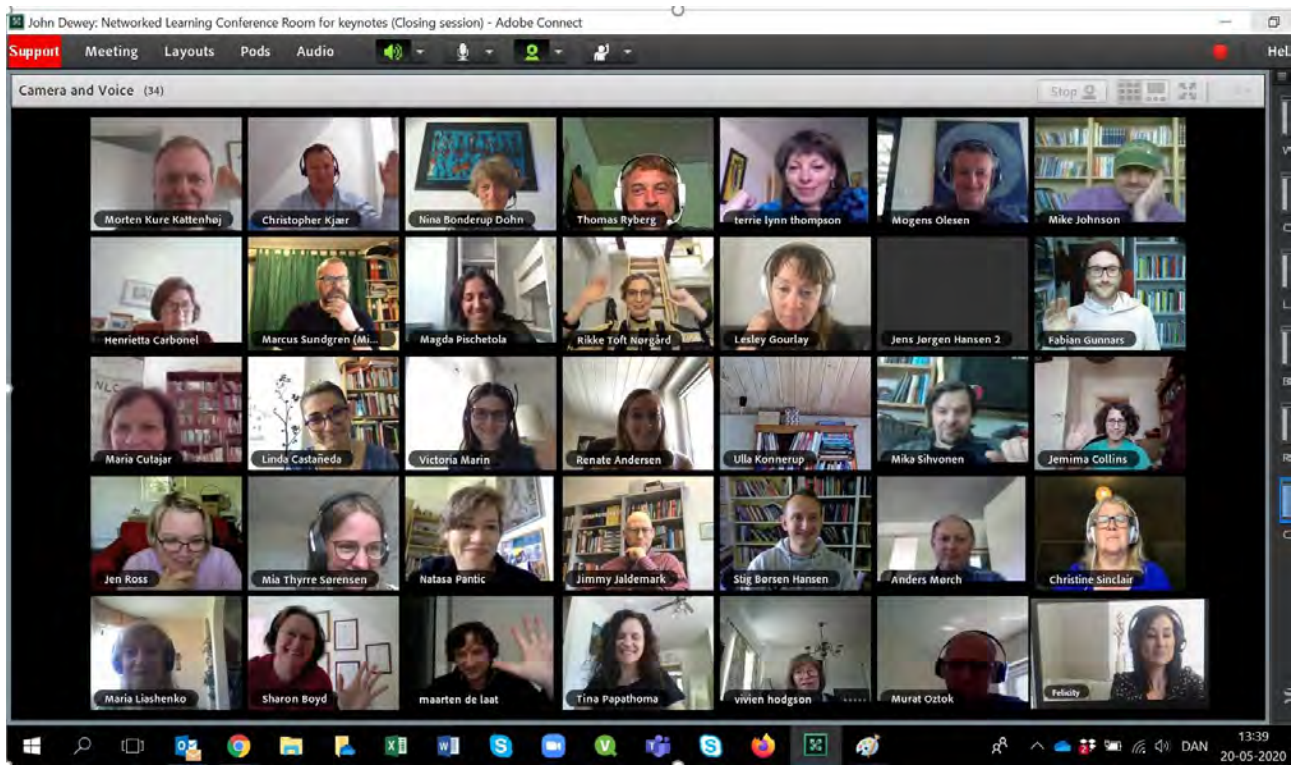
Welcome from Local Committee

Welcome to the 12th biennial International Networked Learning Conference! Under normal circumstances, it would have given us great pleasure to welcome you to our campus building in Kolding at the University of Southern Denmark. The building is an interesting piece of architecture in its own right, and an inspiring place to work for about 200 staff and 3000 students. Further, the building makes for quite a contrast with the venue for our planned conference dinner, Koldinghus, a castle that dates back to the 13th century.

In the past months, all this has changed due to a pandemic, and both delegates and organizers have been faced with difficult decisions. Ultimately, some of these were made for us. Yet, cancelling a conference on networked learning due to travel restrictions was not on the table for very long, and much work has gone into transporting papers and talks to an online environment. However networked we may be when learning, we would have loved to meet you all in person and have the opportunities to exchange ideas that being in a place like a building affords. Yet, there is an upside to the many troubles that delegates, planners and institutions have been going through: this year's number of delegates has soared, likely as a consequence of the mode of access to hours of inspiring lectures, presentations and roundtables.

With more than 5,000 employees and 31,000 students, SDU is the largest research and educational institution in the Region of Southern Denmark. The university has campuses in six cities: Odense, Kolding, Esbjerg, Sønderborg, Slagelse and Copenhagen.
In Kolding, SDU offers more than 20 Bachelor's and graduate programmes, as well as Master's and diploma programmes. The study and research environments in Kolding are characterised by close collaboration across the academic fields as well as working closely with the surrounding society. This speaks in particular to the themes of "Learning on the move" and "Professional Learning" in this year's conference. We especially focus on design, entrepreneurship, relationship management and communication.

We would like to thank the networked learning community of authors and presenters that makes this field vibrant. We especially welcome all newcomers to the field of networked learning. Also, thanks are due to the reviewers, workshop organisers, and everyone else who contributed to the conference. As local organisers we would like to thank the experienced members of the steering committee. Just as importantly, we would have been very hard pressed to have a conference without the invaluable support we got from our University's E-learning support unit. Finally, local administrative staff and student helpers were as helpful as always.

We are particularly happy to welcome this year's keynote speakers. 22 years since the inception of networked learning as a research community, some of the initial excitement over the internet has given way to concerns over the possible dark sides of data practices related to education. Ben Williamson very much expresses such concerns in his works, and we are happy that he accepted our invitation. Rikke Toft Nørgård talks about Designing for computational creativity and technological imagination with teachers. She points at fostering a space for daring, dreaming, conceptualization and understanding practical applications of computational thinking and technological literacy in education. Lesley Gourlay analyzes the concept of a lecture from a theoretical, posthumanist perspective. She argues that the current trend of depreciating the lecture neglects the "performance of text" and "lightening of sparks" in students, which the lecturer's embodied presence makes possible. She emphasizes that the prominent online version, the video-recorded file to be watched at home, displays none of this presence and is, therefore, in effect, not a lecture.

We warmly welcome you to the conference.
Best wishes,
Nina Bonderup Dohn, Jens Jørgen Hansen and Stig Børsen Hansen (local committee)

Papers

Education in the open: Building a network for social action

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Abstract

This paper introduces Fast Food da Politica (FFDP) as a case study of a learning network designed to promote social action in a developing country. Our focus is on exploring FFDP design elements, such as those related to tools, tasks and social organization, and the connections between these elements and valued learning activity. FFDP cleverly (re)purposes popular (board) games as pedagogical tools, which are then customised for the teaching and learning of the mechanisms and functioning of Brazilian political structures. FFDP has taken their political games to game-playing sessions across the country in varied venues – including schools, government organisations, and open sessions at market-street events and public protests. Their games are shared as open learning resources through blueprints and manuals that explain the many ways a game can be played, and which are easily downloadable through their website. FFDP also encourages game users (educators and learners) to come up with and share their own game-playing ideas for reuse. As a result, FFDP has built a repository of games that is constantly evolving, as new ways of using their open resources are captured and packaged for sharing and reuse by others. As a not-for-profit organisation, FFDP has been successfully relying on social media and crowdsourced funding to survive. In this paper, we draw on the ACAD Wireframe to explore the alignment of this network's design elements at the micro and meso levels, focusing on the ways FFDP combines a strategic educational vision deeply grounded on action for social change, with a curriculum that emphasizes gaming elements and promotes the physicality of materials in learning. At the micro level, the case study examines how the quality of materials support the development of educational innovation, while at the meso level this organization, driven by young women, is building-up a learning network for social action, empowering children, youth and adults to learn about the mechanisms of politics and their civil rights, within the Brazilian context. Overall, this paper offers an inspiring example of a productive learning network in action, where participation and co-creation are fostered through connections between a network of people, ideas, digital and material elements.

Introduction

Developing countries are often challenged by a lack of investment in the development of public policies and processes, and support for initiatives that expand and democratize people's access to knowledge and education about these processes. Brazil's history is marked by regional and socio-economic differences, positioning this developing nation alongside others, which are in deep need of open education initiatives that encourage networked learning (Jimena et al, 2019). One of the main goals of the open movement has been to improve education by facilitating access to educational resources and/or practices and, in so doing, to achieve greater effectiveness and equality in education (Cronin, 2017; Cronin & MacLaren, 2018). Open Educational Practices (OEP) usually refer to practices that include the creation and (re)use of Open Educational Resources (OER) but may also refer to open pedagogies and teaching practices that are freely shared (Cronin & MacLaren, 2018). Such practices also often relate to respect and empowerment of learners, and place learners as co-producers of their own learning trajectories (Ehlers, 2011). In this paper, we analyse Fast Food da Politica (FFDP) as a productive learning network (Carvalho & Goodyear, 2014; 2019) using a particular set of analytical lenses – the ACAD framework (Goodyear & Carvalho, 2014) and the ACAD Wireframe (Carvalho & Yeoman, 2019; Yeoman, 2015, 2018) – to explore the ways this network is operating and highlight the importance of alignment

between key design elements. The FFDP case study combines OERs with game-playing, resulting in a network of elements that comes together to educate Brazilians about the mechanisms of their political system and their civil rights. We argue that this learning network strongly enacts the networked learning values of participation, co-creation and knowledge building.

In discussing the case study of FFDP our focus is on illustrating alignment between multiple elements of a learning network including: (1) a strategic educational vision deeply grounded in action for social change, (2) a curriculum that emphasizes gaming elements, (3) the physicality of materials in learning and (4) ways of connecting people through both digital and physical resources. At the micro level we will ask you to pause and consider how the quality of materials supports the development of educational innovation, whilst at the meso level we will invite you to reflect on how an organization run by a group of young women is becoming an established learning network for social action in Brazil. Their goal is to empower children, youth and adults to learn about the mechanisms and functioning of Brazilian politics and, in so doing, to encourage social action based on civil rights. This case study illustrates coherence and consonance working in tandem, as the physical and online spaces come together to encourage, support and showcase a powerful strategic vision, enacted in both formal and informal educational settings. A networked learning spirit is embraced through workshop facilitation and community events where the FFDP methodology and vision are disseminated, and new ideas are gathered, before being curated and shared with participants. Co-creation and participation are some of the principles at the core of this network. As a not-for-profit organization FFDP relies on crowdsourced funding to survive, as it provides free access to all game blueprints and manuals that explain the different ways each game can be played. These OERs are downloadable through their website, and include cost-effective suggestions about how to adapt different elements to create games that are grounded in the socio-economic reality of Brazil. Their pool of OERs is always evolving as new ways of playing games are captured and repackaged for sharing with others in their ever-growing community of learners (Wenger et al, 2002).

In the next section we contextualise our approach to networked learning, briefly introducing the ACAD framework and ACAD Wireframe. We then summarise issues associated with the use of games in education, before presenting and discussing the FFDP as our case study of a learning network. We conclude our paper with the implications of this work, for analysis and design of productive learning networks, before setting out how these ideas are informing our research into the future.

Framing designable structures at macro, meso and micro Levels

According to Dohn (2018), the notion of "networks" can be associated with multiple meanings. It may sometimes refer to geographically distributed people, who come together via an infrastructure of interconnected technologies. Or it can be used to describe communication that is mediated by the use of the internet. It may be about networked machines as agents, or instead, about life activities happening in spaces that mix the physical and the virtual. Networks can also describe people's dependence on others for their daily activities, such as, when one refers to a personal network of family, friends, and like-minded others. There are many perspectives one can take, and they all foreground connections.

Goodyear and Carvalho (2014) explain that networked learning is often process-oriented and connected to a philosophical and pedagogical perspective on learning. Their use of the term learning networks is about describing inquiry in educational research, and phenomena that is often object-oriented. As such, the Activity Centred Analysis and Design (ACAD) framework (Goodyear & Carvalho, 2014) offers analytical lenses to explore how the structural elements in a learning network come to influence emergent activity. ACAD identifies three "designable" components of learning networks and a fourth that is characterised as "emergent". Designable components include those in (i) set design – or the digital and physical structures, tools and resources made available at learntime; (ii) social design – referring to social arrangements of learners, roles and divisions of labour, and (iii) epistemic design – or the proposed tasks, including knowledge and ways of knowing. The last structural component in the ACAD framework is emergent and characterised as co-configuration activity, which includes learners re-configuring and co-creating what has been proposed at learntime. Drawing on the ACAD framework (Goodyear & Carvalho, 2014), alongside Goodyear's (1999) earlier notions of pedagogical frameworks and the concept of pattern languages (Alexander et al., 1977), the ACAD Wireframe (Carvalho & Yeoman, 2019; Yeoman, 2015; 2018) offers a grid to sketch representations of ACAD's three designable elements, at different levels of granularity: micro, meso and macro levels (Table 1).

The ACAD Wireframe has been used to address some of the practical challenges in educational design. Some of these challenges can be associated with designers reaching a shared epistemology of learning before starting work on a new design (Yeoman & Carvalho, 2019), others relate to analysis that traces the coherence across

dimensions of design (left to right) and scale levels (top to bottom) (Carvalho & Yeoman, 2019, Yeoman, 2015, 2018). In this paper, we use the ACAD Wireframe to analyse the coherence of the designable components of the meso and micro levels of this particular learning network. However, before doing so, we discuss relevant research in games in education as this is a crucial component of the epistemic design of the FFDP network.

Table 1. The ACAD Wireframe

Philosophy	SET DESIGN *Learning is…*	EPISTEMIC DESIGN *Learning is…*	SOCIAL DESIGN *Learning is…*
MACRO *The global* *Level I patterns*	*Buildings & technology*	*Stakeholder intensions*	*Social systems*
MESO *The local* *Level II patterns*	*Allocation/use of space*	*Curriculum*	*Community*
MICRO *The detail* *Level III patterns*	*Artifacts, tools & texts*	*Selection, sequence &* *pace*	*Roles & divisions of* *labour*

Games in education

The use of games in educational contexts is not particularly new and can be traced back to the 1960s. With the advent of digital technologies and the internet, video, computer and mobile application games have increased in popularity and have rapidly become part of most people's lives in one form or another. Over 15 years ago, Gee (2003) argued that schools, families, and educational researchers could learn a lot from the principles of good computer and video games. Squire and Jenkins (2004) also highlighted the importance of "fittingness" between games and the overall educational context, including questions surrounding how and why one plays a game, who one is and who they hope to become, and how playing games may allow participation in social practices. Although Gee (2003), and Squire and Jenkins (2004) discussed digital games, we argue that material games offer specific qualities and properties that may contribute to creating educational environments that transform learning into an exciting challenge when infused with game-like elements. What is more, the physicality of games contributes to tool mediated experiences that help to situate people's understanding of the world in interaction that extends beyond brains and bodies – embracing tools, symbols, and artefacts in-use as mediators of our actions in the world (Clark, 2010; Kirsch, 2013). In thinking about the physicality of games, we see connections to Sørensen's (2009) perspective on the materiality of learning, or in practices where the social and material are intrinsically connected to broader ecologies of learning. As Fenwick (2015) reminds us "material things are performative. They act, together with other types of things and forces, to exclude, invite, and regulate particular forms of participation" (p. 85).

As game-players interact with others, either in massive multiplayer games simultaneously online, physically co-located with materials and strangers in a street-market event, or in small groups of known others, people playing these games are taking up the challenge of engaging in collaborative team activity, with the aim of achieving a shared game goal. In these situations, players often bring different but overlapping skills or knowledge, helping each other while sharing their knowledge, skills, and values. In so doing, they co-create knowledge, and have fun with like-minded others in a community of learners (Wenger et al., 2002). Researchers and educators have long been trying to understand how games engage people in lifelong learning. Specific areas of educational research include "serious games", "epistemic games" and "gamification" (Schaffer, 2006; Dicheva et al, 2015). Serious games refers to games developed to teach specific knowledge, content, or curricula. Gamification usually refers to the use of game-like elements in non-game related contexts. In this case study, we argue that regardless of the specifics of the game design, game play fosters engagement in critical thinking, creative problem-solving, and teamwork. In so doing, game-playing encourages players to develop skills and knowledge that may lead to solutions of complex social problems.

FFDP case study

The FFDP case study reported in this paper is part of a larger research project that explores the structural composition of productive learning networks (Carvalho & Yeoman, forthcoming). Case study is a qualitative

research strategy, often used to support in-depth exploration of "a program, an event, an activity, a process, or one or more individuals. The case(s) are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time" (Creswell, 2003, p. 15). For this analysis, we interviewed Julia Carvalho, the founder and one of the creative minds behind this network. We also gathered FFDP artefacts including copies of the games, their online descriptions and manuals, downloads from the FFDP website, reports of public events published in news outlets and disseminated via the FFDP Facebook and Instagram accounts, and YouTube videos reporting on the work of this network.

Background

In 2014, prompted by an assignment, a graphic design student set out to create a game that would teach ordinary people about the complex workings of political structures in Brazil. Like many others, Julia Carvalho was deeply concerned about growing political unrest that was producing an increasingly polarized society. In 2015, she embarked on a trip with the Hacker Bus, taking this as an opportunity to connect with others that were also developing games to help people learn about politics. Overwhelmed by the divisive and often violent nature of the verbal exchanges between members of two political groups, Julia and other hackers wondered if was possible to encourage public debate in a productive but playful way. FFDP emerged as a project during their trip in the Hacker Bus, and its beginning coincided with the day of a major political protest in front of the National Congress, where many were asking for the presidential impeachment. Julia and her companions in the Hacker Bus questioned whether games and fast dynamics could help people review their positioning, certainties and learn the rules of political processes, or learn about what would be the consequence of a presidential impeachment. Together, during this trip, they conceptualized and designed a new game, using a simple basketball structure, their game invited players to reflect on the structure of the Brazilian government (Figure 1).

Figure 1: Basketball game: Three powers system

At public protests, government supporters tended to wear red, identifying themselves with the labor party, and those calling for presidential impeachment tended to dress in the yellow colour of the Brazilian flag. Even in the polarized scenario of public protests, Julia and the hackers quickly noticed those wearing red and yellow were surprisingly open to conversations. With the help of the games a friendlier scenario was set, where questions could be posed, and a strategic and democratic discussion could unfold, about people's contradictory views of the impeachment process. It also made evident that both "sides" did not know who would replace the President once impeachment was completed, and so through game playing, people were invited to a deeper reflection on the issue. The use of the basketball game turned out to be really positive, supporting productive exchanges between the two polarized groups.

FFDP – framing the architecture of a learning network

In adopting a networked learning approach to explore FFDP design elements, we return to the ACAD Wireframe, offering a sketch of the key design elements of this learning network (Table 2). Doing so highlights the coherence of the FFDP vision enacted through a political curriculum, their overarching social values, and the learning "spaces" created by the tools and resources which are used and shared in physical gatherings and online – on the FFDP website, on their Facebook and Instagram accounts – as the network organises and repurposes individual elements over time and space.

The ACAD lenses reveal consonance between social, set and epistemic elements at both the micro and meso structural levels – and what we see is a strategic vision (meso level) that is cleverly supported by numerous resources, specific social arrangements and fun game tasks (micro level) to address the social, political and economical situation of a divided country (macro level). At both the micro and meso levels FFDP embraces openness in ways that respect and empowers learners. They support practices that encourage people to participate as co-producers, not only of their own learning trajectories, but of the community as whole, taking hold of their history, political rights and destiny.

Table 2. FFDP: Coherence at micro and meso levels

	SET	SOCIAL	EPISTEMIC
Macro	Brazil	A socially, politically, and economically divided country	An absence of education about politics and the mechanics of elections.
Meso	Public spaces Private spaces Facebook Instagram FFDP Website	A vision for social change that includes representations of "all voices", people from different social classes, ages, ethnicities, work experiences etc.	A political curriculum: Brazilian government structures and the three powers' system (legislative, executive and judiciary), government roles and responsibilities, and the make-up and backdrop of pre-election debates including issues of gender representation within politics. A gaming pedagogy.
Micro	Game sets Classrooms Street sidewalk Spaces of political protests Online blueprints & manuals	Groups of teachers Groups of students People passing by at a street event	Game mechanics: e.g. Who's Who?, jigsaw, basketball, hangman

Micro level

From the beginning, and at the micro level, FDDP games posed questions and invited game-players to consider issues like: What is the presidential line of succession? What role is responsible for what? Which laws current exist and should not, which ones exist and need to be known, or which are not yet part of their civil rights? The FFDP games essentially incite debates that explain mechanisms of the Brazilian political system, and this is one of their most relevant characteristics – games are designed to bring many different people together to play, discuss and learn (micro social design). Building on the ideas of the basketball set described above, other games were created, one of these explores a theme related to government roles and responsibilities (micro epistemic design) while using a jigsaw structure (micro set design) (Figure 2). The rationale being that once all the pieces had been placed, participants would be invited to reflect on the government structure, and gain insights into the different types of responsibilities of certain government roles.

Figure 2: Jigsaw game: Cargos e Cargas

Through the materials (micro set design), FFDP games bring people together, old and young, rich and poor (micro social design). FFDP games are colourful, well-crafted, and strive to incorporate the mechanics of popular games including basketball, hangman, and Guess Who. By relying on people's familiarity with the rules of these games (micro epistemic design), common ground is quickly established implicitly inviting participation as people approach a game in session. Qualities of the games such as colour, size, and familiarity (micro set design) invite people to come closer, and arranging sessions at public venues or markets broadens participation (micro social design). This coupling of social and material elements (Sørensen, 2009) works to make people feel welcomed and encourages them to have a go. The super-sized version of Guess Who is an excellent example. When people are casually walking the streets, it is difficult to miss the invitation to play (Figure 3) and Julia explains that this particular game is often used as a "calling out" at public events, or a way to attract and engage casual passers by in discussions about politics. The FFDP version of Guess Who is designed to scaffold learning through impromptu dialogue about politicians—their positions and roles in government, party alliances – with people from diverse backgrounds. In addition, the physicality of the gaming elements allows people to take ownership of different pieces, holding and feeling them whilst thinking about where to place an item or what they represent. As such, playing also involves learning through bodily actions that support the negotiation of meaning and the integration of knowledge (Clark, 2010; Kirsh 2013).

Figure 3: A super-sized version of Guess Who: Cara a Cara

FFDP organises gaming sessions in formal and informal educational settings, with sessions run on free market days and other popular public events, including those advertised via social media. They have also run sessions in public primary and secondary schools with students and teachers. Sessions with teachers may include the ideas and methodology that inspired FFDP or "behind the scenes" insight into the development of specific games. As part of these sessions, teachers become developers themselves, and they are invited to think and share new ways of playing an existing game, or to contribute ideas for the development of a new game. FDDP has plans for these new ideas to be (re)packaged and shared with all.

Meso level

Overall, the concept of "fast food" evokes the idea of something easy to consume and with the added element of fun, their name and logo were designed to appeal to Brazilian youth. But at the heart of these ideas, is something far more profound, a commitment to empowering all Brazilians to take hold of both their future and their civil rights (meso epistemic design). Ultimately these games are about understanding the mechanisms of elections, how current political structures work, and the importance of choosing political representatives very carefully. Their overarching aim is to find ways to teach people about political systems and processes through gaming, offering experiences that engage learners in critical thinking while having fun. In many respects, FFDP enacts Paulo Freire's (1996) ideals of critical pedagogy, where the freedom of all is connected to their ability to deal critically with reality, and to find ways of actively participating in the transformation of their world.

FFDP are fierce champions of inclusion and diversity and this is reflected in the attention they pay to the social organisation of their gatherings – designed to include representatives of "all voices", voices from different social classes, ages, ethnicities, and work experiences (meso social design). A cards game called Rights and Silence is another example of their preoccupation with themes of inclusion and discrimination. This game invites discussion about women's civil rights, whilst problematising issues of gender discrimination within the Brazilian historical context. Game players reflect on rights that have been formally acquired, and discover others, which might not have eventuated yet. Whether these highly visible materials are being used as "calling out" or passed around, physical game elements invite people to think and make a stand and this activity, in turn,

often attracts the attention of a broader audience, who is then invited to participate in, widening the circle of the political debate. As people engage in conversations about political systems they reflect on, learn, and share ideas with others. Main themes at the meso epistemic design include a curriculum geared at learning about: (i) structures of the Brazilian government and the three powers' system – legislative, executive and judiciary, (ii) government roles and responsibilities, (iii) the make-up and backdrop of pre-election debates, and (iv) issues of gender representation within politics.

Important principles of this network are also enacted in the digital realm – often used to bring people together via social media and providing access to open resources and platforms for sharing. As such, at the meso set design, FFDP also reaches outwards, reflecting coherence with open resources and platforms for sharing their ideals and games. FFDP capitalises on social media and crowdsourced funding to support their activities and game development, through online initiatives that invite contributors to sponsor the creation of sets, workshops in schools, and announce open events in public spaces. Their online environment is carefully designed to complement physical events, with information and resources to support those interested in "spreading the fun" and enacting their shared vision. Facebook and Instagram groups reach an audience of over 5000 followers. Online resources include free downloadable blueprints of each of the games, including detailed manuals illustrating different ways they can be played (Figure 4). Their ideas and ideals are generously shared as OERs, an act that is positioning FFDP as a leader in innovation and political social action, in the broader Brazilian educational community.

Figure 4: Guess Who (Cara a Cara): Downloadable manual with step-by-step instructions to make your own version of the game

Conclusion and future directions

This paper introduced and discussed FFDP as a case study, which is part of a larger research project that is gathering and examining the structural composition of various productive learning networks in formal and informal educational settings (Carvalho & Yeoman, forthcoming). Understanding the architecture of learning networks involves noticing how a specific assemblage of elements contributes to valuable learning outcomes, with a focus on how key designable elements influence emergent learning activity – it is about foregrounding part-whole relationships at various levels of granularity: micro, meso and macro. The ultimate goal of this educational design work is to identify key designable components for future (re)use, and in so doing, to contribute to improvements in (new) designs for networked learning. The case study of FFDP may be of particular interest for educators in the many developing countries experiencing similar issues as those described in the context of the Brazilian political arena. FFDP showcases a learning network that reflects coherence and consonance in the composition of its structural elements, mixing fun and familiarity, inclusion and openness, to

help people learn and teach deeper critical thinking of political matters, and in so doing, to empower learners to take hold of their own future.

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Exploring pre-established performed roles in a networked learning activity: a sociomaterial study case

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Abstract

This paper presents the first part of a wider sociomaterial research, which aims at exploring alternative ways to look at and analyse the learning activity in a university course, which would lead to an understanding of what learning activity emerges from a learning design, and therefore, to the improvement of the own learning design by promoting decisions for informed change and innovation. This study analyses a university undergraduate pre-service teachers course run by a professor and followed by 58 students divided into 8 workgroups. The course includes networked learning activities, where the connections between three basic structures (cooperative work, activity-based learning and pre-established work roles) are cornerstone, therefore: students perform different pre-established roles in a workgroup and develop week tasks related to the topics of the course (ICT for primary schools). The main goal of this paper is to visualise and analyse students' learning activities based on pre-determined roles through VNA and the students' perceptions on the roles, which is one of the three basic structures mentioned before, as well as its comparison with the declared learning design. As methodology for this sociomaterial research, we followed a mixed analysis approach that combines data from the learning design of the course, the documented performance of the different roles during the course (blog posts) presented in the form of networked maps through the technique of visual network analysis, and the students' questionnaire on the perceptions of those roles. As examples of the performed roles, the cases of the Analyst and the Journalist were studied from that threefold data approach, but we reflect on the general aspects of all of them. The results of these analyses show that the students' documented performance of the roles highly corresponds to the learning design, and suggest that there are some operational chains between roles -that would be confirmed by further studies-. The bias of starting from a given previous structure (the learning design and the students' documented performance) should be considered as a limitation for a sociomaterial research like this one, but a first step of a broader analysis; therefore, future studies will explore other perspectives. As conclusions, we stress that the visual network analysis may be a fruitful approach to learning design and learning activity in a more complementary way to other types of traditional analysis.

Keywords

Networked learning, sociomaterial research, learning design, students' roles, visual network analysis (VNA).

Introduction

This paper is a part of a bigger research that is exploring the reality of a university undergraduate course that has been detailed in a previous work (Castañeda, 2019). As Castañeda (2019) explains, learning design of the course is based on three structural elements: work in groups, task-based learning and developmental performing roles, each one of these elements has been specified (from the epistemic and organizational perspective) and has been characterized as crucial in the learning design. The study uses a variety of artefacts created in the learning design process by the teacher, as well as artefacts created by students along the course, and some student's data collected by the teacher during the course or in surveys. The main goal of the study presented in this paper is to visualise and analyse students' learning activities based on pre-determined roles through VNA and the students' perceptions on the roles, which is one of the three basic structures mentioned before, as well as its comparison with the declared learning design.

The broader research within this study is framed aims at looking for a better understanding of networked learning activities from a sociomaterial perspective; this perspective continues the path other authors started

before (Carvalho & Yeoman, 2019; Decuypere & Simons, 2016; Eynon & Salveson, 2018; Gourlay & Oliver, 2016, among others). For this purpose, we are exploring different approaches to the reality of a course, in order to understand diverse perspectives of the same course relationally, and trying out some techniques to analyse, also in a relational way, the information we have about the learning activity and different data collection and analysis processes, as well as to triangulate and analyse them. The main goal is to enrich the process of getting information about how the relationships among the different actants in the learning activity appear, how the learning activities happen and integrate them as information that would be useful in the following design processes, not in a deterministic way, but as a source of learning design taking-decision process' information. However, as highlighted above, in this paper, we will be focused on the comparison among the learning design proposal of a course, and the students declared vision and perception regarding the work roles performed in the course, in order to visualise and analyse students' learning activities based on those pre-determined roles through VNA.

Exploring the sociomaterial character of Networked Learning

One of the challenges of networked learning is to make the connection between situations or contexts a crucial part of the learning activity itself (Dohn, Sime, Cranmer, Ryberg, & de Laat, 2018; Goodyear, 2005) in where the elements that participate in the activity must be understood in a sociomaterial way (de Laat & Dohn, 2019; Gourlay & Oliver, 2016). Nevertheless, to explore what is happening in the entire educational process (learning design and learning activity together) and how it would be understood, changed or improved, it is mandatory to recognize learning as an emergent activity that only emerges when learners perform their activity (Carvalho & Yeoman, 2017; Goodyear & Carvalho, 2016).

Teachers – learning designers and even educationalists – like to think that this learning happened "profiled" by the learning design and seems proved that improving the learning design would impact on the learning activity. Nevertheless, improving aspects in the learning design that clearly impact the learning performing, implies understanding in a complex and relational way, how the learning activity is enacting the elements of the learning design (Yeoman & Carvalho, 2019).

Nevertheless, the learning activity setting in motion is far away of being simple of exploring and understanding; especially if the activity is conceived as a networked learning process and, moreover, is perceived as a sociomaterial process where the analysis of any of the elements in isolation is not sufficient (de Laat & Dohn, 2019; Fenwick, Edwards, & Sawchuk, 2011). Yet, it is also almost impossible to try to understand the entangled reality on its entire way (even when we do not have the possibility to access to the entire reality in a view), so the best option is trying to create a complex representation of the relationships that enact the activity from different perspectives of that reality and try to work with them (Decuypere & Simons, 2016).

For achieving an analysis like this, we considered that some archeological approaches would help us to structure and organize the exploration of the learning activity (Carvalho & Yeoman, 2019). These approaches will not only try to make evident the actants that are included in the activity, but trying to make explicit the relationship between them, and also, some operational chains that are enacted on the learning activity (Hodder, 2012); as a way for illuminating some contacts between the design and the actual activity.

In this study, we argue that Visual Network Analysis (VNA) will be used as a tool for the sociomaterial research, or what is the same, that VNA would make explicit not only people relationships, or relationships expressed by people, but to explore other relationships that would be evident from the people's discourse. As a technique to study the dynamics of networks and their components, Social Network Analysis (SNA) was explored in Wasserman & Faust (1994). SNA has been already used effectively in other studies in the field of educational technology with different kind of data; for example, to study the relationships between scientific communities based on journal citations (e.g., Marín & Zawacki-Richter, 2019) or analysing thematic trends through keywords used in publications (e.g., Bozkurt, Koseoglu & Singh, 2019). Differently to SNA, where the focus is on the structural (social) properties of networks, VNA is rather concerned with the visual characteristics of networks and allows them to be interpreted qualitatively. VNA has been explored and detailed as sociomaterial methodology in the recent work of Decuypere (2019). Therefore, VNA can support us to visualise the relationships between learning design of the course, roles and students' performance (actors) based on the text-mining analysis of students' groups and blog posts during the course.

Research Context

As mentioned above, in this study we are exploring the learning activity that happened in the context of a preservice teacher training course in a Spanish university in order to visualise and analyse students' learning activities based on pre-determined roles through VNA. As Castañeda (2019) describes, the face-to-face course, "Educational Resources and ICT for Primary School", is offered in English for students of the first year during the spring semester and on its version of the course 2018-2019 with a complete organization of 6 ECTS

(European Credit Transfer System) credits, and a student's work estimation of 150 hours. The course is run by one professor (female) along 12 weeks of duration (5 hours per week). No teacher assistants are involved in this course.

The studied course's edition was followed by 58 students, 47 women (81%) and 11 men (19%). Students were between 18 and 39 years old ($\sigma = 2.9$). Students were divided into eight different groups. Two groups consisted of five people, three groups of six people, three of seven members and just one group with nine members. Even they all started with at least six members; some students dropped out in the first two weeks.

From the designing point of view, the course is designed around three big functioning structures that shape the course environment, not only from the social but also from the epistemic point of view:

● Cooperative work
● Activity-based learning
● Pre-established work roles

These structures can help us to analyze different aspects of the learning activity and will also be used as research focuses.

Additionally, in the context of this course, and in order to document the learning process, a variety of artefacts has been collected; those artefacts have been developed during the course and reflect the course work. The majority of them has been developed by students (blogs, websites, pictures, videos, diagrams, and so on, especially related to task, as well as questionnaires for peer-reporting and a final questionnaire about their course's perception), and others have been developed by the teacher (assignment instructions, assessment instructions, among others).

Even all those artefacts are considered part of the learning activity; each one reflects better specific parts of the design structure explained by the teacher. So, the artefacts will be used to analyse the course from three different perspectives that coincide with the three main structures declared by the teacher in the learning design.

As we have previously said, in this paper, we will focus on the analysis of this course from the perspective of the performed roles developed by students during the learning activity.

Performed roles in the learning design

In the studied course, "social and metacognitive groups interaction is based on a dynamic of cooperative work that use pre-established work roles" (Castañeda, 2019: 31). The model of pre-established work roles (Scripted Roles (Dillenbourg, 2002)), aims above all, to put emphasis on the type of tasks and processes that should be implemented in the context of the subject, as well as to try to make explicit the type of competencies that are intended to be developed in each of the proposed tasks so that students know exactly what is intended of them in each case (Strijbos & Weinberger, 2010).

As mentioned before, even if students are working in this course with pre-established working roles, they are aware that, in the informal organisation of the group, roles specific to the organisation of the group will emerge (emerging roles (Strijbos and De Laat, 2010)), although we cannot foresee them, nor do we have sufficient capacity to follow them up.

The roles that have been defined for this course have the main goal of developing the student's transversal competencies defined by the university in which the course is developed, for this specific degree (Castañeda, 2019). For the definition of roles, previous proposals (such as that of De Wever et al. (2010) and Strijbos and De Laat (2010)) coming mainly from the world of Computer-Supported Collaborative Learning (CSCL), as well as the teacher's own experiences in previous courses, are taken into consideration.

Every week, students perform six roles that are designed to be developed individually (with a few exceptions, especially regarding the star figure). Roles are assigned in a discretionary manner by the team members, using the method they consider more appropriate for the assignation but with some restrictions, such as e.g. that the distribution of the roles is valid for a week, the same role can only be performed once, and members must take turns so that all of them perform each role at least once during the course. Every week, each role must upload a post in a groupwork's development portfolio documenting their work.

The six designed roles are: Analyst; Curator-Farmer; Journalist; Translator; Facilitator and Star. The correspondence of each of the roles with the transversal competences that it covers, are shown in figure 1 as they appear in the original configuration.

	Analyst	Curator-Farmer	Journalist	Translator	Facilitator	Star
Be able to express themselves correctly in the disciplinary field of Primary Education.			■			■
Be able to manage information and knowledge in the disciplinary area of Primary Education, including knowing how to use the basic tools in ICT as a user.		■				
Consider ethics and intellectual integrity as essential values of professional practice.	■				■	
Be able to project the knowledge, skills and abilities acquired to promote a society based on the values of freedom, justice, equality and pluralism.	■	■	■	■	■	■
Ability to work in a team and to relate to other people in the same or different professional fields.	■	■	■	■	■	
Developing skills of initiation to educational research in the disciplinary field of Primary Education.				■		
Understanding of the theoretical and practical foundations: scientific and didactic knowledge of school subjects, of the individual and cultural diversity of students, of the complex interaction between processes and contexts of learning, and of the principles and structures of educational systems.		■		■		
Justifying and managing interpersonal skills: relationships between teachers, students and families based on democratic values of social inclusion and respect for human rights, as basic principles of school coexistence.					■	
That students can transmit information, ideas, problems and solutions to a specialized and non specialized public						■
Students have developed those learning skills necessary to undertake further study with a high degree of autonomy	■					

Figure 1: Correspondence of performance roles with the general competences of the degree. (translated from Castañeda 2019: 33)

Study

Objective

The main goal of the part of this research presented in this paper is to get information to improve the definition of the roles developed by students, as well as to reduce the gap between the design and the actual role performance. In the same way, researchers wanted to propose new strategies that would help students to improve their performance and teachers to understand better the learning activity, using for it different strategies of data analysis and triangulation.

Data collection and analysis

The data used in this paper come from three main sources that have been analysed in different ways, and that will be triangulated in order to get conclusions about this perspective of the learning activity:

Learning Design Document

The learning design of this course has been documented, justified and explained, in a document that introduces most of the elements that have been taken into account in the course. The document includes all the theoretical references that consolidate the teacher's decisions, as well as some crucial information about resources, spaces and instructions for students (Castañeda, 2019).
The main statements included in this documentation related to every aspect of the design have been used to be compared with the actual learning activity that happens.

Blogpost Development Portfolios

All the learning activity development has been documented by students using a blog. On it, each member of the group, depending on their mission and role of each week, has to write a post following the instructions for its specific role, as well as to explain what is happening from its point of view, how, and their reflections.

This portfolio should serve not only to reflect the reflection of the groups, but should also serve as a field notebook to help them make subsequent decisions about each of the parts of that work, the processes they carry out to develop it and, of course, how it could be optimized. In addition, during the course, the importance of some of the elements of the portfolio is stressed as material for future reference; beyond the end of the course itself.

In total, we are analysing 550 blog posts, written by all the students. For the objective of this part of the study, blog posts have been divided by role, so we have six groups of approximately 70 posts each.

Blog posts per each role were analysed via the text-mining functionality and visualised through the construction of maps based on networked data with VOSviewer 1.6.11 (van Eck & Waltman, 2010). The posts related to each role were separated in different text data files and used to create co-occurrence maps, where the items (nodes) are terms used in those posts, and the links represent how often two terms appear together (distance between items). The higher the weight of an item, as connected to the number and strength of its links, the more prominent it appears in the map. Terms in the text data are identified and linked using natural language processing algorithms based on text-mining (van Eck & Waltman, 2019). These text-mining algorithms, which include the identification of noun phrases and the selection of the most relevant noun phrases, lead to a process of identification of clusters of items (van Eck & Waltman, 2010). Clusters may be seen as a topic, which in our case, should be connected to our actors and are represented with different colours. Clusters could include one or more items with strong links among them, although there are no overlappings between clusters in VOSviewer.

In order to create the different networked maps regarding the roles, the set-up of standard procedures were needed to obtain depurated maps that could aid in the identification of the relationships between the learning design of the course (tasks, contents, connections), the roles and the students' performance; for instance, the removal of terms that did not relate to the actors to be identified or the replacement of terms that were mentioned in different ways. The network visualisation is one of the three offered by VOSViewer and was selected for our co-occurrence maps, since it seemed to distinguish better the relationships among the actors in our sociomaterial analysis. That is why we will use networked maps as the term to identify the visualisations that we obtained as follows.

From clusters, we will analyse included nodes, their relationships, size and we will classify the nodes into five main categories: terms related to concept or processes (understanding that sometimes the same term refers to both), formats (for presenting information, slideshow, presentation, blog, word processor, etc.), tools (apps, software or hardware clearly identified by brand or name), spaces (physical or online), people (by its role, name or function).

Final Questionnaire

Once the course was finished, students were asked to participate in a final questionnaire anonymously, they could show their perception and satisfaction with the performance of many aspects of the course.

For this study, we are going to use the questionnaire's items about each role (Scales items from 1 -the lowest- to 10 – the highest): where learners were asked about (1) Level of difficulty in the role's performance, (2) Level of satisfaction, (3) Role's relevance in the group work and finally, (4) The relevance of what they have learnt doing this for their professional future.

Some Results

Even if the analysis has been done for all the six performed roles, and that all those analyses will be reflected in the conclusions of this paper, taking into account the space limitations of this paper, we will include only two of them as example: the Journalist and the Analyst.

Journalist

How is the role designed?

The role Journalist is defined in the course's learning design as the student in charge of writing a weekly chronicle about what has happened in the group during the week and of documenting everything that happens in the group (Johnson, Johnson, & Holubec, 1999; Mackey & Jacobson, 2011), being free to carry out his/her task in the format he/she considers more appropriate. Students are encouraged to 'tell their groups' stories' using the variety of formats provided by ICT. The post is expected to be useful as a group's field journal, allowing them to make decisions about maintaining or modifying their internal work's dynamics. Besides, the journalist has the mission of exploring sites of interests which may be interesting either for the subject development or for the teaching training of the class members. The blog must include, at least, a reference to a website by a class group and another by somebody outside the class, explaining the reasons of choice and leaving a comment in the site that is available for review.

How is the role perceived/performed by students in the learning activity?

Students perceive the journalist as the easiest role of all (5.72/10 points of the level of difficulty, σ = 2.10) with almost 2.5 points of difference with the star that is perceived as the most difficult). Also, the journalist is perceived as relevant in the group-performance (7.36/10 points, σ = 2.14) but one of the less relevant among the roles (the only role considered less relevant than this, is the curator). Despite the fact that the role is perceived as relevant for the future professional performing of the student as a teacher (7.78, σ = 1.84), it is also perceived as the second less relevant of the six roles performed.

In addition, in the journalist's networked map, the 11 found clusters seem coherent with the pre-definition of the role, there are some clusters centred in the "story", the "history" of the group, another that includes "fun" and "process". Moreover, it appears a cluster around "environment" and other around "education" that seem related to the exploration of other web sites. Remarkably, there is a cluster around "problem" that seems evidence of the inclusion of difficulties in the process and how this cluster includes words as "member", "classroom" and "image". Moreover, one of the identified clusters rounded about the role itself -journalist- and includes a remarkable node: "reflection".

The main nodes of the relationships shown on the role visualization would be classified principally as concepts or processes (25 of the 70 identified nodes, that appear 309 times), other nodes refer to specific tools (10 with 144 hits) or formats for presenting information (15 nodes, 204 hits) and 13 nodes mention spaces (virtual or physical) even if they appear on 236 references in the text. Only 7 of the nodes refer to people, even if they appear a lot (209 hits). The only other role that appears on this visualization is the facilitator, regardless, there are other actors that appear but not defined (member, kid, girl).
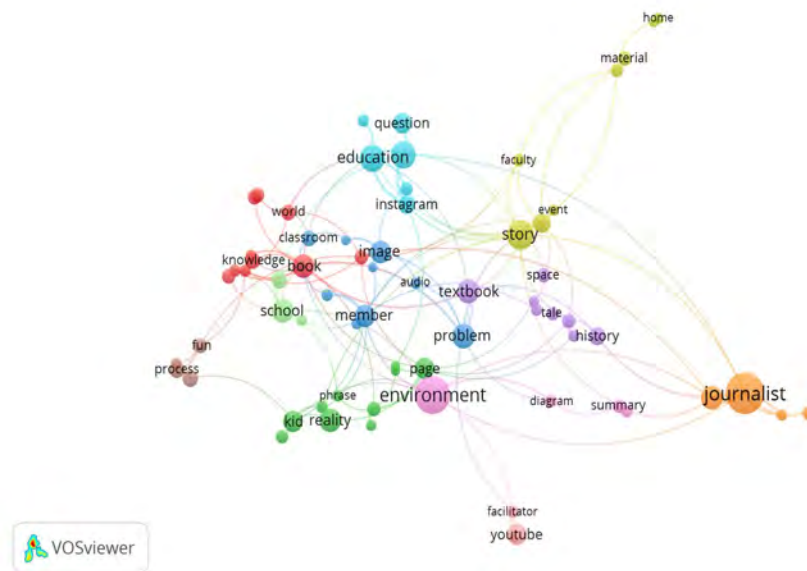

Figure 1: Journalist's Blogposts Networked Map

Analyst

How is the role designed?

The analyst is the role in charge of conducting the assignment "final reflection" and the weekly evaluation of the group members' performance. The performance evaluation is carried out following a general rubric, which enables analysts to value the contribution of each group member. At the end of each week, each analyst must include that assessment (numerical and qualitative) in an online ad-hoc questionnaire.

This role is inspired by the role of "Analyst" described in some of the works referred to in Strijbos and De Laat (2010) and it is designed as one of the most important roles of the work. Not in vain, the role is in charge of carrying out the reflection of the work, paying attention to the work carried out by all the other roles, looking at what aspects they have approached, thinking about how they have worked and agreeing with their colleagues on a reflection on what they have learnt. Ultimately, he/she is in charge of explaining and agreeing on the process of reflection and metacognition of the team.

In addition to this assignment, following the teacher's description, the analyst is responsible for making the weekly reflection of the team, which should include comments on what they have learnt both on the contents of the subject and the group work, as well as for becoming a teacher. It is the only role that includes on its design, a reminder about the importance of this role in the entire course.

How is the role perceived/performed by students in the learning activity?
Students classify the analyst as the second most difficult role of all the performed roles (7.81/10 points of the level of difficulty, σ = 2.30), as well as the second most relevant in the group-performance (9.17/10 points, σ = 1.28), but also the second most satisfactory (9.37/10 points, σ = 2.06) and the second most applicable in the future teaching professional performing (8.83, σ = 1.55), just below the star.

9 clusters were identified in the network map process. 5 of them focus on the development of the task itself and that makes relationships on instrumental resources and concepts; those clusters are identified around nodes as "video" (surrounded by other instrumental resources and concepts as dropbox, google drive, reflection or communication), "picture", "photo", "app" and "result". The other 4 clusters are related to aspects that focus on the learning reflection: "classroom" (surrounded by other nodes related to the teaching itself as book, fun, learning, methodology, question, among others), "future" (where they connected other nodes as world, change, society, mind or life), "technology" and "education".

Almost half of the 55 nodes showed on the network map would be classified principally as concepts or processes (26 nodes, 446 hits), followed by those nodes related to formats (14 with 211 hits), tools (7 nodes, that appear 98 times), other nodes refer to people or spaces (4 nodes each), even when nodes about people appear 39 times in the posts, and the nodes about spaces 67.

As in other roles, the only other role that appears on this visualization is the star and, for the first time, "children" does not appear as a node, only as "kid", but there is also a node for "pupil".
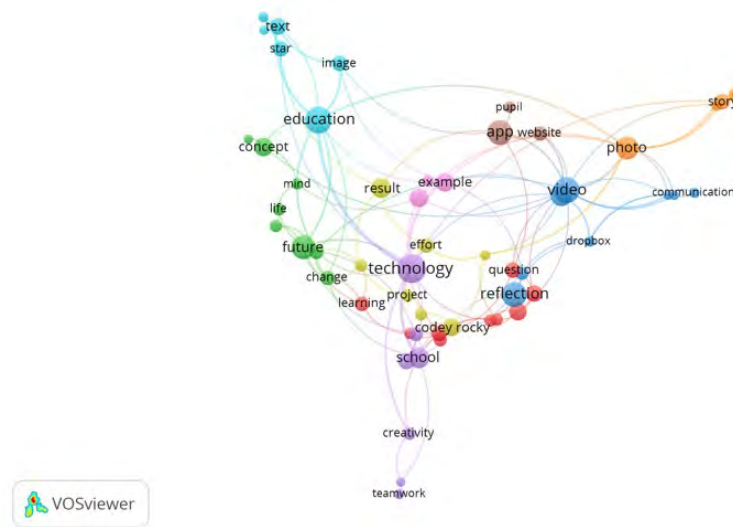

Figure 2: Analyst's Blogposts Networked Map

Limitations

First of all, this analysis suffers from an evident bias: the reality is being analysed starting from a given previous structure, which would be incoherent with the pretending sociomaterial vision; nevertheless, the objective of the research itself (being useful to following designs) would, at least partially, justify this.

Also, it is crucial to remark that we are contrasting the learning design not with the performance itself, but with the declared performance and the perception about the task from students, how they interpret it, and how they want to show their performance to the teacher. Not in vain, this is an assessed assignment. So, as we have previously said, this is just one partial perspective of the learning activity performance.

Conclusions

Being our main goal in this study to visualise and analyse students' learning activities based on pre-determined roles through VNA and the students' perceptions on the roles, we can affirm that the sociomaterial nature of the emergent activity around the roles seems clear in the networked maps, even if the possibility to entirely analyse and understand the sociomaterial nature of the learning activity would not be possible until the entire research within this study is framed will be done. Although we have included in this work only two of the analysis already done, concepts (or process), tools, formats, spaces and people appear on almost every networked map as nodes of relationship, and their relationship in the clusters do not suggest any differentiation among them (e.g., specialized clusters for technologies, people, or so) in the task performance. Nevertheless, some roles

accumulate more nodes related to some categories, for example, facilitator and curator that accumulate more nodes related to tools and information formats, or analyst, journalist, star and translator that accumulate more nodes related to concepts and processes. Therefore, we can affirm that the use of networked maps has helped us to visualize the processes and elements related to each role clearly and to check its coherence with learning design.

The majority of roles' declared performance included the main features described by the teacher in the design, so it suggests that the definition of the roles is very well explained and understood by students. Despite this, this coherence between the declared student's work and the learning design, also implies the bias of the collecting data sources, not in vain we have analysed the declared work, and it is, in fact, directed to achieve the best evaluation from the teacher.

The role Star is perceived as the most important of all and also appears as node in three of the other roles' networked maps. The Translator and the Facilitator are connected to other role's performance. The Analyst, Curator and Journalist are not explicitly included as nodes of relationship in the declared performance of students. Even if those data do not make explicit the perceived relevance, they show us the relationship between roles that are explicitly perceived by students, and at the same time, suggests the importance of making more evident the relationships between them in order to enrich the cohesion between roles. The Translator, Journalist and Facilitator's networked maps show specific clusters dedicated to the explanation of the role's performance, some of them in a very explicit way (journalist and translator have specific nodes with their role's names). Even if those roles are not those that are declared as "more difficult", it seems that their task is more undefined or needs more explanation, at least when they are declaring the performed job.

This is just one part of a necessarily wider exploration of the learning activity that is still being done. There are other perspectives to explore. In this first level of exploration, we will explore at least two more perspectives related to the other big tasks that structure the course work: the week learning activities as well as the workgroup performance. On the other hand, we understand that the use of networked maps can reveal itself as a good way of finding new elements and visualizing expected and unexpected relationships, although in this specific study, it has not been like that. We consider it as one more complementary technique, and we are sure that more works in this line, and our future work with the two complementary perspectives of this work (groups and weeks) will give us more light on the usefulness of the technique for the proposed objectives and for other possible sociomaterial research, this may also be a development to be offered to learning designers in order to help them refine their design in future courses. Once these other two analyses are ready, their integration would be key to understand how the whole activity is performed, as well as how every structural task is related to one another and, if there, they would establish hierarchical relationships in operational chains.

Finally, we want to venture that the analyses of the other structures, as well as diverse visualisations, in comparison with the declared learning design may offer new perspectives of the sociomaterial analysis of the course. Nevertheless, the next steps of the research need still to be carried out and other studies would be necessary to have more firm evidences of that.

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Acknowledgements

The acceptance of a wiki site as a learning platform in English exam training: students' perceptions

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Abstract

The development of computer mediated technologies facilitated the paradigm shift in the culture of working and learning. Due to these changes, language education is also going through the development beyond the communicative approach to more complex and dynamic action-oriented approaches. There arises a necessity to explore how language teaching and learning, which are guided by new strategies, can be mediated through technology. This research proposes the deployment of a wiki site as a "learning platform" the design of which is underpinned by the principles of networked learning (NL). A wiki-site created by the teacher will be deployed as a platform for language learning and exam training. The study explores students' perceptions of accepting a wiki site as a learning platform for IELTS (International English language testing System). The previous research has pointed to the fact that wiki as an educational technology has not been used for improving IELTS training so far. So, before large-scale implementing of it on a regular basis at the formal university level, it is necessary to explore whether students accept or reject this information technology as an educational tool. Taking a pragmatic view of NL approach allows the authors to start with exploring the needs of learners involved in NL environments so that a teacher could co- construct the knowledge about the design together with the learners. Technology acceptance model was used to gather the data via an on-line survey. The participants are undergraduates from different faculties who voluntarily and anonymously took part in the research. The survey included the questions about the main TAM constructs: perceived ease of use, perceived usefulness, attitudes, intentions and expectations. The research reports a high level of agreement on easiness and usefulness of wiki sites, with the latter sub-construct having a higher rate of agreement among the respondents. Overall, students are reported to have high expectations of a wiki technology used for practising exam skills. However, there is evidence of some less positive outlook in terms of students' prior experience of wiki in their studies. Despite some limitations, the paper reveals favorable students' perceptions and proposes implications for further wiki deployment.

Key words:

students' perceptions, TAM, a wiki site, English learning, networked collaborative e-learning, IELTS

Introduction

The development of computer mediated technologies facilitated the paradigm shift in the culture of communicating, working, and learning (Harasim 2000; Jones 2015). Due to these profound changes in the way how information is processed and disseminated, language education is also going through the development beyond the communicative approach to more complex and dynamic action-oriented approaches based on the ideas of mediation across cultures, worlds and media (Piccardo et al. 2019). There arises a necessity to explore how language teaching and learning, which are guided by new strategies, can be mediated through technology. This research proposes the deployment of a wiki site as a "learning platform" (Passey 2011) the design of which is underpinned by the principles of networked learning. The effectiveness of using wiki tools for learning languages as a second one (L2) is well documented in the literature (Li 2012). Wiki sites create learning communities where collaborative goal-oriented practices can take place (Henderson et al. 2015). There is the necessity to research how exactly a wiki site is perceived by learners as a possible educational platform in their exam training.

The research aim

In 2015, the conception of developing students' foreign communicative competence was adopted in the National Research University Higher School of Economics (HSE, Russia). According to the new strategy, the students of 1st and 2nd courses of all faculties are expected to pass an examination in IELTS format (International English Language Testing System) at the end of each course. The formal training is arranged using conventional face-to face weekly meetings (only two hours per week) and a learning management system (LMS). The system offers obvious advantages and benefits, but it is unwillingly accepted by teachers and learners (Liashenko 2017), so an "appealing approach" can be a "hybrid course site" that would be linked to the formal context but will be openly accessible (Godwin-Jones 2016 p 347). With an advent of social media there arises the necessity to switch to more shared and "dynamic learning platforms" to integrate traditional approaches with collaborative Web 2.0 media (Stern 2011). Wiki technology is viewed as a transition zone between the university with its formal approach and life-worlds of students (Bergold 2012). The choice of a wiki technology is in line with a networked learning (NL) perspective which "questions how new knowledge is developed, emphasizing collaboration and sharing as both a pedagogical and social goal" (Jones 2015, p. 25). In the proposed research learning is placed into a NL collaborative environment mediated via a wiki technology. The questions of better understanding thinking, and intentions of learners involved in NL activities are within NL scope (Goodyear et al. 2001). The previous research has pointed to the fact that wiki as an educational technology has not been used for improving IELTS training so far. So, before large-scale implementing of it on a regular basis at the formal university level, it is necessary to explore whether students accept or reject this information technology as an educational tool. Being an underpinning theory of the research, NL provides the rationale for exploring students' intentions and their interest in deployment of a wiki site for extra training in an informal context. The research question is whether the learners are ready and willing to access wiki as an educational and learning platform to construct new knowledge.

Theoretical framework underpinning the project design

NL is a theoretical framework to view the teaching practices based on social interaction and connections between the participants and the resources (Goodyear et al. 2001). The nature of learning happening in a social collaborative space such as a wiki site can be defined as a networked collaborative e-learning space which is based on well-articulated values and beliefs that underpin this study (McConnell 2006; Hodgson et al., 2012). Collaboration and dialogue in the learning process takes place in communities or groups, the central place of which is based on differences and connections formed by weak and strong ties. These implicit relationships are expressed in different modes of participation, changing role of students and teachers, mediating functions of the technology. Such type of learning involves a community which is intentionally designed as an educational space following the principles of knowledge building that is aimed at an intentional goal-oriented interaction between participants of the learning process (Bonamy & Haugluslaine-Charlier 1995; McConnell 2002). The pedagogical design of a wiki site is underpinned by key principles of networked collaborative e-learning (McConnell 2002). The strategy will involve numerous mediation activities (text, concepts, communication) embedded into the primary context of the curriculum and online interaction mediated with a wiki site.

Research site and context

The participants are 2nd year students in HSE from various faculties (Management, Economics, IT) who demonstrate a good command of the English language (intermediate and upper-intermediate levels). They are invited to join the community on a voluntarily basis. The rationale for joining and the potential learning benefits along with the design of the learning community will be explained in advance and one week will be given as a trial period to decide on joining or not. The research consists of several stages including the following steps: preparation, development, deployment, data collection and analysis. At the preparatory stage, the students were asked to answer closed questions via an online survey using SurveyMonkey tool (https://ru.surveymonkey.com/home/) to determine students' needs and expectations from the project. The rationale for conducting the survey is to make students' intentions and perceptions of using a wiki site as a learning platform be explicit (Kooper 2005). The paper describes the preparatory phase of the research which is prior to a wiki deployment

Data gathering

The purpose of this stage of the research was to collect quantitative information about the extent to which students accept a wiki site as an educational tool using the constructs of TAM: perceived ease of use (PEU), perceived usefulness (PU), attitudes and intention" (Davis et al 1989). TAM was applied because it "focuses more on the importance of a technology as a tool" (Passey, 2010, p. 7).

The data for this phase was collected from three groups of undergraduate students (number= 32) preparing for IELTS.. To determine students' perceptions about the acceptance of a wiki site for the exam preparation, the respondents were asked to answer 7 questions using Likert scale form "strongly agree" to "strongly disagree". The questions were

structured as TAM sub-constructs. The participation in the survey was voluntary and anonymous. A total of 32 responses were returned.

Question number	Statement	strongly disagree	moderately disagree	neutral	somewhat agree	strongly agree
3	wiki is easy to use	0.00%	3.13%	25%	53.13%	18.75%
4	Easy access to wiki	0.00%	12.50%	3.13%	50%	34.38%

Table 1. Perceived ease of use

Most respondents moderately or strongly agreed with the statements. There were no responses showing strong disagreement. Considering the percentages, the most agreed-upon response is the statement "wiki is easy to access". The construct PU was analyzed using the question related to studies in general/

Question number	Statement	strongly disagree	moderately disagree	neutral	somewhat agree	strongly agree
5	Using wiki is useful for studies	0.00%	6.25%	0.00%	37.50%	56.25%

Table 2. Perceived usefulness

Most respondents (number=27) agreed with statements about usefulness of wiki sites for studies in general. However, 6.25% of respondents disagreed moderately with acceptance of wikis for studies.

Table 3 illustrates the data about responses towards construct attitude (6) and intention (7) in TAM model

Question number	Statement	strongly disagree	moderately disagree	neutral	somewhat agree	strongly agree
6	It is a good idea to use wiki sites for exam preparation	0.00%	0.00%	3.13%	53.13%	43.75%
7	I am going to use this site for IELTS	0.00%	3.13%	6.25%	59.38%	31.25%

Table 3. Attitudes towards using wiki for English learning and intentions

The question about students' expectations regarding a wiki learning platform for IELTS training shows their needs and priorities which match the overall aim of the course, i.e. to improve or train skills and have more practice.

Findings

The overwhelming majority of the respondents (number=31) show a positive attitude towards the idea of wiki deployment for studying English, with 29 respondents expressing their readiness and high degree of intention to use it for IELTS preparation.

Findings of the data analysis illustrate that a wiki site as an educational tool proves to be easy to accept from students' perspectives. They do not expect any difficulties to access wiki sites. However, a minor percentage of the respondents disagreed with the idea of usefulness of the technology for studies. This statement can be categorized as the item for deeper research at the qualitative stage in future. As for usefulness of wiki for studying English in particular, the data present the highest percentage of agreement. Overall, students rated both constructs high, with large percentage of agreement about usefulness and ease to use, with the sub-construct PU being more influential in decision-making than PE. In other words, the students showed a higher rate of agreement concerning usefulness of the technology for studies (statement 5) in comparison with the ease of usage (statement 3), with 94% and 72% correspondingly. The attitude and intention to use the technology in future exam preparation is high with 91% of agreement among the respondents (statement 7). However, answering the question about the usage of wikis for studies 62.5 % of the respondents answered in the negative: 20 students out of 32 have never used this technology for studies. This percentage gives much food for thought before deployment of a wiki into a real teaching process. The findings correspond with the research in this field proving that deployment of wiki technology in higher education is an effective teaching strategy but it requires "design knowledge" and much scaffolding (Manzini 2006).

Conclusion

The use of a wiki site as an educational tool in exam preparation has not been widely researched yet. The study was aimed at exploring the acceptance of this technology among students with the idea of its future deployment into teaching English in the university context. The quantitative survey has helped collect and analyse the data on the main constructs of TAM. The results and the findings should be treated with some caution as the number of respondents and a limited number of questions do not provide a solid ground to generalize for larger population. Although there were certain limitations for this small-scale study, it has resulted in some interesting findings that can inform technology enhanced teaching in future exam preparatory courses. The research tried to fill in the gaps in the existing literature concerning the usage of wiki for IELTS training. It is reported to validate quantitatively a high level of agreement among students on usefulness and easiness of this technology for their English learning studies. The data revealed a high level of students' rating for PU and PE of the tool. As for theoretical contribution to NL theory, this research can be an attempt to inform NL design using a pragmatic approach via TAM model. This approach is associated with the idea of learning through experience which points to the problems that can be resolved by inquiry (Jones 2015). Such a pragmatic view of NL research allows to start with exploring the needs of learners involved in NL environments so that a tutor/ teacher/ course designer could co- construct the knowledge about the design together with the learners.

Overall, wiki sites should become a part of academic life and be implemented for different teaching and learning purposes. The small-scale project has been conducted to explore students' perceptions of wiki's acceptance as an educational tool. The findings highlight favourable perspectives for further deployment of a wiki technology into academic environment.

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Building digital literacy through exploration and curation of emerging technologies: A networked learning collaborative.

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Abstract

People readily consume an ever-growing range of emerging technologies while largely unaware of their lack of control over the impact that such networking, devices, data, and processes have on their lives. Since college-educated people are huge consumers of digital products and are expected to participate in networked learning, it is critical to foster student development of an expanded understanding of digital literacy. To address this challenge, we have created instructional materials for instructor and student use of the internationally known repository, "Fabric" of Digital Life (https://fabricofdigitallife.com/).

This research comes as the result of collaboration between the University of Minnesota's Emerging Technology Research Collaboratory (ETRC, https://etrc.umn.edu/), a research group for investigating emerging technologies, and Fabric of Digital Life (https://fabricofdigitallife.com/) and its affiliated Decimal Research Lab at Ontario Tech University. Together, functioning as a collaborative in support of networked learning, we invite and facilitate research on building student digital literacy through examination, contribution, and/or curation of collections regarding emerging technologies. From Spring 2019 to the present, 13 instructors and associated students across nine institutions have developed and are using a set of instructional materials for student exploration and/or curation of collections in this repository.

This paper documents initial instructor discussion and study of student development of digital literacy as a result of use and/or curation of Fabric collections on emerging technologies and the discourses surrounding them. We are beginning to study the abilities that students draw upon when exploring the collections and when determining which artifacts might be included in current collections as well as new collections that might be developed. Collaborative interaction with the editorial team at Ontario Tech University not only enhanced the repository content and development of instructional resources, it also further evolved the metadata for Fabric for external users and the public. At its core, this research examines the potential development of digital literacy through the act of exploring and curating collections on emerging technologies. Critical to this core is the networked learning collaborative in place to foster and support this work.

Keywords

Digital literacy; Emerging technologies; Curation; Networked learning.

Introduction

Emerging technologies have been broadly and rapidly embraced due to their promise of increased efficiency and the allure of personalized data. In higher education, "smart writers" assist with academic writing; artificial-intelligence (AI) chatbots tutor students; analytics predict student performance; and augmented and virtual reality devices amplify performance and extend intelligence. Massive amounts of data are collected, mined, and used to alter human behavior. In higher education and the public sphere, information about technologies is often proprietary and withheld from citizens or is too complex for people to understand. In terms of AI, ethicists have been calling for AI systems to meet high standards for both "transparency and explainability" (Winfield, Michael, Pitt, & Evers, 2019). Floridi and Cowls (2019) note that society is dealing with "the need to understand and hold to account the decision-making processes of AI." Simultaneously, many of the claims made surrounding technologies in higher education are heavily hyped, which obscures the ability to be critical about them and their affordances (Gourlay & Oliver, 2018).

Since college-educated people are huge consumers of digital products, which affect their own digital lives (Pedersen & Aspevig 2018), it is critical to foster student development of an expanded understanding of digital literacy. To date, efforts in higher education have focused largely on information literacy training and how it influences subsequent occupational life. A study of 727 college graduates found that students "were given minimal guidance around the laws, rights and responsibilities, and security for using technology and media (58.1%)" (*Digital Literacy Impact Study,* 2017, pp. 6-7). In the realm of technical communication, moreover, work has revolved mainly around the use of computers for composing and producing meaning (Breuch, 2002; Hovde & Renguette, 2017; Selber, 2004).

To foster student development of an expanded understanding of digital literacy, we constituted a networked learning collaborative as a means for multiple scholars to develop instructional units that range from student use of the collections as a springboard for communication of their digital literacy experiences to more extensive involvement in collecting artifacts and proposing metadata for curation of new collections related to augmented reality, virtual reality, wearables, implantables, and embeddables. As this is an exploratory study, our collective goal is increased understanding of student digital literacy development as a result of student exploration and/or development of curated collections on immersive technologies.

Networked learning collaborative

This research comes as the result of a networked learning collaborative between the University of Minnesota's Emerging Technology Research Collaboratory (ETRC, https://etrc.umn.edu/), a research group for investigating emerging technologies, and the internationally known repository, *Fabric of Digital Life "Fabric"* (https://fabricofdigitallife.com/) and its affiliated Decimal Research Lab at Ontario Tech University (Iliadis & Pedersen, 2018).

Networked Learning Conference attendees are well aware of the often-used definition of networked learning by Goodyear, Banks, Hodgson, and McConnell (2004) who define it as "...learning in which information and communications technology (ICT) is used to promote connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources" (p. 1). Throughout this project, we use ICT to foster scholar connections in which we construct community and learning resources in support of building digital literacy. Students use ICT for interactions concerning Fabric and connections between learners and tutors as well as between learners. For Jones (2015), such connections and relationships are central to what constitutes networked learning. Similarly, Hodgson, McConnell, and Dirckinck-Holmfeld (2012) view networked learning as co-created, and the experiences and perspectives of others are needed for learning, and in this case, for expanded understanding of digital literacy to take place. ETRC members and Fabric leadership develop and maintain connections with people and information, communicating regularly (via Zoom) in support of this research (Dircknick-Holmfeld, Jones, & Lindström, 2009).

Defining digital literacy

Based on this collaborative's extensive review of documents related to digital technologies and literacy, we note that Stordy (2013) articulates digital literacy as "The abilities a person or social group draws upon when interacting with digital technologies to derive or produce meaning, and the social, learning and work-related

practices that these abilities are applied to" (p.472). A further expanded definition of being digitally literate "implies making ethically informed choices and decisions about digital behaviour... digital safety, digital rights, digital property, digital identity and digital privacy" (Traxler, 2018, p.4). Noting the challenge of "navigating varied definitions for digital literacy" (p.91), after reviewing iterations of digital literacy definitions from the mid-1990s onward, Ferrar (2019) shares Virginia Tech University's use of the Joint Information Systems Committee (JISC) Digital Capability Framework (2020) developed in the UK as particularly influential to the institution's understanding of digital literacy. Through an extensive review of articles, reports, frameworks, specifications, and standards as well as interviews, JISC leadership identified key issues in framing how to expand digital know-how, defining digital literacies as "the capabilities which fit someone for living, learning and working in a digital society." In this framework, digital literacy capabilities include the following: ICT proficiency; data and media literacies; digital creation, problem solving and innovation; digital communication, collaboration and participation; digital learning and development; and digital identity and wellbeing.

When networked learning collaborative members studied and discussed these elements of digital literacy in terms of student use of the Fabric archive, statements from this JISC framework that were noted as most relevant (documented in meeting notes) include the following:

- ICT Proficiency: "The capacity to stay up to date with ICT as it evolves…[and] an understanding of how digital technology is changing practices at work, at home, in social and in public life;"
- Information, data and media literacies: "The capacity to find, evaluate, manage, curate, organise and share digital information...to collate, manage, access and use digital data in spreadsheets...and to curate, re-edit and repurpose media, giving due recognition to originators;"
- Digital creation, problem solving and innovation: "The capacity to design and/or create new digital artefacts and materials...to use digital evidence to solve problems and answer questions; collect and collate new evidence; evaluate the quality and value of evidence; and to share evidence and findings using digital methods;"
- Digital communication, collaboration and partnership: "The capacity to participate in digital teams and working groups; an understanding of the features of different digital tools for collaboration; and an understanding of how digital media and networks influence social behavior;"
- Digital learning and development: "The capacity to identify and use digital learning resources [and] participate in learning dialogues;" and
- Digital identity and wellbeing: "to manage digital reputation (personal and organisational) across a range of platforms [and] act safely and responsibly in digital environments."

The largest amount of discussion to date has focused on the development of guided prompts for use across deployments in studying student development of digital literacy. One member shared how he connected the JISC elements to possible guided prompts for students:

> I used these prompts to focus rather directly on [my] class's integration of the Fabric project into our study of modern theories of rhetoric. These may need to be de-coupled from the course learning objectives for broader use, but I wanted to provide this localized approach as a generative starting point. As I have considered Gee's (2017) approach to literacy as uses of secondary language, I wonder if our participation in the Fabric of Digital Life as a digital archive represents the context of our language uses. While a 'primary language use' of the archive might be curation, one secondary language use may be applied rhetoric; digital literacy in this space represents recognition and understanding of the rhetorical dimensions of building and managing digital archives. Other secondary language uses certainly exist, including content (understanding the artifacts themselves), cultural studies (recognizing the social-cultural moment from which these artifacts emerge), or applied technology (recognizing the technical challenges of building a digital archive).
> 1. To what extent has your contribution to the Fabric of Digital Life influenced your understanding of rhetorical agency? [relates to JISC capability: Digital creation, problem solving and innovation]
> 2. How has your work around the Fabric of Digital Life contributed to your understanding of digital archives? [relates to JISC capability: Digital learning and development]
> 3. What has the Fabric of Digital Life demonstrated about the role of curators in a digital collection? [relates to JISC capability: Digital identity and wellbeing]

However, according to Gourlay and Oliver (2016), such use of JISC and other frameworks that seek to define digital literacy "based on capabilities or features of learners" may lose sight "of important aspects of student engagement with technologies" (p.78). Gourlay and Oliver prefer the European Union's DigEuLit project definition provided by Martin and Grudziecki (2006):

Digital Literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process. (p.255)

In addition, similar to Hamilton (2012), we recognize that these many definitions and their associated narratives "help to organize and control this diverse and changing landscape" (p.3). As a networked learning collaborative, we too have difficulty defining digital literacy and studying the impact of Fabric use on building student digital literacy. However, as our students explore and/or curate Fabric collections, they clearly "identify, access, manage, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others" (Martin & Grudziecki, 2006, p.255). As scholars and instructors, we situate this work as a means to build digital literacy.

Overview of deployments to date

During Spring 2019, three University of Minnesota ETRC members used Fabric collections in their design of instruction for expanding student understanding of emerging technologies as related to technical and international communication. Instructional units ranged from student use of the collections as a springboard for dialogue of their digital literacy experiences to more extensive involvement in collecting artifacts and proposing metadata for curation of new collections related to augmented reality, virtual reality, wearables, implantables, and embeddables. In collaboration with Ontario Tech University colleagues (Isabel Pedersen, Sharon Caldwell), we used the customized, open access CollectiveAccess software, Fabric's public web interface to identify, collect, archive, catalogue, revise and analyze the discourses (i.e., articles, images, audios, videos, other artifacts and events) surrounding emerging technologies to assist in student exploration and/or curation of the collections.

Fabric's scope of representations also seeks to situate emergent, embodied, personal technologies within broader digital cultural discourses. One goal is to reject purely technical description of inventions made available through engineering or computer science channels. The aim is to contextualize technological emergence within both traditional and non-traditional cultural spheres such as journalism, broadcast news, marketing outlets, tradeshow videos, academic research venues and social media outlets, to reveal how digital technology is evolving. Within its 'timeline,' it enables examination for past and future-proposed technologies. Through its extensive metadata categories, Fabric recognizes and reveals ideologies, value-systems, and fictional narratives that drive technological innovation for both better or worse. In line with Gourlay and Oliver's (2018) goal to achieve a "sociomaterial understanding" of the "embodied practices" that students engage with in the digital university to counterbalance assumptions and tech hype, members of this networked learning collaborative asked students to critically engage discourses through Fabric's content and metadata categories. To reiterate, this study works to foster digital literacy through the acts of examining, contributing and curating collections on emerging socio-technical artifacts.

An outcome of the Spring 2019 work was the development of instructional materials for potential use across multiple disciplines as means to build digital literacy through exploration and/or curation of collections on emerging technologies; see https://sites.google.com/umn.edu/buildingdigitalliteracy/home. Development included metadata spreadsheets, instructional videos, and guides to break down steps for students and instructors. We met weekly throughout the term, developing and pilot testing instructional materials to guide students in learning a common language of classification to ground their understanding of technical emergence. Another outcome was a keyword schema that helps students to standardize the constantly evolving language used to describe emerging technology. Finally, this feedback informed the development of a contributor's web interface to facilitate contributions for the future phases of the study.

This use of the Fabric archive took place in both upper level technical and professional writing and advanced/graduate level Writing Studies courses as part of short (one week) to longer (4 week) assignments. Students developed and published six Fabric collections at the site: Emerging Technologies for Technical Communication; Wearables and Carryables for Everyday Communication; What Language Sounds Like: Wearable Devices in Translation Communication; Cultural Reality--A VR Experience; AR from Conception to Reality; and Implanted and Embedded Medical Devices. Two screenshots of the first collection are shown in Figure 1.

FABRIC About Browse Analytics Contact Decimal

24 Object Results ⚙ Filter results

COLLECTION: EMERGING TECHNOLOGIES FOR TECHNICAL COMMUNICATION ... ⊗

Emerging Technologies for Technical Communication (2019)

Curator: Jason Tham, University of Minnesota, USA | January–April 2019

Archivist Team: Khadir Albert, Bennett Christenson, Becca Waletzko, Brianna Cochlin, Sydney Rottman, Kelly Wolfe, Mariah Mullen, Adam Scow, Kevin Tchalla, Guangwei Wu, Taylor Huntley, Baylee Bessingpas, Sean McNally, Sarah Cohen, Irma Frlj, Nicole Gocker, Haley Sventek, Zachary Thomas, Timothy Kutyla, Matthew Stellpflug, Amir Coffey, JaeHeui Kim, Eleanor Stenglein, and Kendra Vigdal

Collection editor: Isabel Pedersen
Acquisitions Editor: Ann Hill Duin
Senior archivist: Sharon Caldwell

INTRODUCTION
Technical communication is continually shaped by the advancing technologies that facilitate its process, practice, and professionalization. As the Society for Technical Communication puts it, technical communication mainly constitutes the act of "communicating by using technology" ("Defining," 2019). In "What is Technical about Technical Writing," David Dobrin (2004) highlights that "technical writing [and communication] is writing that accommodates technology to the user" (p. 118). Clearly, technical communicators must pay attention to the changing nature of communication and information technology in order to employ/deploy technology appropriately for various purposes. In a world evolving towards futuristic technology, how might technical communication continue to advance alongside new affordances and limitations? How will innovations affect technical communication: will it provoke growth, regression, new ideas?

As part of the WRIT 3562W Technical and Professional Writing course led by instructor Jason Tham at the University of Minnesota, 24 undergraduate students have located emerging technologies across multiple industries with the attempt to envision how these technologies will shape the future of technical communication. As archivists, these students gathered multiple artifacts in response to the questions above. This collection seeks to explore the emergence of breakthroughs in the technological field that help to facilitate technical communication.

ABOUT THE COLLECTION
This team-based collection explores the growth and development of emerging technologies in the field of technical communication. Contributors are students enrolled in the course WRIT 3562W Technical and Professional Writing (Fall 2019) facilitated by instructor Jason Tham at the University of Minnesota.

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China's CRISPR twins might have had their brains inadvertently enhanced

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Burgers grown in a lab are heading to your plate. Will you bite?

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Facebook scandal: Who is selling your personal data?

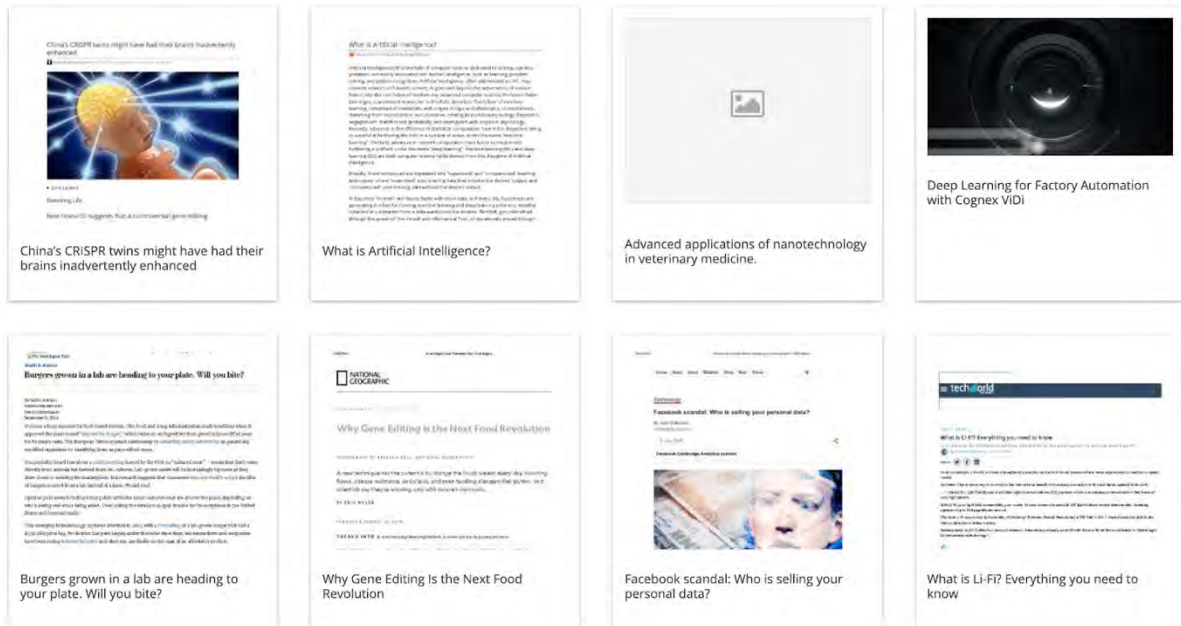What is Li-Fi? Everything you need to know

Figure 1: Two screenshots from the Fabric collection, Emerging Technologies for Technical Communication, developed in Spring 2019 by undergraduate students at the University of Minnesota.

With funding from the Council for Programs in Technical and Scientific Communication (CPTSC) and in collaboration with Jason Tham from Texas Tech University, we invited CPTSC and Association of Teachers of Technical Writing (ATTW) instructors to join this networked learning collaborative, with the proposed outcome being increased understanding of student development of digital literacy as a result of exploring, contributing, and/or curating collections of artifacts on emerging technologies.

During Fall 2019, eight instructors at five U.S. institutions took part in this networked learning collaborative, meeting bi-weekly to share updates, provide advice and receive direction on Fabric use and the curation process, and refine collective understanding of digital literacy. Each assignment or project in a writing or technical communication course has been equivalent to a mini-case study on student development of digital literacy as a result of exploring and/or curating collections on emerging technologies. On the editorial side at Fabric, the contributor's interface meant the team could see all submissions and work collaboratively during the publication process. Each item submitted was checked against the metadata scheme for consistency; sometimes items were edited and revised by Fabric archivists in consultation with ETRC members.

Instructor reports and meeting notes indicate that students across undergraduate and graduate levels benefit from use and/or curation of collections on immersive technologies as a means to build digital literacy. Students benefit from the information architecture of Fabric, understanding metadata and accessing information, the metaphor of libraries and seeing the website as a collection with artifacts that are navigated and how suitable items are identified, submitted, and accessed.

Across all deployments Fall 2019, students were surveyed using these questions developed by the networked learning collaborative:
- To what extent is your work with the Fabric of Digital Life influencing your understanding of digital literacy?
- What are the most challenging aspects of this assignment? Why? How did you overcome them?
- Were there any mental models, metaphors, or other experiences you've had that you used as a way to understand Fabric as you worked with it? If so, can you say a little about them?

Based on initial analysis of survey results, we have learned that students explicitly engage prior knowledge (mental models) and metaphors in learning this new tool, thus informing our developing framework for building digital literacy.

Based also on initial thematic analysis of meeting notes, members of this networked learning collaborative have articulated a digital archive as applied posthuman rhetoric, where agency emerges from the interplay of multiple actors including curators, collectors, users, digital artifacts, editors, archive infrastructure, other software applications, and constraints of curatorial tools. Members have explored the relationship between archives and rhetoric; what collecting and curating an archive means as a rhetorical activity; and which of these metadata options best assist student understanding and agency. Members have articulated "productive ambiguity" in the deployment process, noting how it shapes student journeys in learning and fosters digital literacy.

Conclusion

This networked learning collaborative has generated a number of skills in relation to the creation of curations to encourage a more sophisticated recognition of time (e.g., how digital phenomena progress, evolve, or disrupt a domain) as an asset for digital literacy. As a repository, Fabric offers a method to chart past and present inventions, digital practices, and implications. Simultaneously, Fabric provides a method to chart future emergence implied in relevant discourses. For instance, new technical innovations pass from instantiation in very early phase research papers given at academic conferences, to pre-release videos that represent (and celebrate) the same but more advanced version of a technology years later, to advertising campaigns that finally launch an emergent product. Miller (1994) defines the phenomenon of Kairos, or 'technological forecasting'" as a unique discourse "in which the characterization and construction of moments in the present are crucial to the projection of the future" (p.82). Fabric provides teams a means to analyze through forecasting and the dynamically unfolding conditions which allow for digital emergence. With its *timeline* feature, multiple ways to display metadata, and the analytics page, Fabric provides instructors and students novel ways to view digital artifacts and their temporal contexts. Many of the curations contextualized technologies as future projections, using the metadata to classify relevant emergent innovations, such as artificial Intelligence or neurotechnologies.

In terms of networked learning, de Laat and Ryberg, in their introduction to the 2018 NLC collection (Dohn et al.), write that "we might be experiencing a growing interest in forms of learning that are social in a different way than suggested by collaborative learning, communities, or communities of practice" and that

> the next 'wave' in educational technology and networked learning research might involve a growing interest in the importance of being networked in the sense of personal, social networks in a global learning landscape, where the core is not necessarily learning communities and group learning, but rather a greater attention to the degrees of freedom and choice that social networks and learning relationships provide – as well as the challenges of such personalised, social networks to central networked learning values such as community and collaboration (p.18).

Interestingly, students involved in exploring and/or curating Fabric collections to date also have explored social networks and learning relationships, in one case, proposing a collection on specific social media platforms.

As phase three of this work now begins (Spring 2020), we are focusing in more detail on the abilities that students draw upon when exploring the collections and when determining which artifacts might be included in current collections as well as new collections that might be developed. We also are employing collaborative autoethnography (CAE) methodology for continued study of building digital literacy through exploration and curation. CAE is a qualitative research method in which a combination of multiple voices interrogate a social phenomenon (in this case, the building of digital literacy through collaborative curation) to create a unique synergy and approach (i.e., a model for expanding digital literacy) not easily obtained from work in isolation (Chang, Ngunjiri, & Hernandez, 2013). Social networks and learning relationships are central to this work.

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Cross-cultural adaptation and user-experience validation of the ACAD Toolkit

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Abstract

Design for learning involves the delicate interweaving of knowledge about learning and knowledge about design. This work is often carried out by heterogenous design teams in which members speak of and value different aspects of design, and different methods for evaluating these designs in use. The challenge of reconciling these often-competing demands is critical to the success of these teams. This short paper outlines work breaking new ground translating an educational design method, developed in English speaking contexts, for use in Spanish speaking contexts. Steeped in socio-cultural and socio-material awareness this project explores how the ACAD Toolkit—a set of tangible design related resources embodying networked learning ideals—shapes and is (re)shaped in and through the process of translation. Guided by two questions: (i) How can we explore the process of translating not only language but values and forms of practice? and (ii) How can the ACAD Toolkit be validated in new contexts? This qualitative study involves the thematic analysis of multimodal data including video and audio recordings, and artefacts produced during workshops. Our method builds on traditional cross-cultural processes of adaptation that involve adapting, expanding and splitting ideas and concepts in two stages: language translation and user-experience testing. Our analysis is, therefore, reported in two stages. In the first we explore the process of reaching agreement on a test set of translated resources, and in the second we explore how these resources are being enrolled in educational design work in new contexts. The newly translated resources have been tested in three workshops in two Spanish speaking educational settings (Spain and Argentina). After analysing the data from these workshops, the initial translation will be corrected, and instructions will be developed—in both languages—to improve future translations of the ACAD Toolkit and in its ongoing use in English contexts. These instructions and the processes through which they will be developed will produce potential research objects for future educational design research. This method, initially developed with educators in Australia and New Zealand, embodies the very heart of networked learning—the movement of people, objects, and ideas across contexts and time.

Keywords
Design for learning, learning design, design teams, cross-cultural

Introduction

Around the world, learning designers and educators are in need of new methods to support their work (Beetham, & Sharpe, 2019). Finding validated approaches that incorporate a deep understanding of learning in networked societies that are also capable of expanding the design repertoires of educational designers, is challenging (Bartolomé, Castañeda, & Adell, 2018; Yeoman, & Carvalho, 2019). This short paper details initial findings from a project involving the translation of a new method rooted in theories of networked learning and developed

in English speaking contexts (Carvalho & Yeoman, 2019), for use in Spanish speaking contexts. Our aims in doing so are threefold: to extend the reach of this new approach, to explore the process of translating not only language but values and forms of practice, and to contribute to the validation of the original method in new contexts.

The new method is an embodiment of the Activity Centred Analysis and Design framework (Goodyear & Carvalho, 2014). ACAD is an analytical tool designed to reveal the architecture of productive learning networks that acknowledges and accounts for the physical, social and epistemic situatedness of learning. As a result, it calls us to pay careful attention to designable aspects of three distinct dimensions of design (i) the set design, (ii) the social design and (iii) the epistemic design. When thinking about epistemic design we should focus on valuable things for learners to do, different ways of structuring knowledge, and how it is we come to know. When thinking about social design, we should focus on the specific nature of social arrangements including the formation of groups, the assignment of roles, and the division of labour. When thinking about set design, we should focus on material and digital elements, the points of connections and or transition between them, and their spatial and temporal distribution.

Building on the ACAD framework, Yeoman and Carvalho (2019) developed the ACAD Toolkit to support the work of heterogenous design teams. The ACAD Toolkit includes tangible elements such as the ACAD wireframe and cards, and assorted case studies, images, and stationery. The ACAD cards provide conversational prompts, such as collaborative learning studio, assigned mentor, or peer assessment. These terms help to initiate dialogue with specific reference to a carefully selected set of designable elements across the three dimensions of design. The ACAD cards reduce complexity by providing colour coded visual representations that can be shared and reconfigured, scaffolding design conversations that support the good alignment of the material, social, and conceptual structures of learning. In doing so, they help to shape designs that will indirectly influence the emergence of valued learning activity (Yeoman & Carvalho, 2019). These tangible tools provide support for educators increasingly being asked to think bigger, be more creative, and develop learning designs capable of preparing learners to solve the complex challenges of our times. All of which they must do while remaining true to the high-level philosophies of learning that underpin their teaching and learning practice.

Cross-cultural adaptation—The Spanish ACAD Toolkit

Using a qualitative design, this study combines multimodal elements and thematic analysis (Jewitt, 2009; Denzin & Lincoln, 2017). Data collected includes video and audio recordings, and artefacts produced during workshops. Audio translations have been completed to support analysis by all researchers. Informed by socio-material theories of learning (Fenwick, 2015; Sørensen, 2009) the process of translating and adapting the ACAD Toolkit involved paying close attention to the material, social, and conceptual structure of both the tangible resources and the new contexts in which they were intended to scaffold design for learning. Our motivation for creating the Spanish ACAD Toolkit was not merely to expand its reach, but to explore how the cultural adaptation of the material and conceptual elements supported adaption and enactment across a range of contexts. In doing so, we build on cross-cultural processes of adaptation (Beaton, Bombardier, Guillemin, & Ferraz, 2000; Guillemin, Bombardier, & Beaton, 1993) that focus on adapting, expanding and splitting ideas and concepts in two distinct stages or iterations.

First iteration: Language translation

Method and process
The first iteration of the Spanish ACAD Toolkit, to be tested in the second iteration, involves:

- translation (two different versions),
- unification,
- back-translation (two different versions), and
- expert committee unification.

Initial findings
We acknowledge the importance of understanding the context in which words are used and the valence of their meaning in particular settings, is not a new contribution to knowledge. However, the power of unspoken

assumptions to confound translation did provide new insight into the importance of understanding when the intentional use of standardised term was desirable, and when it was not. This was most evident when translating the terms for the set design cards (infrastructure, tools, and texts). Some of the original terms are derived from Australian higher educational standards. A case study lecture theatre is a room with 100 seats or less, arranged in a horseshoe shape, with a tiered floor, and teacher computing and audio-visual support to support small group discussion during lectures. In the Spanish speaking context, there was no equivalent room type or set of standards. But removing these terms from the deck highlighted another role they were playing. Some of these standardised terms had been recruited to support conversations about how the specific physical attributes of a case study lecture theatre would support an innovative pedagogical design, rather than what types of learning spaces would be necessary to enact a specific pedagogical practice. This was important because in many instances teams were not designing new learning spaces and new curricula in tandem, so the set design needed to be understood with reference to—or in support of—the design and not as the focus of design attention. Other set-design terms that presented challenges were those selected to be deliberately ambiguous, such as in-between, which had been included in the original deck to generate creative discussion precisely because they lacked clarity. Articulating this subtlety and finding terms that performed similar functions was challenging as many of these choices had evolved with the deck and had not been the function of an explicit strategy from the outset. As such, a key lesson learned in translation has been to identify and highlight the underlying significance of terms selected to reduce cognitive load or stimulate creative dialogue in one context, which may not translate well in another.

Second iteration: User-experience test

Method and process

This iteration involves evaluating the ACAD Toolkit using video-recorded workshops and participant interviews, in two Spanish speaking countries (Spain and Argentina), with three different target groups:

- experienced teachers working in primary and secondary settings,
- experienced learning designers working in tertiary settings, and
- novice learning designers with basic knowledge about education.

After the analysis of data gathered during these workshops the initial translation will be corrected, and instructions will be developed—in both languages—to improve future implementations of the ACAD Toolkit in other scaffold design processes. These instructions and the processes through which they are developed will then become potential research objects, for future research.

Conclusion and future directions

As the complexity of designing for networked learning increases, it is critical that we find and share practical and scalable ways of identifying and analysing the key structural elements that constitute the architecture of productive learning networks. Designing for networked learning involves finding good ways to promote the use of technology to connect people to the (global) learning community (Goodyear, Banks, Hodgson, & McConnell, 2004). There is, therefore, an imperative to ensure accessibility of ideas across economic, political, cultural and linguistic boundaries. What is more, in facilitating this process, the learning ought to travel in both directions enriching and developing understanding across contexts. This short paper reports on work in progress that aims to connect Spanish speaking educational designers with access to new design ideas. In doing so, we will not only be sensitizing these designers to the how tasks, tools and people come together to indirectly influence learning activity, but we will be sharing in the ongoing co-construction of design ideas across contexts.

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Academic librarians' Twitter practices and the production of knowledge infrastructures in higher education

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Abstract

This short paper describes the use of infrastructural theory to interrogate data gathered for an ongoing study on the Twitter practices of academic librarians at one research-intensive university in the United Kingdom. In tandem with wider changes in networked technologies and ways of producing scholarship, academic librarians' roles have shifted increasingly to knowledge production, particularly in the area of research support. A related shift has been academic librarians' adoption of social media, particularly Twitter, to disseminate information and encourage community and collaboration. The few existing studies of librarians' Twitter practices, however, frame such activity as service promotion, overlooking the relationship between technology and professional practice entwined and concomitant social effects in the university.

The theoretical framework devised for this study was woven from research in anthropology and Science and Technology Studies about the nature of infrastructure. Instead of viewing infrastructure as separate and monolithic substrates supporting the circulation of goods and information, such theory posits infrastructure as relational and contingent, constituted of political decisions and having broad and co-constitutive social effects on knowledge, subjectivities and agencies (Jensen & Morita, 2017). The study's theoretical framework particularly draws on the notion of knowledge infrastructures defined as "networks of people, artifacts, and institutions that generate, share, and maintain specific knowledge about the human and natural worlds" (Edwards, 2010). The framework therefore emphasises the invisible labour of infrastructure — often dubbed infrastructuring — and related socio-political practices of design and maintenance that embody promises for the future (Larkin, 2018). In this picture, infrastructure is fragile and contingent, shaped by its installed base, and remarkably complicated, unfixed and open to contestation.

Based on preliminary findings, the study argues that academic librarians' Twitter practices constitute knowledge infrastructures in higher education. Using an infrastructural framework helped foreground the material conditions of librarians' knowledge production in terms of entanglements of technology and professional values, shifts in professional subjectivities and performative effects within the university. A tentative implication for studies of technology and learning is that, by insisting that infrastructure and social activity are intertwined, learners and teachers are not framed in opposition to infrastructure and are thus better able to contest totalising narratives surrounding infrastructural learning technologies such as VLEs or MOOCs. In this picture, therefore, infrastructure is not simplistically background bulwark or sinister force. Appreciating the invisible labour involved in creating and sustaining infrastructure is therefore important for understanding contemporary learning contexts.

Keywords

Research Background

The aim of this study in progress is to explore how academic librarians use Twitter to produce knowledge at one research-intensive university in the United Kingdom. In tandem with wider changes in networked technologies and ways of producing scholarship, academic librarians' roles have shifted increasingly in the past twenty years to knowledge production, particularly in the area of research support (Dempsey, 2017). A related shift has been academic librarians' widespread adoption of social media, particularly Twitter, to disseminate information and encourage scholarly community and collaboration (Deodato, 2018). Given this uptake, the use of social media as a tool for conducting librarianship has not been theorised in the literature about librarianship or higher education (HE). Little is known about academic librarians' day-to-day social media practices and the relationship of such practices to librarians' professional responsibilities and the user groups they serve. The few

existing studies of librarians' Twitter practices frame such activity as service promotion, overlooking the relationship between technology and professional practice and associated social effects in the university.

The aim of this study, therefore, is to explore the material conditions of librarians' knowledge production through examining the entangled aspects of institutional context, professional values and technology use. The study's main argument is that librarians' Twitter practices are rooted in the context of a rapidly changing digital and political landscape in HE and closely entangled with the profession's search for relevance in fluctuating times. The study furthermore argues that such Twitter practices, which seek to encourage interaction and collaboration between researchers by creating and curating a stream of beneficial information, produce knowledge for the university that is infrastructural in nature – i.e., a service on which research work depends and/or helps make sense of an information landscape (Blok et al., 2016).

Previous research into the mechanics of knowledge production in HE has tended to adopt a disciplinary focus, predominantly in scientific contexts (Bleiklie & Byrkjeflot, 2002). Fenwick and Edwards (2014), however, in their study of quiet forms of knowledge production in HE, assert that "we tend not to see the networks that are continually assembling and reassembling to bring forth and to sustain what we authorize as knowledge" (p. 39). It is therefore hoped that this study will add to such research by exploring how librarians contribute to knowledge production in HE.

Theoretical Framework

Popular conceptions of infrastructure posit it as an invisible and enduring substrate that enables and supports the circulation of goods and information (Carse, 2016). Despite the urging of Jones et al. (2005) to adopt a more relational and social model of infrastructure, however, with few exceptions (e.g., Guribye, 2015; Williamson, 2018), most studies in technology-mediated learning implicitly use popular notions of infrastructure, uncritically positioning infrastructure as monolithic support systems separate and in opposition to teaching and learning practices. To explore the entangled aspects of context, values and technology for librarians' Twitter practices, I wove together strands of theory from the fields of anthropology and Science and Technology Studies (STS) about the nature of infrastructure.

The specific kind of infrastructure explored in the study was knowledge infrastructures, defined as "networks of people, artifacts, and institutions that generate, share, and maintain specific knowledge about the human and natural worlds" (Edwards, 2010, p. 17). Monteiro et al. (2014) assert that the distinguishing feature of knowledge infrastructures is their "epistemic machinery" (p. 8), i.e., their ability to produce new forms of knowledge. It is not that other forms of infrastructure cannot do this, it is just that the term more directly implies a special focus on how infrastructures "exert effects on the shape and possibility of knowledge in general" (Edwards et al., 2013, p. 23). Examples of knowledge infrastructures can include databases, taxonomies and scientific monitoring instruments (Karasti et al., 2016). The three components of the theoretical framework for this study thus are:

1   Relationality: Star and Ruhleder's (1996) seminal assertion that infrastructure is relational to use has become core to STS conceptions of infrastructure. In their study they ask, "When is an infrastructure?" (p. 112), after Engeström's famous provocation "When is a tool?" The question implies a relational view of infrastructure, holding multiple meanings and emerging from individuals' situated needs and practices. Infrastructures, in other words, are more than just "matter that enable the movement of other matter," they are "the relation between things" (Larkin, 2013, p. 329).
2   Infrastructuring: Infrastructuring, as a verb, conveys the idea that infrastructures are accretions of technologies and social relations (Pipek & Wulf, 2009) — something always in the making — which in turn necessitate ongoing maintenance (Karasti et al., 2018). Studies of infrastructuring stress that mundane work on infrastructure is laden with values reflecting care towards technology and hopes/promises for the future (Granjou & Walker, 2016; Jackson, 2019; Larkin, 2018).
3   Ontological effects: If infrastructure is relational and ingrained in social activity, it has ontological effects on knowledge, subjectivities and agencies. As Jensen and Morita (2017) assert, "Viewed as open-ended experimental systems that generate emergent practical ontologies, infrastructures hold the potential capacity to do such diverse things as making new forms of sociality, remaking landscapes, defining novel forms of politics, reorienting agency, and reconfiguring subjects and objects, possibly all at once" (p. 620).

In this picture, knowledge infrastructures are fragile and contingent, shaped by their installed base, and remarkably complicated, unfixed and open to contestation.

Methodology and Methods

Due to their distributed and emergent nature, studying infrastructure poses several challenges (Karasti et al., 2016). To investigate at once knowledge infrastructures' scope and granularity, the study employed two methodological approaches commonly used in the infrastructure literature: 1) infrastructural inversion, first suggested by Bowker (1994), which encourages looking 'backstage' to view the normally invisible and undervalued work of making infrastructure, and 2) multi-sited ethnography (Marcus, 1995), which encourages applying ethnographic methods across multi-scalar and complex phenomena. Despite my participants' working at a single university with a shared context, they tweeted representing different libraries within the campus. It was hoped that a multi-sited sensibility would better illuminate the meanings and relations that participants brought to their work as well as their shared context (Karasti & Blomberg, 2018). Data-gathering methods for the study included semi-structured interviews, diaries of Twitter use, focus groups and Twitter Analytics. Data analysis, which is still ongoing, has been deductive based on themes from the theoretical framework related to relationality, infrastructuring and ontological effects.

Preliminary Findings

Preliminary findings indicate that academic librarians' knowledge production via Twitter is rooted in an imbrication of institutional context, the promises of Twitter and professional values related to creating scholarly communities. Participants emphasised that their highest priority on Twitter is to create a sense of community and identification based on their services and professional values:

> I value openness and connection and believe that the library should be a welcoming space. I see us as library professionals being facilitators and helpers for knowledge, not gatekeepers of it, so presenting a human face to the world is important as it flattens perceived hierarchy and gives us a way of meeting our readers ... where they are. Tweeting is a practical application of those values as it is a social space, where people are already having conversations, and where we can connect on an equal level. (P5) [Infrastructuring]

Participants, moreover, discussed how this drive to create scholarly community both stemmed from and contributed to a heightened sense of themselves as a complex and supportive community of professionals within the university:

> I think it's made us more of a reactive responsive community, so we can be more supportive of each other, because before, if we didn't have social media, it would just be over email or when we meet in-person or we'd have to keep phoning each other up. So, we can be a bit more responsive in our communities, I think. (P6) [Ontological effects]

Therefore, the daily and careful work that librarians devote to Twitter, while rooted in an evolving set of professional values and sense of professional membership, is also entangled in the changing technological context of academia and expectations fostered by the features of Twitter:

> So, it is basically online engagement with your users, because so much of people's space now is digital, it's just like the library being in the digital space, like people's digital spaces and engaging with them there and bringing the library itself into that space. Rather than, I think, just being a signpost to other things or just another place on the internet where there's links to the library's opening hours, I think it is more for like engagement with people in their digital environments. (P1) [Infrastructuring]

Finally, participants discussed the relational and always-emerging nature of their work on Twitter and the accretion of their efforts over time:

> I think with anything, people kind of expect with social media because it's such a fast moving platform that you'll have kind of instant engagement but it's also about relationship building, so it actually takes time to build that sense of trust and that sense of relationship for people to respond. (P5) [Relationality]

Discussion and Implications

In summary, the study's preliminary conclusion is that academic librarians' Twitter practices are knowledge infrastructures. In their attempt to create scholarly communities via Twitter, librarians produce knowledge for the university; in the process, new ontological opportunities open up which are inextricably intertwined with material conditions. Of course, whether librarians' Twitter practices are infrastructures in practice will need to be determined by further interviews with students and faculty. However, using an infrastructural framework to interrogate interview data foregrounded librarians' situated cultural practices within HE's wider political and technological milieu and helped elucidate the material conditions of their knowledge production.

The results suggest a tentative implication for research on technology and learning: by insisting that infrastructure and social activity are intertwined, learners and teachers are not framed in opposition to infrastructure and are thus better able to contest totalising narratives surrounding infrastructural technologies such as VLEs or MOOCs. Framed in such a way, infrastructure is not politics in material form, at least not simplistically so. Infrastructural theory helps destabilise fixed notions of the political imbued in totalising narratives about infrastructure by demonstrating infrastructure's contingency and fragility. In this way, infrastructural theory opens pathways to contest seemingly unassailable systems. Infrastructure, thus, is not background bulwark or sinister force, but imbricated deeply in human activity. Appreciating the invisible labour involved in creating and sustaining infrastructure is therefore important for understanding contemporary learning contexts and the conditions that best support learners.

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Developing a hybrid and networked educational approach to lifelong learning for organisations and employees

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Abstract

Developing work-related competencies suitable to the ongoing changes in surrounding society could be discussed in terms of lifelong learning. In such a context, the role of higher education has been identified as a key to develop advanced competencies applicable in a networked society. The current project includes scholars from three Swedish universities, representatives and employees from six Swedish bank and insurance companies, and a related governmental agency, all belonging to an established network. The project focuses on highly specialized professionals and their organisations, and the paper aims to answer the following research question: How can a hybrid and networked educational approach to lifelong learning for organisations and employees at the advanced level of higher education be designed? The investigation applies design-based research, and preliminary findings indicate that a hybrid and networked educational approach for lifelong learning for organisations and employees could be viewed from various perspectives. However, an overall observation is that several boundaries dissolve – for example, the ones between universities and participating and collaborative organisations – when a hybrid and networked educational approach for lifelong learning is designed. For one thing, universities should not be reduced to suppliers of education, and organisations should not be reduced to receivers of knowledge. Of particular interest is that participants working with data from their organisations can devote time to organisational challenges and/or utilize a deeper understanding of such challenges in a university course module approach. While the project still is in progress (the implementation phase is ongoing, and the phase intended to evaluate completed course modules has not started yet), the preliminary hybrid and networked approach for lifelong learning needs further development before it can be established. Nevertheless, early trials highlighting the idea of flexible courses that consist of various short modules developed in collaboration between universities and participating organisations indicate a promising venue for creating long-term relationships that could include deeper university-organisation and/or university-industry collaborations. Dialogues with course module participants and representatives of the collaborative organisation reinforced this preliminary conclusion.

Research Context

Societal development has had an impact on competencies needed in working life. Such development includes emerging hybrid and networked organisations. Moreover, emerging digitalisation changes the conditions for performing tasks that earlier were built on analogue technologies. Digitalisation also introduces new tasks into working life (Susskind & Susskind, 2015). From these changes in the conditions for performing work, the need to develop suitable competencies emerges. In working life, the learning and development of suitable competencies could include professional development in informal situations while performing work-related tasks. Professional development could also include formal training organised within the organisation or by studying at an accredited educational institution. Another aspect of professional development is that it occurs at both an individual and a collective level (Jaldemark, Håkansson Lindqvist, & Mozelius, 2019). Developing competencies suitable for the changes in the surrounding society could indeed be discussed in terms of lifelong learning. However, the concept of lifelong learning is complex, including private and public aspects (Jarvis,

2007). The private sphere embraces the lifetime combination of a person's integration of experiences of situations and perception of content. While the private sphere relates to individual processes, the public sphere relates to processes of and opportunities for learning that are available in the surrounding society.

During the 20th century, global initiatives linked professional development to the concept of lifelong learning. Two of the key players were the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Organisation for Economic Co-operation and Development (OECD). They formed policies (e.g., Faure et al., 1972; OECD, 1996) that emphasised global competition and social inclusion. These policies have subsequently diffused into national initiatives. In Sweden, such initiatives have indicated the role of higher education as a key to develop advanced competencies applicable in a digitalised and networked society (e.g., Swedish National Audit Office, 2016). This paper discusses a project that follows from one such national initiative funded by Vinnova (Sweden's innovation agency). It focuses on the development of a hybrid and networked educational approach for lifelong learning that includes flexible courses.

As indicated, the project builds on the trend and importance of hybrid and networked organisations, which has also grown within universities in their relationships with the surrounding society (Nørgård et al., 2019). In this way, universities and society have become closely linked, and higher education emerges as a phenomenon in the interplay of both parties' needs. Hybrid and networked universities are characterised by weak boundaries between the universities and collaborating organisations. However, the theorisation of networked learning as a hybrid phenomenon is still in its infancy. Therefore, development and research of hybrid and networked educational approaches for lifelong learning are important to understand how such approaches impact the relationship between higher education and the needs in the surrounding society. It could also lead to the development of a theoretical understanding of lifelong learning in the digital era and how such learning could be enhanced (Jaldemark, in press).

The project, called BUFFL (a Swedish acronym translated to industry development at banks and insurance companies through flexible lifelong learning), aims to strengthen professional competencies in a specific labour market area (banking and insurance) while stimulating lifelong learning. The project initiates further development of the ongoing efforts using flexible methods for technology-enhanced learning in working life. In this project, researchers from the fields of business administration, education, and informatics from three universities are working together with six Swedish national and international bank and insurance companies and one governmental agency within insurance. The universities and the participating and collaborative organisations operate within three regions scattered across Sweden. The ambition of the parties involved in the BUFFL project is to develop and conduct short university courses to develop a hybrid and networked educational approach to lifelong learning for organisations and employees. Notably, the collaborating organisations belong to an established network including joint working groups, physical meetings, and common research and educational projects. While the target group for the initiative is highly specialised professionals, the development applies to the advanced level of higher education.

The project runs over two years and contains three phases, partially intersected and repeated on several occasions. The pre-project phase is based on disciplinary competence of the participating universities and the needs identified by the organisations involved. Three main themes for the flexible courses (change management, company valuation, and customer relationship) were identified in a lunch-to-lunch session where all collaborating organisations participated. In the intersection of disciplinary competencies and organisational needs, short and flexible courses (including course modules) at the advanced level were developed. In the latter part of this phase, university experts within the field of technology-enhanced learning created a model of a preliminary educational approach embracing appropriate educational methods and technologies. During the ongoing implementation phase, course modules are tested together with selected employees of the organisations as course participants. The evaluation phase will analyse ongoing and completed courses to contribute to the further development of the courses and the preliminary educational approach.

Aims and Research Question

The paper aims at reporting the design of the preliminary educational approach of the BUFFL project. It answers the following research question:

How can a hybrid and networked educational approach to lifelong learning for organisations and employees at the advanced level of higher education be designed?

Methods

The project discussed in this paper applies design-based research (e.g., Barab & Squire, 2004). This means that the research outcomes should result in a theory on learning and teaching (here defined as the hybrid and networked educational approach to lifelong learning). Moreover, interventions in terms of design principles should be implemented in the developed courses and course modules run by the project. The project is set in naturalistic contexts, including strong links between practices of organisations and the content and assessment in the courses and course modules. The project also applies an iterative approach to course development, while course modules will run repeatedly.

Preliminary Findings

Based on preliminary findings from the pre-project phase and the implementation phase of the first course modules, it could be suggested that the preliminary educational approach should be built on close collaboration between universities and organisations. It is also suggested that such forms of lifelong learning could be discussed from various perspectives:

- From a network perspective, collaboration should benefit the development of both the universities and the participating and collaborative organisations. The universities should not be reduced to suppliers of education, and the organisations should not be reduced to receivers of knowledge. Moreover, long-term relationships must be developed and maintained. This could include university-organisation collaboration, university-industry collaboration, and/or crossover industry collaboration with the universities.
- From a university perspective, the boundary between education and consulting for organisational development dissolves. Moreover, the boundary between previous theoretical knowledge and previous practically acquired knowledge dissolves.
- From a participating and collaborative organisation perspective, the boundary between professional development and organisational development dissolves. Therefore, the lifelong learning process should include the development of both employees and organisations.
- From an educational perspective, formal and informal learning are linked through bring-your-own-data practices, and this could afford a strong link between practice and theory. Bring-your-own-data includes the idea that course participants work with challenges related to their working life context. This means that participants should work with authentic and real challenges situated in their organisations. The inclusion of own data facilitates the solving of organisational challenges and/or a deeper understanding of such challenges.

From the bullet points above follows an overall observation that boundaries between universities and organisations in society dissolve and should be characterised by a hybrid and networked perspective on work-related lifelong learning.

The approach includes the idea of flexible courses that consist of short course modules. These modules deal with sub-themes that can be studied alone or in a package together with other modules in the same course. The participating and collaborative organisations and their employees are free to apply the modules that fit the needs of the respective employee. The short flexible course modules could preferably include a workload between one and three weeks of full-time studies. Each module starts and ends at fixed dates to assist in the planning of the universities and collaborative organisations. The fixed dates also allow for creating networking and possibilities to create study groups of individuals from various organisations. The flexibility in terms of study tempo (between 10 and 50 per cent of full time) allows the participants to adapt their studies to their professional and daily workload. A preliminary finding is that around 20 per cent of full time seems appropriate for most participants. Besides working full time, an academic workload that is too heavy jeopardises the employees' conditions to complete the course modules. This illustrates the importance of how public organisational conditions are related to the private conditions of the employees. Preliminary results further emphasise the importance of organisational support. For one of the participating organisations, the throughput is 100 per cent, while another participating organisation has a throughput of around one of three. Moreover, sole participants from an organisation have a particularly high dropout rate.

A cornerstone in the development of the hybrid and networked educational approach for lifelong learning is that each course module will be repeated several times. Such a repeating pattern facilitates the long-term development of organisations. The participating employees can continue to work with an organisation's own data after the end of a specific course module, and the following time the course module is given, new

participants from this organisation can continue to work with challenges identified and initiated by their fellow employees. The repeating evaluation pattern also allows for improvement of the modules and a stronger adaption to the needs of the collaborative organisations.

Regarding educational aspects, each course module should include pre-recorded lectures, thematic online seminars, online question-and-answer seminars, asynchronous online communication, and methods including bring-your-own-data. Web-based resources should expand the content beyond the mandatory literature. Dialogues between course participants should continuously be emphasised to enhance networked learning.

Regarding technological aspects, each course module should include participants working with their own or their organisation's devices. It lowers the threshold of the participants' deployment of technologies in their studies. A learning management system should be used to host a virtual space for assessment, teaching activities, and dialogues. Each module also should include video-based technologies to support dialogue. Moreover, support from technicians and experts within the field of technology-enhanced learning should be formalised.

Regarding assessment aspects, each course module should include at least two assignments, one related to the content discussed in the course literature and one related to the organisation's own data. Regarding the content discussed in the course literature, various types of assessments are tested, such as short written assignments, essays, and oral seminars. Moreover, the assignments include written and oral features as well as individual and group-based work. This will help the participating employees to develop competence also in written and oral communication and increase their ability to work independently and with others. This will, in turn, develop participating organisations.

Discussion

While the project could still be considered a work in progress, the preliminary hybrid and networked approach to lifelong learning will be developed throughout the project. It needs further iterations of course development before it can be established as a valid approach. Nevertheless, early trials and responses from dialogues with the course module participants and representatives of the collaborative organisation indicate its preliminary value.

The impact of ideas of a networked approach on lifelong learning initiatives needs to be further investigated by scholars. Although some studies have been published recently (e.g., Littlejohn, Jaldemark, Vrieling-Teunter & Nijland, 2019), the conceptualisation and research of lifelong learning as a hybrid and networked phenomenon is still in its infancy. Further design-based research is encouraged to guide continued development in the field.

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Reaching for a hybrid and networked university through lifelong learning initiatives

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Abstract

Working life is transforming, including an emerging digitalisation of its products and processes. Due to such transformation, competencies need to be developed in organisations that suit the emerging conditions for performing work. In the growth of these competencies, higher education is a key player. Its role is twofold, including preparing students for working life and being involved in professional development through continuous education and lifelong learning initiatives. This role as a key player has the potential to assist in the development of competencies at both an individual and organisational level. Another movement in society is the dissolution of boundaries between organisations, leading to the emergence of networked and hybrid organisations. Digitalisation is a driving force in this phenomenon. Even within universities, this trend has grown and impacted the relationship between the university and the surrounding society. In a hybrid and networked university, its operations are closely linked to the surrounding society, including the interplay of the needs of both parties; a balance of power; and weak boundaries between the university and organisations in the surrounding society. Another trend in the higher education sector is the emphasis on lifelong learning policies. Such policies link lifelong learning to global competition and social inclusion for all. The project reported in this paper builds on the ideas of lifelong learning from a university that aims to be hybrid and networked. The reported initiative builds on data from an early phase of a development project that aims at developing new forms of lifelong learning and professional development. Thematically analysed Post-it Notes from workshops supported the answering of the following research question: How do higher education staff perceive development of lifelong learning? The following four main categories were generated: (1) the hybrid and networked university, (2) pedagogical models, (3) internal organisation, and (4) quality. The conclusion includes staffs' positive attitude towards lifelong learning initiatives. They emphasise the university as an open space and as a partner for agents in the surrounding society. Moreover, they stress lifelong learning initiatives for staff; further development of educational models; scientific legitimacy and high-quality deliverance; flexible internal organisation and structures; and finally, the importance of collaboration and networking. Further data collection is needed to validate the results and the potential for developing theoretical insights that could inform lifelong learning initiatives in emerging digitally infused societies.

Keywords

Higher education, hybrid university, lifelong learning, networked university, professional development

Research Context

Working life is transforming, including an emerging digitalisation of its products and processes. Due to such transformation, competencies need to be developed in organisations that suit the emerging conditions for performing work. In the growth of these competencies, higher education is a key player. Its role is twofold. First, higher education institutions are involved in educating the workforce by preparing them for working life. Usually, this educational process involves the development of competencies within individuals. Together with research, this is at the heart of the activity of higher education. Second, higher education institutions are involved in professional development through continuous education and lifelong learning initiatives. This activity has the potential to assist in the development of competencies at both an individual and organisational level (Jaldemark, Håkansson Lindqvist, & Mozelius, 2019).

Another movement in society is the dissolution of boundaries between organisations (e.g., Jones, Hesterly, & Borgatti, 1997). From this movement grows the idea of networked and hybrid organisations. Digitalisation is a driving force in this phenomenon. Even within universities, this trend has grown and impacted the relationship between the university and the surrounding society. Over the years, at least three different approaches to this relationship have evolved (Nørgård, Mor, & Bengtsen, 2019). The first one builds on the metaphor of the ivory tower. In this approach, the link between the university and society is weak. Society has the role of taking care of the competencies developed within individuals. The power of deciding over the content and form of higher education is within the university. The second approach follows the metaphor of the university as a factory. Higher education delivers the competencies the market needs, and it is society that defines the market. This approach has grown out of the philosophy of new public management, a philosophy that embraces the idea of governing society as if it were a company, including applying management ideas from the private sector. The third approach emerges out the metaphor of the network. In this approach, the university and society are closely linked, and higher education emerges in the interplay of the needs of both parties. Therefore, it includes a balance of power. A networked university has a hybrid character, with weak boundaries between the university and organisations in the surrounding society. This hybrid character is intentional, with a mix of different discourses, forms, and perspectives (Bakhtin, 1935/1981). The competencies the university should nurture are a result of interplay with the surrounding society.

Another trend is the emphasis on lifelong learning. This concept includes both private and public spheres. The private sphere includes aspects of learning from an individual perspective, while the public sphere includes aspects of the social institutions within society that the individual encounters (Jarvis, 2007). The emphasis on lifelong learning has grown from emerging policy work. Among others, the emphasis on global competition and social inclusion for all were identified in the 20th century as key aspects in the emergence of global policy work in the field of lifelong learning. Global organisations such as the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Organisation for Economic Co-operation and Development (OECD) formed policies (e.g., Faure et al., 1972; OECD, 1996) that later diffused into national initiatives (e.g., Swedish National Audit Office, 2016). These national initiatives are also implemented into the policies of higher education institutions. From such higher education policy work follows various development projects. Therefore, the project reported in this paper builds on the ideas of lifelong learning and the hybrid and networked university. Through policies, the studied university has initiated various development projects that should push the university towards being a hybrid and networked university ready to act as a driving force in the development of the surrounding society. One of these initiatives is reported here, and the preliminary results presented build on data from an early phase of a development project. While societal and technological development impacts private and public sectors, the project aims at developing new forms of lifelong learning and professional development, forms that should build on the demands and needs that follow from emerging societal and technological development. The project is built on three different phases. During the writing of this paper, it is in the first phase, preparatory work, including external analysis, investigation of internal conditions, and identifying suitable pilots. The second phase, development, includes running and evaluating pilots. The third and final phase should be a wider implementation of the results into regular operations of the university.

Aims and Research Question

The paper aims at reporting preliminary results from a higher education lifelong learning project. It answers the following research question:

How do higher education staff perceive development of lifelong learning?

Methods

The project is currently in the first phase. In this phase, the authors of this paper initiated a workshop that aimed at investigating how staff perceived the development of lifelong learning in the operations of the university. Following a short introduction of the topic, participants worked in smaller groups with a Post-it Note method (Hrastinski et al., 2019). The initial phase of the group work included five minutes of individual work in which each participant reflected on the theme of the workshop and wrote down his or her thoughts on Post-it Notes. Following this individual reflection, the Post-it Notes were presented to the group and clustered on posters. In the workshop, 17 staff participated, including administrative staff, managers, researchers, and teachers. These participants were sampled from an open invitation sent out through e-mail to all staff at the university. The sample include all staff that participated in the workshops. In total, the analysis included 101 Post-it Notes. These were inductively approached through a thematic analysis model including the following six steps (Braun

& Clarke, 2006): (1) getting familiar with the data, (2) generation of preliminary codes, (3) identification of patterns and themes, (4) review of patterns and themes, (5) creation and naming of categories, and (6) presentation of the analysis. Quotes from the Post-it Notes are included in the results.

Preliminary Results

The analysis of the Post-it Notes generated four main categories: (1) the hybrid and networked university, (2) pedagogical models, (3) internal organisation, and (4) quality.

The hybrid and networked university

Post-it Notes clustered in this category were about the regional, national, and international role of the university. The university should "be a hub" and "a distinct agent" that feeds off networks, digitalisation, and globalisation. Participants also mentioned the need for networks and arenas for dialogue, identifying needs, and enabling collaboration, both within the university as well as with agents and "networks in the surrounding society". Furthermore, the notes dealt with issues of formalised collaboration including agreements and long-term stability. To facilitate collaboration, dealing with issues of communication and providing channels for communication were identified as important.

Pedagogical models

Post-it Notes clustered in this category were mainly about different aspects of the design and forms of lifelong learning, for example, "short and module-based flexible courses". Several notes mentioned needs orientation, flexible solutions and technology-enhanced learning oriented towards the needs of the targeted group of professionals. One of the notes emphasised "assessment that supports development within participating organisations". Some notes also mentioned co-production together with the target group. Moreover, they discussed various educational methods. Another aspect within this category concerns the impact of lifelong learning, emphasising that it should include "benefits on both individual and organisational" levels.

Internal organisation

This category deals with how the university set up its organisation to encourage, support, and enable its development within lifelong learning. Administrative support should embrace "faster processes of adaptation", an obvious way into the university, and clear governance and a consensus on the meaning of lifelong learning. "Invest more on pedagogical qualifications (for example incentives of pedagogical development projects)" was also discussed.

Quality

This category deals with issues of competence and the quality of higher education. It is about the competence of the teachers and the need for continuous learning and development to be able to meet the needs of the surrounding society and to deliver high-quality education. These issues of quality emphasise the importance of "resources for delivering lifelong learning opportunities to staff" and "joint development of competencies" between the university and the surrounding society.

Conclusions and Further Directions

Some preliminary conclusions could be drawn from the early analysis of the data. Staff included in the study seem to have a positive view of lifelong learning initiatives. However, this positive stance from staff members might be biased due to the small sample and the sampling method. Negative voices might not be heard in the results because workshops might have only attracted staff that are positive about lifelong learning initiatives. Nevertheless, staff emphasised the university as an open space and as a partner for agents in the surrounding society. Moreover, lifelong learning for staff is an important issue of quality; the university should be able to stay up to date with current developments and deliver state-of-the-art education. Further development of educational models including designing courses should be adapted to the needs and context of professionals. Such designs should be flexible to the needs of organisations and their professionals and embrace strong educational approaches. Staff also emphasised the importance of scientific legitimacy and high-quality deliverance. To facilitate and support development and implementation of lifelong learning initiatives, the internal organisation and structures need to be flexible and ready to adapt to various agents and situations. Finally, collaboration and networking are important to connect, uphold dialogue, identify needs, and co-produce.

Initial results from the project are discussed in this short paper. These results will be applied to the project to enable further development in the forthcoming pilots. Pilots may benefit from building on issues linked to the categories. Nevertheless, to strengthen the validity of the results and be able to optimise these pilots and later implement them on a wider scale, further data needs to be collected. Therefore, a survey should be distributed to all staff to learn more about the conditions for building a hybrid and networked university that acts as a driving force for lifelong learning in the surrounding society. This survey and additional interviews with selected staff could build on the categories presented in this paper. The deliverance of the preliminary results has the potential to enable developing theoretical insights that could inform lifelong learning initiatives in emerging digitally infused societies.

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Designing activities and tools to support university students' creative and collaborative exploration of physical computing

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Abstract

Today's digital world requires students to gain skills in collaborative problem solving and digital literacy. One approach is to teach people how to design computational artefacts that require both electronics and programming. Physical computing platforms offer an endless amount of possible opportunities for people to design and develop technological artefacts. However, many times students are overwhelmed when trying to learn both software and hardware simultaneously. The students struggle to be innovative and creative in their projects. Also, they focus on mastering the tool and following instructions for existing projects rather than being able to creatively explore the tool and understand the process of designing and developing new artefacts. For that reason, we aimed to answer the question: What type of tools and activities can be developed to support university students creative exploration of physical computing? Programming and electronics are fundamental design disciplines in today's digital world, and therefore they should be taught through design activities rather than limiting education to textbook readings and laboratory exercises.

We introduce our process of designing activities combined with a supportive tool to ease these challenges. The activities and tools were developed iteratively in three phases with a series of workshops with 126 students and teachers. The tool consists of a set of paper cards that provide necessary details (hints) about the electronics and software and help provide structure for the students to conceptualise how their artefact interacts. We additionally, introduced a learning Jigsaw pattern (orchestration script) for the later intervention that enabled individual students in the groups to focus on design, hardware, or software. For evaluation, we used the Creativity Support Index (CSI), which is a psychometric survey designed to assess the support of the creative process. The instrument investigates collaboration, efforts worth the result, exploration, immersion, enjoyment, and expressiveness. The results between the phases showed improvement with the use of the refined versions of the cards and orchestration of the learning activity. This study has demonstrated that design activities can provide a more accessible approach for the introduction of physical computing to students from various majors. Moreover, learning physical computing through design activities allows the learner to develop computational and design thinking skills for collaboratively solving problems.

Keywords

Collaborative Problem Solving, Learning by Doing, and Creativity.

Introduction

Interactions with technology are exponentially increasing, and the need for understanding the digital world is of utmost importance, especially for young people (Heintz & Mannila, 2018). More than 20 billion connected devices exist in the world; however, less than 1 percent of people have the skills to understand and influence them (British Council, n.d.) To be able to understand digital artefacts and explore the world around them, people need to be introduced with computational thinking and programming. Similarly, design thinking is a significant skill when developing technology to respond to our needs. Furthermore, schools and universities are seeking ways to introduce these subjects to a diverse population of students to prepare them for the changing future (Trust, Maloy, & Edwards, 2018). One of the focal challenges is to develop methods for teaching students from various backgrounds.

In today's world, computational thinking and programming are acknowledged to be fundamental skills like numeracy and literacy are (Bocconi, Chioccariello, & Earp, 2018). To teach these computational skills, schools and universities commonly use different physical computing platforms (like Arduino, Raspberry Pi, Micro:bit, and Scratch). These different platforms allow teachers to introduce technology, programming and problem solving to students by building tangible and fun projects. These interest-driven projects combine problem solving, engineering, and design. However, physical computing platforms require the learner to work simultaneously with both software and hardware.

Moreover, driving the learners' focus towards understanding the process of wiring and programming of particular tasks and following step-by-step instruction, rather than gaining skills on computational thinking, designing new solutions, and understanding digital artefacts. Learning both software and hardware at the same time is often perceived overwhelming and students struggle to design new types of artefacts beyond the components, programming concepts, and instructions they have used before. To support students, new kinds of activities and tools are needed to support the creative exploration of physical computing

Additionally, these tools and processes connect the learners to communities of makers and tinkerers. We see this aligning with the broader notions of networked learning through the maker-space ethos that includes: openness in the educational process, self-determined learning, purpose in the cooperative process, supportive learning environment, and a focus on process (McConnell, Hodgson, & Dirckinck-Holmfeld, 2012). For that reason, we aimed to answer the question: What type of tools and activities can be further developed to support university students' creative exploration of physical computing? The aim is to allow students to focus on one aspect of physical computing at a time and design new solutions, not merely re-creating existing ones.

Background

Sentance and Csizmadia (2017) observed that in schools, programming is perceived to be the most challenging aspect of computer science: students have problems with connecting the theoretical concepts to the practical applications and thinking computationally, as well as breaking problems into smaller pieces was perceived difficult. Visual programming tools have been developed to help with these challenges and aim to make programming more accessible for non-technical students. However, the differences between visual programming and traditional text-based programming are considerably extensive. Visual programming languages simplify procedures and guide the user through the creation, for example, with blocks that snap together or use colour-coding. Vihavainen, Paksula and Luukkainen (2011) noticed that a common problem when teaching text-based programming languages is that the focus is too much on learning specific syntax or semantics rather than understanding the process. When students understand the process of coding, they can construct more meaningful programs. Also, Przybylla & Romeike (2014) assert that physical computing encourages learners to use their imagination and creativity, focusing more on ideas, not on technical limitation. Physical computing takes a hands-on approach to understand computational thinking, building tangible artefacts to visualise the abstract programming concepts.

Programming and electronics are fundamental design disciplines, and therefore they should be taught through design activities rather than limiting education to textbook readings and "cookbook" laboratory exercises (Buechley, Eisenberg, & Elumeze, 2007). Even if the outcome does not turn out to be as hoped, students can revise their ideas and create a new version. Iversen and colleagues (2016) argue that design-based activities with tangible digital artefacts provide learners with competencies that reach beyond STEM (Science, Technology, Engineering, and Mathematics) skills. New digital tools, such as 3D printers, laser cutters, and construction kits should expand the forms of learning in classrooms enabling children to learn through the processes of constructing and thinking rather than disabling their thinking by letting them merely carry out ready planned projects. As a matter of fact, design thinking, and computational thinking are both tools for problem-solving (Bowler, 2014).

Learning through design argues that students construct their knowledge by designing and creating meaningful projects and that learning is the most effective when pupils are engaged in creating a tangible artefact . Moreover, Kafai and Resnick (2012) state that activities involving design provide a rich context for learning as knowledge should not be something that is merely transmitted from teachers to students. As previous research state, physical computing can be a more natural way for learners to grasp on programming and computational thinking. Likewise, using familiar techniques and tools decrease the feeling of being overwhelmed and that way help learners to enter a mindset of collaborative creative exploration (Kafai & Resnick, 2012; Qi & Buechley, 2014). We see the practice of physical computing as a strong example of how Networked learning that brings together different aspects of information and communication technology (ICT) that promotes connections

between learners and tutors and the larger community around physical computers from maker spaces to open source hardware (Hansen & Dohn, 2018). Koole and colleagues (2018) have argued for the socio-material approach of maker-spaces that combines cooperative process, supportive learning environment, and a focus on process with the hands-on physical, face-to-face-interaction relational style of learning that is augmented by online interactions with people and resources. Opportunities exist to use physical computing as a means to support developing skills in computational thinking and problem-solving through creativity. Developing a supportive tool in the form of paper cards allows students to work with a familiar concept and does not add any utterly new information to students creative exploration of physical computing.

Methodological Approach

We started from our experiences of teaching physical computing to diverse groups of students from K-12, university students across domains and informal and formal learning activities. The common theme across the different activities was that we observed that these diverse students were capable of following the direct and process-oriented workshops, for electronics and programming. The general approach uses a microcontroller, a small computer that users can program and plugin different sensors and outputs. In our case Arduino, which is an open-source hardware and software platform[1].

Arduino was originally created as a tool for artists and designers to have an easy way in the world of electronic artefac production. Participants in workshops are exposed to a combination of building, coding, and reflecting on how digital electronics work. Educational activities around these tools take many forms and are many times contextualized to the educator's knowledge, the learners' point of departure, and even the availability of electronic components or Internet connectivity. Arduino was the first open-source hardware educational tool for all ages. Arduino's design was generic enough for it to be adopted in many different contexts, from primary schools to universities.

From our education and product development backgrounds, we see that students struggle when it comes to collaborative problem solving when they were given a design or engineering task. In other words, how to create an idea and solution, design it, build it, wire up the electronics and program their concepts. Across the different groups of students, the frustration of putting together electronics, programming the software in a concept different than the workshop examples highlighted the challenges of physical computing and the benefits for creating creative learning. Our general approach to running physical computing workshops is to introduce the electronics and the microcontroller first and then begin with the programming. This introduction was accomplished by a series of hands-on workshops and activities where the participants are learning by doing with different semi-completed examples and some open-ended tasks for higher-performing groups.

Working from an iterative human-centred design approach (Bjögvinsson, Ehn, & Hillgren, 2012; Buxton, 2007; Ratto, 2011), we approached the above challenge through several cycles of investigating the needs of the different people (students and teachers) through observations, interviews, the design of different artefacts. We started with the notion that students needed some support and scaffolding to take the process knowledge of the hands-on demonstrations of hardware and software that they can follow and transfer those experiences into the creative collaborative problem-solving. Our initial hypothesis was that we needed to create some tangible like "cheat sheets" about the hardware and the software that would enable the students to carry forward their workshop knowledge into the creative phase of the learning activities.

We used Cherry and Latulipe's (2014) Creativity Support Index (CSI), which is a psychometric survey designed to assess the support the creative process of digital tools. Cherry and Latulipe (2014) developed the CSI as a way to investigate creativity and tasks and the starting point for the instrument was the shorting comings of instruments like the NASA Task Load Index (TLX), which is a standardised survey used to quantify workload (Hart & Staveland, 1988).

Interventions

Our initial workshop started with 40 Interaction Design students at their first workshop with physical computing. From this group we worked with a group of 6 students where they used our hand-sketched paper cards (see Figure 1). We observed how the students used the cards, and we interviewed students, teachers, and teaching assistants to evaluate the cards. In these workshops, the participants learn the basics of physical

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[1] See https://www.arduino.cc/

computing through the process of constructing their projects. Students knew how to design but not the knowledge of how to transform the idea to the electronics and programming. This similar problem was noticed when interviewing teachers and teacher assistants working in Arduino workshops. Students struggled to combine the electronic components and programming concepts as well as to take into considerations components outside of the workshop examples. They were limiting their ideas to the few components they had managed to wire and program properly before.

Fig. 1. First two versions of the paper cards: hand-sketched cards and two-sided cards to help with wiring and programming.
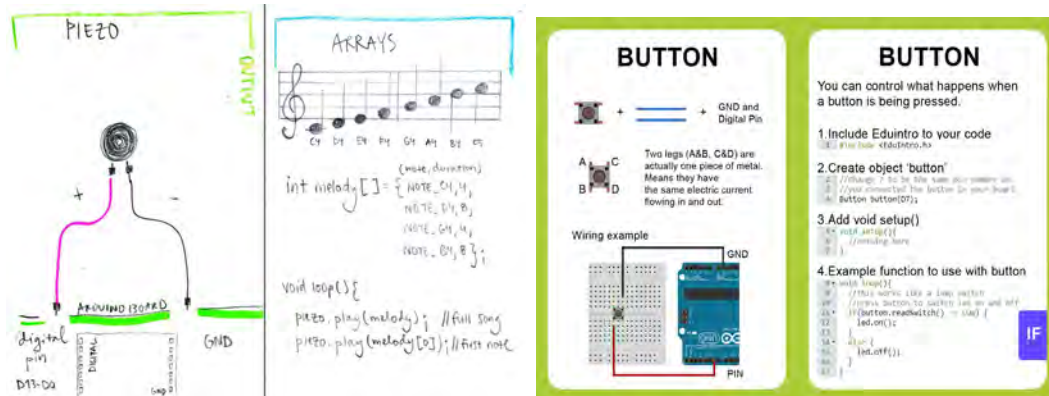
After Design Phase 1, we created sixteen cards, including tips on how to connect and program electronic components commonly used in Arduino workshops, such as LEDs, buttons, resistors, and different sensors. Additionally, we introduced a pre- and post-survey about their knowledge and used the Creativity Support Index for Design Phase 2. For this activity, we tested at a nearby university where the students worked for five days in groups of three. The goal was to see if participants could explore the given sensors and components more freely without being overwhelmed by the fact that they did not yet have the skills to work with them. This workshop had a total of 50 participants. The design activity and cards (tools) under observation seemed to be promising in enabling students to collaborate further, explore new components and concepts, and design and develop new kinds of solutions.

Table 1. Design Interventions across learners

Design Phase	Interventions	Artefacts	n
Interaction Design Students	Interviews, videos	Cards v01	n= 40
I.T. and Learning Students	Surveys interviews, video	Cards v02	n= 50
Engineering Students	Surveys interviews, video	Cards v03	n= 36

Through the feedback from Design Phase 2, we refined the cards (see Figure 2) to be more straightforward and more as a stepping stone to help them design and solve the design task. The cards were divided into three pages: design, electronics, and programming. The idea was that students would be able to create pseudocode with the first page of the cards that could be then transferred to an actual working project using the Arduino components and with the help of the information on the second and third page of the cards. The goal for Design Phase 3 was to see if this kind of activities would shift the focus from mastering everything at once to understanding one aspect at a time and through collaborative working design, assembly and creative program prototypes. This workshop had a total of 36 participants, and this time activity was tested by conducting six separate 70 minutes workshops. Each workshop had six students, divided into two groups of three.

We were inspired from the field of computer-supported learning and the design of learning activities. We chose to use a Jigsaw script, which is a set of instructions that specialise in group formation, distribution of resources, role assignment, and sequences of activities (Fischer, 2007). The Jigsaw method structures segments of the learning activity into expert groups that reform the workgroups to bring specific knowledge back. In our case, this was about electronic, programming the microcomputers, and the design of the task. In this workshop, we used Jigsaw method to see if that would help students to focus on one aspect of physical computing at a time and reduce the feeling of being overwhelmed (Pozzi, 2010).

Fig. 2. Refined set of cards for the third design phase to help with designing.
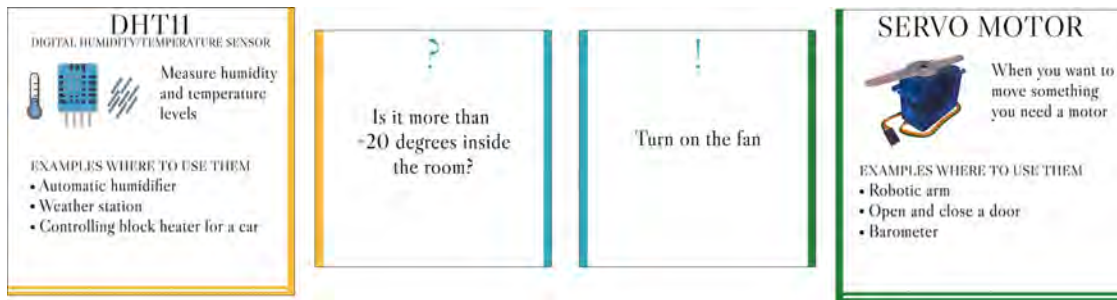
At the beginning of each workshop, two student groups had 10 minutes to get familiar with Arduino and an open-ended problem given to them. After 10 minutes, these two initial groups were divided again, now into three expert groups: hardware, software and design — each group having now two members, one member from both of the initial groups. Expert groups received a kit, including a set of cards and a specific task for each group and a half-constructed Arduino project. Hardware group received a piece of code in the IDE, and their task was to with the help of the cards to wire the components accordingly to work together with the ready-made code.

Additionally, the software group received components that were ready wired, and their task was to with the help of the cards to create a code to work together with these components. Design group's task was to explore input and output cards and create different types of solutions with the if-then conceptualising cards without needing any knowledge on how to wire and program these components. After working 20 minutes in the expert groups, the students went back to the initial groups and started to design a solution for the given problem. The idea was that students would work collaboratively sharing their knowledge gained from expert groups and developing a solution using the cards, Arduino IDE, microcontroller and a set of components.

Results

For evaluating the learning activities and tools (the cards), we used the Creativity Support Index (CSI). The CSI scoring system maps to educational grading systems, and researchers can use grades as a rule of thumb. For instance, a score above 90 is an "A," which indicates excellent support for creative work. A score below 50 is an "F," which indicates that the tool does not support creative work. The CSI also generates individual factor scores that can help a researcher understand how a tool supports various aspects of creative work. The CSI consists of two different types of ratings. The first section includes statements about the six factors (Collaboration, Results worth the Effort, Exploration, Immersion, Expressiveness, and Enjoyment) on a Likert scale where participants rate how well the cards matched with these factors (see Appendix A). Statements were about working with the set of cards, such as it was easy to work with others, explore different ideas, and be creative while using the tool. On the other section (see Appendix B), participants rate what factors they value the most when doing this kind of activity.

Table 2. Intervention Design Phase 2 The average CSI score was 67.70 (SD 12.32, n=50).

Factors	Avg. Factor Counts (SD)	Avg. Factor Score (SD)	Avg. Weighted Factor Score (SD)
Collaboration	2.67 (1.43)	15.35 (3.68)	41.47 (24.38)
Results worth Effort	2.27 (1.73)	13.39 (3.32)	28.33 (23.69)
Exploration	2.27 (1.35)	13.22 (3.76)	28.98 (18.46)
Immersion	2.16 (1.49)	10.53 (3.80)	22.04 (21.56)
Expressiveness	2.71 (1.71)	12.98 (2.89)	36.16 (23.02)
Enjoyment	2.88 (1.51)	14.53 (3.53)	41.71 (25.29)

The CSI is scored first by multiplying each factor score by its factor comparison count (the number of times it was chosen in the factor comparisons). Then, these are summed and divided by three for 0-100 index score (Carroll & Latulipe, 2009). The factor counts for any particular factor are on a range of 1 to 5, with 5 being the highest possible score. The factor score is the agreement statement responses for each which is on a scale of 1 to 20; therefore, the maximum score is 20. Weighted factor scores are calculated by multiplying a participants

factor agreement scale score by the factor count, in order to make the weighted factor score more sensitive to the factors that are most important to the given task (Cherry & Latulipe, 2014).

If we look at CSI for Design Phase 2 (see Table 2), we see that the overall average score is 67.70, providing a satisfactory score. However, for Design Phase 3 (see Table 3), the overall score moved up to 82.4. If we compare the different factors, we can see that Enjoyment factor showed the most improvement between the different design phases. Also, with small improvements in all other factors (Collaboration, Results worth the Effort, and Expressiveness). However, the Immersion factor showed a decline between the two phases. In order to understand how the tools and the activity can impact the learning experience, we can investigate the different factors.

Collaboration

Between Phase 2 and 3 Collaboration, average factor counts are 2.67 and 2.44 suggesting with the first intervention that collaboration was more critical to Phase 2 while not as crucial for Phase 3. However, the average factor scores point towards value of collaboration being higher with a score of 17.61 compared to 15.35 with a lower SD (1.86 compared to 3.68) suggesting that students in Phase 2 felt more engaged with their collaboration.

Table 3. Intervention Design Phase 3 The average CSI score was 82.4. (SD 14.19, n=36)

Factors	Avg. Factor Counts (SD)	Avg. Factor Score (SD)	Avg. Weighted Factor Score (SD)
Collaboration	2.44 (1.30)	17.61 (1.86)	42.5 (22.24)
Results worth Effort	2.64 (1.44)	16.67 (4.01)	42.5 (24.14)
Exploration	2.08 (1.36)	16.11 (3.11)	33.61 (24.58)
Immersion	1.22 (1.73)	15.08 (4.37)	17.72 (25.04)
Expressiveness	2.42 (1.20)	15.17 (3.72)	37.03 (21.71)
Enjoyment	4.19 (0.98)	17.58 (3.33)	73.75 (23.36)

Results worth the Effort

The average factor count for Results Worth the Effort in Phase 2 was 2.27 and in Phase 3 was 2.64, suggesting some importance to the students. While the average weighted scores respectively were 13.39 and 16.67, suggesting that the students required more effort to get results. However, it is essential to note that the scenarios are different in time frame and situation. The students in Phase 3 had only limited time to complete a task while in Phase 2, the students had more time, over two days.

Exploration

The average factor count for Exploration was 2.27 in Phase 2 and 2.08 in Phase 3, suggesting low importance for the students. While the average factor score for Phase 2 was 13.22 and for Phase 3 was 16.11 suggesting that the students felt more comfortable exploring the different design and technical options of the assignment with the revised cards and learning activity.

Immersion

Between the two design phases, the average factor count for Immersion for Phase 2 was 10.53, and for Phase 3 it was 15.08, illustrating the perceived level of immersion by the students. However, the SD was large for this factor. Additionally, similar to the Exploration factor, students in Phase 2 felt that Immersion was easier while in Phase 3 the pressure to perform and the time constraints limited the feeling of Immersion with more disturbances and notifications.

Expressiveness

The average factor count of Expressiveness for Design Phase 2 was 2.71 and for Phase 3 was 2.42 illustrating that the students did not generally feel that the assignment allowed them to express their ideas from concept to prototype. While the average factor score for Phase 2 was 12.98 and for Phase 3 was 15.17 illustrating the fact that the students may have experienced more control of the design tasks through the Jigsaw and the cards allowing them to work on their concepts more effectively.

Enjoyment

The average factor count for Enjoyment between Phase 2 and Phase 3 are 2.88 and 4.19, showing that this factor was especially high for Phase 3 and somewhat high in Phase 2. While the average factor scores show that for Phase 2, the students enjoyed the activity slightly less than Collaboration. However, for Phase 3, the Enjoyment factor is significantly higher, giving us insight that supporting the design activity and the tasks with additional learning materials need further investigation.

Discussion

Using the Jigsaw script together with an open-ended problem and the cards allowed students to design creative solutions with components and concepts they had not used before. Having a real purpose in learning, creating a solution to an existing problem engages students with the learning process. After being introduced to one part of the process: hardware, software, or design students worked collaboratively, sharing their new knowledge and ideas, designed a solution to an existing problem and developed the final artefacts while simultaneously learning the skills required for the whole process. Students had the opportunity to share their expertise and encourage each other by doing and trying together. Our workshop results confirm that chopping the design activity to three parts by using the Jigsaw method students were able to focus on one thing at a time. Cards made it easy for students to still have enough information without knowing about the other aspects and then collaboratively combine those three aspects into functional projects.

In Design Phase 1 and 2, when developing these skills with Arduino, students were overwhelmed and mastering two things, software and hardware at the same time was complicated. Significant challenges were encountered when students were required to apply the knowledge gained from the step by step assignments to their projects. Because previously students used wiring and coding examples without more profound understanding, they were not able to modify these examples to work with their project. These lead students to limit their thinking to components that they managed to wire and program correctly with the previous assignments. Students were struggling to explore what can be done with different components, and many groups were using the outputs and inputs for the same purposes.

For the challenges that students encountered when working with their projects, the first version of the prototype was not enough. Students needed help on how to construct their project, how to think logically, and where to start the whole process. Moreover, this is where the design activity with the cards, tested in Design Phase 3, was found helpful. The support that was needed to explain the abstract concepts had to be something else than visualisations of each part of the process, such as tips on how to wire an LED correctly. Moreover, students required help with conceptualising and exploring creative ways to use technology.

Creating a design of the project with the input, output, and conceptualising cards were working as a bridge between building the understanding of technology and developing the skills to work with the technology. Students could take a problem they have witnessed in the real world and with the help of the cards break this problem into smaller, easier to handle tasks. Breaking down to what inputs are needed to detect the world and what outputs should be triggered. When they had chosen all the inputs and outputs, they could start thinking logically: if this is detected, then this should act accordingly. Students constructed their knowledge of design thinking, computational thinking, technologies, and different components work as well as they were immediately able to apply and test their new knowledge when building and programming designed projects.

We take the view that creativity support tools are tools (digital and physical) that can be used by people in the open-ended creation of new artefacts. Our aim, with the work, has been to investigate how to create tools and activities, can be further developed to support university students creative exploration of physical computing. We see from the results that both the process (the Jigsaw) and the support materials (the cards) support collaboration, that students felt that the creativity support tools helped them achieve what they wanted. Maybe, more importantly, that the students had higher enjoyment when we combined the Jigsaw and the cards.

Conclusion

Framing our work on learning networks, we see the creativity tools support the learning outcomes, activities and tasks. While the settings and the divisions of labour can be supporting with orchestration (scripts) they are emergent (Goodyear, Carvalho, & Dohn, 2014). We have tried to focus on the physical settings through the nature of the both the digital and the materials through the use of physical computing. The CSI is a relevant instrument that can support the design of networked learning and provide insight.

This study has demonstrated that design activities can provide a more accessible approach to introduce physical computing to students from various majors. Moreover, learning physical computing through design activities allows the learner to develop computational thinking and design thinking skills for collaboratively solving problems. It is essential to develop different approaches to teach computational thinking and programming to a diverse population of people. To allow everyone to understand, actively participate, and communicate with the digital world around us.

Next steps for future work involves more structured research design with more similar groups of learners and longer time frames. One issue not to overlook is that in Phase 2, the students were generally from a social science background while Phase 3 were engineering students who were generally more familiar with lab workshops and different aspects of technology. However, the structuring of the learning activities with the support of the cards provides needed orchestration for teaching creativity with technology.

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Appendix

A. First part of the CSI

Creativity Support Index

It was easy to work together with others while using the cards.

Disagree | | | | | | | | | | | | | | | | | | | | | | Agree

I enjoyed using the cards and would use them again.

Disagree | | | | | | | | | | | | | | | | | | | | | | Agree

It was easy for me to explore many different options, ideas, designs or outcomes, using these cards.

Disagree | | | | | | | | | | | | | | | | | | | | | | Agree

With the help of the cards, I was able to be very creative while creating my own Arduino project.

Disagree | | | | | | | | | | | | | | | | | | | | | | Agree

I became so absorbed in working with the cards that they "disappeared" and became a natural part of my workflow rather than an extra tool.

Disagree | | | | | | | | | | | | | | | | | | | | | | Agree

Using the cards helped me achieve what I wanted to create with Arduino.

Disagree | | | | | | | | | | | | | | | | | | | | | | Agree

B. Second part of the CSI

Creativity Support Index – Factor rankings

For each pair below, please select which factor is most important to you when doing this activity:

Enjoyment___ OR ___Expressiveness

Collaboration___ OR ___Results worth the effort

Exploration___ OR ___Immersion

Expressiveness___ OR ___Collaboration

Results worth the effort___ OR ___Exploration

Immersion___ OR ___Expressiveness

Enjoyment___ OR ___Collaboration

Expressiveness___ OR ___Results worth the effort

Immersion___ OR ___Enjoyment

Collaboration___ OR ___Exploration

Results worth the effort___ OR ___Immersion

Exploration___ OR ___Expressiveness

Enjoyment___ OR ___Exploration

Collaboration___ OR ___Immersion

Results worth the effort___ OR ___Enjoyment

Mixed methods with social network analysis for networked learning: Lessons learned from three case studies

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Abstract

In our research we study small group interaction and meaning making in the context of a larger community of people and artifacts. Our research methodology combines social network analysis and content analysis in different ways. The primary purpose of this paper is to explore approaches and demonstrate the feasibility of mixed methods research combining network-level and content-level methods. We report our experiences from three case studies (Get Satisfaction, Canvas, r/place), which include individual variation (innovative approaches toward integration) and a common approach of "zooming in," or shifting perspective between bird's eye and detailed levels of interaction data during analysis (message content, dialogic structure, or visual artifact vs. patterns of users and their interactions). We show that the two sets of methods in combination can eliminate shortcomings of the separate methods used independently.

Keywords

Mixed methods, social network analysis, interaction analysis, discourse analysis, networked learning

Introduction

Networked learning researchers have suggested the "network" metaphor to conceptualize the different forms of social organization in learning activities to help better understand the phenomenon (Ryberg & Larsen, 2010). Haythornthwaite and De Laat (2010, p. 186) referred to networked learning as "an emerging perspective on learning that aims to understand the network processes and properties – of ties, relations, roles and network formations – by asking how people develop and maintain a 'web' of social relations for their own and others' learning". We also understand networked learning along the lines of the "second approach" provided by Dohn et al. (2018) who said, "What makes learning 'networked' is the connection to and engagement with other people across different social positions inside and outside of a given institution. The network is supportive of a person's learning through the access it provides to other people's ideas and ways of participating in practice" (p. 204). This calls for perspectives from several disciplines, including computer supported collaborative learning (CSCL) and computer supported cooperative work (CSCW), and the combination of research methods. In our research we have focused on integrating social network analysis (SNA) and content analysis in three settings: cooperative work, collaborative learning, and collaborative content creation.

For many years qualitative and quantitative research methods have been clearly distinguished as separate and distinct, as they are derived from respectively discrete research traditions with unique underlying assumptions of epistemology. As such, the two approaches differ in their perspective of learning and knowledge. While the primary goal of qualitative research is to clarify the characteristics or attributes of a phenomenon in focal areas, quantitative research attempts to in some way measure the same phenomenon using a wider lens (Widerberg, 2001). In recent years the weaknesses of both methods have received increased awareness and attention, and a possible solution for overcoming the weaknesses has been proposed, which involves the combined use of the two methods, also referred to as mixed methods research (Lund, 2012). The increased interest in mixed methods can be explained, according to Hollstein (2014), as the attempt by researchers to merge the strengths of both qualitative and quantitative methods and, in the process, counterbalance the respective weaknesses of both approaches.

In this paper we present three examples of mixed methods research employed to analyze empirical data in the areas of cooperative work, collaborative learning, and collaborative content creation. Each of the three case studies applies SNA as the quantitative method, combined with one of three alternative content analysis

methods: interaction analysis (case 1), discourse analysis (case 2), and visual artifact analysis (case 3). The term *content analysis* is used here as a general term to represent the qualitative method category, not as a reference to its established use for describing the research technique for coding and analyzing segments of textual data, which is outside the scope of our work. The main purpose of this paper is to address how mixed methods research, integrating SNA and content analysis, can be useful in examining a networked learning context, such as online communities like discussion forums on social media or learning management systems. We survey related work on the development and use of these methods (background, concepts, and empirical results) before we embark on our own case studies.

Social Network Analysis and Content Analysis

Researchers in SNA use terminology and procedures from the mathematical graph theory to study networks (De Nooy, Mrvar, & Batagelj, 2011). The basic entities are nodes (vertices) and edges (links, ties). Social network analysis pertains to finding (usually by computer) patterns of relationships of nodes and edges using matrix algebra (matrix representation of "1s" and "0s" with computers) (Scott, 2000). The results of a social network analysis after matrix computation are visual (e.g., sociogram) or structural properties or measurements (e.g., table) of nodes and whole networks (Borgatti, Everett, & Freeman, 2002). For example, the degree centrality measure of a node is the number of ties held by that node, which consists of indegree and outdegree values for a directed graph and degree values for an undirected graph (Freeman, 1979). In plain terminology, degree centrality is an indicator of a person's importance in a community based on the number of interactions (e.g., number of telephone calls or posts and comments in a Facebook group) the individual has been involved in, where high outdegree indicates influence and high indegree indicates popularity (Andersen & Mørch, 2016).

Social network analysis originated in the early to mid-20th century but increased in popularity with the emergence of computers for use in automating the collection and analysis of large networks (tedious or impossible with manual methods) and performing analyses of online social networks (Java, Song, Finin, & Tseng, 2007). At first, primarily sociologists, anthropologists, and psychologists used SNA, but today it also used by political scientists, computer scientists, and information scientists, among others. In many online communities, access to data is simplified by crawling or web scraping, which means that the edges between nodes are openly accessible online and can be captured more easily using SNA tools (Mislove, Marcon, Gummadi, Druschel, & Bhattacharjee, 2007). Sites that allow for this data extraction feature provide an opportunity to measure and study online social networks on a large scale. Examples are public Facebook groups and Twitter lists, which can be accessed with social network analysis tools, such as NodeXL (Smith et al., 2009), among others.

A dual focus is inherent in some social networks, such as those involving persons and affiliations (Breiger, 1974) and those involving persons and mediating artifacts (Harrer, Malzahn, Zeini, & Hoppe, 2007; Suthers & Rosen, 2011), which gives rise to two types of social networks, single-mode (or ordinary) and two-mode (affiliation). A single mode network is represented by nodes and edges as described previously and exemplified by face-to-face (direct) interaction, telephone calls, and online chatting, whereas two networks are required for a two-mode network. A classic example of a two-mode network was examined in an anthropological study where data were collected on 18 women who interacted at one or more of 14 social events in a community in the southern United States (Davies, 1941). By analyzing the patterns of which women were present (or absent) at which events, it was possible to infer an underlying pattern of social ties, factions, and groupings among the women (Breiger, 1974). The discussion forum constitutes the "social event" in online communities and is often represented as a two-mode network, involving two networks of actors and topics, where the latter mediate the former (Harrer et al., 2007; Suthers & Rose, 2011; Andersen, 2018). Social network analysis measurements of two-mode networks are time consuming and are usually transformed into a single-mode network before computation (De Nooy, Mrvar, & Batagelj, 2011). An underlying assumption for inferring relationships in a discussion forum is that when people are sending posts and reply-to comments on the same topic, they are connected by an edge in the equivalent ordinary (single-mode) network (Andersen, 2018; De Nooy, Mrvar, & Batagelj, 2011; Harrer et al., 2007). Suthers & Rosen (2011) suggested using "associograms," which are intermediate representations obtained from lower level write and read events to provide stronger evidence for interaction in discussion forums. There is no intrinsic reason for stopping at two-mode networks; indeed, multimodal networks have been proposed for complex communities (Breiger, 1991) and different types of media (Suthers & Rosen, 2011). In one of our case studies (case 3), a visual network of tiles on a pictorial canvas serves as a third-network that complements a two-mode network of users and discussion threads.

Social network analysis and other network analysis methods give us the big picture of a large dataset of actors, interactions, affiliations, and mediating artifacts. However, the big picture (e.g., a sociogram or a table of

structural properties) cannot tell us anything about the detail (content) of the interactions, for example, if two actors who communicate agree about a point of view, if they exchange information to persuade each other, and how they gradually develop understanding over time, which are key aspects of coordination, meaning-making, and collaborative knowledge construction. The social interactions occurring in networked learning environments are supported through dialogue between actors. To understand the dialogue, we need to analyze the content of interactions, for example, through interaction analysis (Jordan & Henderson, 1995), which focuses on how to produce accounts of people's verbal activities in terms of turn-taking and meaning-making (constructing meaning over time). However, it is difficult to evaluate the quality of collaborative learning without tracing the interactive contributions of the individuals involved (Gašević et al., 2019). Therefore, we also explored another example, discourse analysis, which analyses transcripts of discussions and large amounts of text generated during online interactions to gain insight into the nature and quality of students' digital artifacts. In our case, it meant looking for patterns of activity that correspond to meaningful learning and knowledge construction (De Liddo et al., 2011). We make use of interaction analysis in case 1, discourse analysis in case 2, and analyze the visual contributions of the collaborators in case 3.

Previous Work Combining SNA and Content Analysis

In this section we review selected studies that combine SNA and CA, since this is our focus. The selected studies were found by online database searches and chosen due to their relevance to our mixed methods research in networked learning. We were inspired by this work and built on their ideas to create new knowledge.

Martínez, Dimitriadis, Gómez-Sánchez, Rubia-Avi, Jorrín-Abellán, and Marcos (2006) applied a mixed methods approach in three case studies to examine the participatory aspects of learning in CSCL contexts. Social network analysis data was triangulated with data sources that included observations and interviews. Technology was an asynchronous communication tool supporting messages and document sharing (BSCW). Technology supported indirect communication, which pointed toward a two-mode network modeling, i.e., distinguishing two types of nodes (users and shared artifacts, i.e., folders in the BSCW collaboration software in this case). Our work is related in that we use two-mode networks in two of our cases, but we use interaction analysis and visual artifact analysis as our content analysis methods.

De Laat, Lally, Lipponen, and Simons (2007) used SNA with a mixed-methods approach, combining SNA with content analysis and context analysis (online postings and interview data), referred to as a multi-method research framework for studying networked learning. This method is used for understanding message exchanges in online courses. The authors used SNA to zoom in on regions of high density to carry out content analysis, using the outcome of one method to further understand the subsequent method. They also used timeline analysis to capture development over time (beginning, middle, and ending phases). However, they do not refer to artifacts outside the social interactions, as we do in our cases.

Fugelli, Lahn & Mørch (2013) used SNA in combination with interaction analysis to understand the evolution of intersubjectivity in an open source software development community and created an early version of a process model for mixed methods research. This consisted of three steps: 1) identify regions in the network that are interesting from the point of view of intersubjectivity, 2) identify meaning-making processes in the selected regions, and 3) identify the mechanisms that trigger the meaning-making process. Our work was inspired by this research; we developed it further for educational settings and using new theoretical frameworks.

Kolleck (2013) studied social innovations applying a mixed methods approach, combining quantitative SNA and questionnaires with qualitative semi-structured interviews and egocentric network maps. The participants constructed the egocentric network maps during the interviews, the maps providing important data in their own right, but also working as tools to guide the interviewer in asking relevant questions about the interviewees' relationships. This integration of methods provided insights of both the structural characteristics of the studied networks as well as each individual's own understanding of his or her place within them.

Baker-Doyle (2015) employed a tri-model for mixed methods social network analysis to study teachers' support-seeking behavior and experiences. The analysis led to the identification of network members who were unreported by participants in socio-metric survey data yet were nonetheless significant members of teachers' professional support networks. Such a result would have been invisible in traditional SNA analysis. By exploring the characteristics of the relationships, critical moments, and the contexts in which these relationships became engaged, the tri-modal model helped to uncover the invisible networks.

In a recent study on classroom group discussion, Bruun et al. (2018) combined discourse and network analysis methodology to identify relationships between content and group dynamics. The discourse analysis method identified relationships between content and group dynamics, and the network analysis method used the same data to identify meaning-related dynamic structures found in the data. This methodology led to the attainment of greater analytic insights than would have been possible by either of the two methods individually. The strength of the work is an example of connecting discussions and structural representation of the dynamics of the discussion, serving as two reciprocal mechanisms for developing ideas over time in discussion forums.

Three Case Studies

Below we present data from three case studies to provide empirical evidence for our research efforts at exploring alternative approaches to mixed methods research combining network-level and content-level methods. For each case, the context of the study, integration of the methods, and analysis of the empirical data are described. This includes discussion on the integration of the two datasets for each case and what information they provide in total.

Case 1: Get Satisfaction

Context of the study: Get Satisfaction (GS) is a customer engagement platform consisting of a bundle of online communities for involving customers in product development activities, which are the focus of the case study. GS has more than 63,000 online communities and boasts 9,600,000 visitors a month. The online community is structured around questions and answers, organized under four different topic threads: 1) ask a question, 2) share an idea, 3) report a problem, and 4) give praise. The research focus for the case study was identifying the interactions between end users, champions, and professional developers in the online community as they jointly created a shared artifact (a web application) in different processes defined as mutual development (Andersen & Mørch, 2016). The data were collected from the publicly available platform over a six-month period.

Integration of the methods: We integrated two sets of methods in two ways: 1) SNA was used to analyze the whole dataset, which was followed by zooming into a specific region to further investigate in detail from a interaction-level perspective; and 2) SNA data was brought into the interaction analysis by presenting the SNA centrality measures "tagged" or connected to each utterance given by the participants.

Analyzing the empirical data: The data extract presented in Figure 1 was derived from one of the largest discussion threads in the GS online community. The extract shows the beginning of the thread that deals with the topic of "sticky threads" as part of the discussion forum. *Sticky thread* is a term assigned to threads deemed important, appearing before the others in Internet forums. Two end users, three champions, and one developer are part of the extract. Figure 1 illustrates how SNA and interaction analysis are combined during analysis of the empirical data and during visualization of the empirical data (Andersen & Mørch, 2016).

Turn	Actor	Text from discussion thread	nDeg	nBet
1	E_125	Offer sticky or featured topics	3.084	0.00
2	D_5	Hi, End user 125, You can make a reply "sticky" but we don't currently have a mechanism for making a post sticky. If you're a company rep you can use the "Company Update" topic type to post that topic on your company home page, which might partially solve the issue for you. Can you describe your need a bit more?	8.157	8.009
3	E_125	I am a company rep in GS and we got this question from our users a couple of times. They see a post (be it a question or an idea shared), and they suggest making the thread/post sticky. And I just wanted to see if there is a way in GS to do so. Thanks for your reply. I will look into your suggestion.	3.084	0.00
4	C_1	Just got a similar request from one of our users. http://getsatisfaction.com/izea/topic...	1.713	1.484
5	C_7	I've shared this with the product team - I'm working on pulling together a community-manager focused release to help get some of these ideas and bugs all bundled together for maximum awesomeness. Stay tuned.;)	5.042	2.188
6	E_131	Any progress on sticky topics?	3.084	0.00
7	C_7	We're getting closer, but it's a tough change! I'll update over here once we've rolled it out	5.042	2.188
8	C_2	I do think there is room for a "sticky" if we just arrange things a little and have them on the left side bar or the right side bar maybe in a smaller text. FAQ would be ideal. I did a very quick and rough example here but you get my drift lol	6.828	9.112

Figure 1: Excerpt from a discussion thread in GetSatisfaction using format for interaction analysis that extends the Jordan & Henderson (1995) format with two columns: nDeg and nBet, importance according to Degree (ability to find and give information) and Betweenness (ability to block or spread information).

This data extract helps to illustrate the processes that emerge when different stakeholders collaborate and interact when co-creating a shared artifact. In the extract we can see that it is the end-user who initiates the idea for further development of the web application when suggesting the new "sticky feature." What is interesting in this extract is the role of the champions. Champion 2 makes an important decision at the end of the extract. However, we do not know in the outset whether or not to trust Champion 2 regarding the power and quality of the posting. Viewing the postings of Champion 2 from a purely interactive ("here and now") perspective would not reveal the history of his or her previous interactions in the community. When we look at the data taking the

SNA perspective into account, we see that Champion 2 is the most powerful champion in the network, having a degree centrality of 6.828 and betweenness centrality of 9.112. This excerpt is part of a central mass collaboration process defined as bridge building in Andersen and Mørch (2016).

Case 2: Canvas

Context of the study: Canvas is a learning management system (LMS) that simplifies the organization of course content for students, teachers, and administrators in educational institutions. In this study, Canvas was used as a platform for online discussions within a blended bachelor's course (i.e., involving face-to-face and online activities) at a public university in Norway. The main objective of the course was to introduce selected learning technologies and applications and to familiarize students with the central theoretical perspectives of technology-enhanced learning. The course included eight compulsory online discussions on eight different topics, and face-to-face lectures over eight weeks between January and April 2019. The discussions were conducted asynchronously and were text-only. For each week, teachers initiated a new discussion thread based on the topic of the next face-to-face lecture. Each student was expected to make two contributions and respond to at least one other student every week. The primary research focus of the case study was on exploring the potential of social learning analytics (i.e., social network and discourse analysis combined) to support teaching and learning decisions in online learning environments.

Integration of the methods: For the first approach (SNA), the network data of 34 students and 4 teachers were analyzed using NodeXL, a third-party social network tool (Smith et al., 2009). For the second approach (discourse analysis), we used social network analysis metrics (i.e., degree and betweenness centrality) to "zoom in" on the more active and less active students to inform further discourse analysis (Kaliisa, Mørch & Kluge, 2019). Discourse analysis of students' discussion content was performed using Coh-Metrix, a computational linguistics tool for analyzing higher-level features of language and discourse (McNamara et al., 2014).

Analyzing the empirical data: The findings of the first analysis (SNA) revealed information about the characteristics of students' interaction patterns across the eght weeks, with some students demonstrating more activity in the discussion forum than others. However, the findings from the second analytic action (discourse analysis), which examined the actual discussion content, provided greater understanding of the nature and quality of students' contributions that would not have been visible by employing a single approach. For instance, as illustrated in Table 1, the results revealed that the students who had high centrality measures were associated with contributions having higher referential cohesion and syntax simplicity, which means that their text had simple familiar syntactic structures and ideas within the text were well connected. On the other hand, students who had a less central position were characterized with a more narrative style discourse, which implies an informal style of discourse (Kaliisa et al., 2019).

Table 1: SNA centrality and discourse metrics for more active and less active students in Canvas

SNA Metrics	More Active Students					Less Active Students				
	S3	S17	S9	S14	S28	S10	S25	S27	S31	S32
Degree	7	6	4	2	3	1	1	1	1	1
Betweenness	94	33	25	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Discourse Analysis Results										
Narrativity	36	78	2.2	71	35	44	70	58	61	93
Deep Cohesion	81	60	0.8	50	80	39	87	93	83	99
Referential Cohesion	51	41	67	46	77	2.7	29	16	20	56
Syntax Simplicity	60	30	15	37	34	23	18	4	11	18

Case 3: r/place

Context of the study: r/place is the name of an event that took place on the social media site Reddit on the first three days of April 2017. During the event, participants had access to a virtual "canvas" (not to be confused with

case 2) of 1000 x 1000 single color tiles. The canvas started out empty (all tiles were white), but participants could color (i.e., "place") tiles on the canvas using any of the 16 colors provided. However, after coloring a single tile (in a single color), each participant had to wait five minutes before coloring another tile. These constraints meant it was difficult to create meaningful objects alone. Within the first day of the activity, the participants began working together to develop and maintain objects. They also developed Reddit communities (discussion forums) to coordinate the construction and maintenance of the visual objects. At the end of the event, over 1 million users had placed over 16.5 million tiles (Reddit, 2017). The data we present here are based on a specific region on the canvas (coordinates x in the 375–529 range and y in the 375–529 range, which became an adaptation of the Mona Lisa) and its related online community, The Mona Lisa Clan.

Integration of the methods: We integrated quantitative and qualitative methods in three ways: 1) SNA helped to "zoom in" on particular regions of interest in the discussions using network degree centrality, as in the first two cases, 2) SNA helped to understand the structural context of the discussions by tagging individual utterances with node degree centrality, as in the first case, and 3) whole discussions are connected to visual objects by a URL tag (e.g., r/monalisaclan are printed in tiles in the Mona Lisa picture, see Figure 2) (Litherland, 2018).
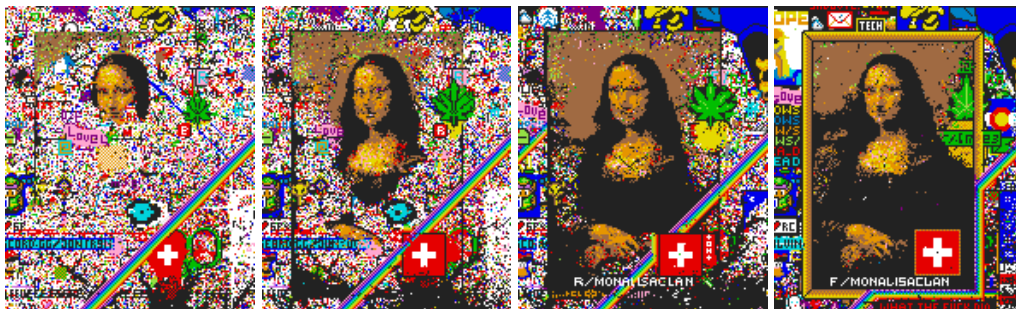
Figure 2: The Mona Lisa visual artifact evolving on r/place

Analyzing the empirical data: The users were not instructed to create URL tags, but many of the 1,500 objects that emerged during the experiment ended up having tags to discussion forums to coordinate construction and protect the region from vandalism from neighboring groups. The application of structural analysis to both visual artifacts and talk (discussion forum posts) to understand the r/place event were undertaken because they were organized as networks of lower level building blocks and analyzed by network analysis methods (relationship of tiles to color and region where they belonged, and relationship of users and who they communicated with). The latter relationship was examined using SNA and the former using visual object placement graph (Figure 3).
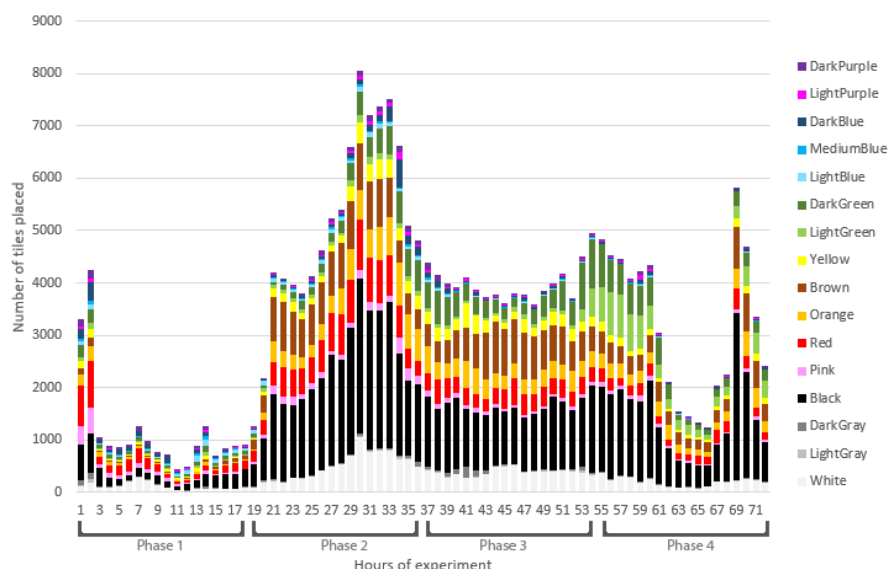
Figure 3: Visual object placement graph: Number of tiles placed by color per hour in the Mona Lisa region on the pictorial canvas.

The two types of networks had similar structures but did not change in the same way. The average degree centrality in the social network was stable at about three for the entire period, i.e., on average three postings per person (sending and receiving messages) in the Mona Lisa Clan discussion forum. The activity on the Mona

Lisa picture revealed a wavier pattern (Figure 3), a dynamic relationship driven by the emergent sub-parts appearing in the image (Figure 2). Thus, we found evolutionary development in r/place in both visual artifacts (pictures were created and maintained over time) and coordination talk (discussion and persuasion). They were not formally connected at the network level but tightly connected at level of meaning making (interaction).

Summary of the Three Cases

Table 2 provides an overview of the different data methods, duration of study, number of participants and networks, and tools used for analysis in the three case studies.

Table 2: Case studies overview of methodological features and choices

Individual case	Qual Method	Quant Method	Collected data and length of study	Networks and nodes (*N*)	Analysis tools used
Case 1: Get Satisfaction	Interaction analysis of the text from discussion forum posts and replies	Social network analysis of the interactions between end users, professional developers, and champions	Postings in the discussion threads in the online community from March 2012 to August 2012	Two-mode network: $N1$ = 229 participants (End users, professional developers, and champions) and $N2$ = 41 discussion threads	UCInet and DNA
Case 2: Canvas	Discourse analysis of discussion forum posts and replies	Social network analysis of students' online interactions	Postings in discussion threads (399) from Jan 2019 to April 2019	One mode network: N = 38 participants (34 students and 4 teachers)	NodeXL and Coh-Metrix
Case 3: r/place	Interaction analysis of the text from discussion forum and visual artifact analysis	Social network analysis of user interactions and analysis of visual artifacts (visual object placement graph)	Discussion threads made Apr. 1st-3rd collected Feb 2018 to Apr. 2019. Visual object placement graph from public data file Apr. 2019	Two-mode network: $N1$ = 161 users, and $N2$ = 72 discussion threads, and a visual object network with $N3$ = 243,103 tiles	Excel and Pajek

The values in Table 2 were partly chosen by the researchers of this study and partly determined by the type of discussion forum analyzed. In cases 1 and 3, the GS and Reddit discussion forums are topic-based, which means participants interacted indirectly, mediated by topic, which required a two-mode network. In case 2, using Canvas, discussants interacted by responding to a posting or comment created by another participant (e.g., like a Facebook group discussion), and interaction was direct, which allowed us to model interaction by a single-mode network. In case 3, a third network was added to the analysis, visual objects network of pixels. This network level representation of a visual artifact was compatible, though not formally connected, with the discussion forum at the network level (both had nodes and edges), thus allowing for structural comparison.

General Discussion

In this section we discuss and compare the various approaches to mixed methods presented in this paper. The focus of our discussion is not on the empirical data in the case studies but on the methods applied and the strengths and weaknesses experienced. Additionally, we compare our approaches with related work.

Lessons Learned

Case 1 (Get Satisfaction) strengths: Employing a mixed methods approach on a large set of data in a mass collaboration context that focuses on mutual development of a shared artifact (web application) was found to be very useful. It provided a rich dataset and two very different perspectives on mass collaboration in an online community. The network level (SNA) yielded an overview of the empirical data serving as a zoom; the interaction level (IA) provided detailed explanations of select segments of the empirical data. This informed a

more comprehensive understanding of the phenomenon of mutual development than either method by itself could have done (Andersen & Mørch, 2016). At the interaction level, SNA was used to tag the different participant utterances with network-level data, thus connecting socio-historical structural properties (spanning months to years) with content-specific interaction data unfolding in real time (spanning minutes to days).

Case 1 (Get Satisfaction) weaknesses: Combining two different research methods stemming from very different research traditions and capturing different time spans is not without obstacles. For example the SNA measures may not always be accurate as participants can receive high scores also for rudimentary content and short texts. In addition, the process of coding the empirical data was very time consuming. A better solution could be to scrape and generate SNA data ready for UCInet (Borgatti et al., 2002) directly from a webpage.

Case 2 (Canvas) strengths: The implication derived from the analysis for this case study is that even though social networks on a learning management system do not necessarily show evidence of knowledge construction among students, this process can partly be monitored through discourse analysis, thus empowering teachers to create criteria for teaching and learning decisions. In other words, combining social networks and discourse analyses can provide quick and useful insights for teachers' understanding of their students' cognitive and social characteristics of their learning processes. Consequently, this can be used to empower teachers in creating informed decisions for the purpose of redesigning courses delivered on an LMS to improve networked learning processes (Kaliisa et al., 2019).

Case 2 (Canvas) weaknesses: The main limitation of the methodology presented in this case lies in the complexity of establishing students' learning processes based on the SNA and discourse metrics in combination. Further research is needed to understand how SNA and discourse analysis can be combined to monitor collaborative knowledge construction processes and whether different social ties yield different discourse structures (i.e., through, for example, networks) over time.

Case 3 (r/place) strengths: As we only used data from open Reddit communities, and the r/place dataset itself was openly available, data collection was simple. While the implication for learning might not be obvious, our approach revealed that participants practiced a wide variety of skills pertaining to collaborative content creation, and that actions on the canvas influence the related social networks and vice versa, thus complementing each other. We argue that by viewing r/place through a single lens (e.g., SNA by itself), we would not have been able to reveal this interconnectedness, nor the intra-connectedness within single communities and visual objects.

Case 3 (r/place) weaknesses: Although the mixed methods approach allowed us to capture some aspects of the r/place event, additional work is needed to determine how to further integrate different methods to understand not only the structural aspects of collaboratively created visual objects and their connected communities, but also their qualitative aspects, and how these two realms are complementary in terms of, e.g., meaning-making.

Implications for Learning in Networked Communication

The experimental studies and system building efforts reported by Martínez and colleagues (2006) and Harrer and colleagues (2007) represent early efforts to use SNA in CSCL contexts. Those authors revealed a compatibility of mediating artifacts, such as information sharing systems and collaboration software, and two-mode networks in SNA. Our work was inspired, in part, by their work, but our empirical settings are broader in scope, as we accessed data from commonly available information sharing systems (e.g., public websites and institutional LMS), thus demonstrating the approach to different settings of networked learning like distance education and mass collaboration. Learning can be divided into collaborative learning and individual learning. According to Stahl, Koschmann & Suthers (2006), "CSCL locates learning in meaning negotiation carried out in the social world rather than in the individuals' heads." In the cases reported from here we have studied collaborative learning at the small group level within the context of a larger network of communication. We have studied group interaction and meaning making by content analysis methods mediated by artifacts and more knowledgeable persons. In case 1 & 3 we analyzed argumentation, negotiation, and persuasion about improving a shared artifact, a web application (case 1) or a visual artifact (case 3). In case 2 we analyzed collaborative knowledge construction in a Canvas discussion forum by undergraduate students responding to and advancing understanding of topical questions raised weekly by instructors in a technology-enhanced learning course. All three case studies are conducted in a context of online learning and focus is on networked communication in different ways. In case study 1 and 3, the context is an online discussion forum that mediates the participants' communication. In case study 2 the context is also in an online platform, however the focus is not on analyzing the online communication between students, but on how they use Canvas. Finally, in case 3, the focus of the communication is to coordinate the evolution of a visual artifact (a reconstruction of Mona Lisa in pixels).

The three case studies have in common the mixed methods approach (combining content analysis and SNA). However, we found it is time consuming to carry out the analyses and there are epistemological challenges

connected with the methods' originating in different research traditions. Foregrounding research questions with an argumentation for the relevance of combining methods for addressing them can help to counterbalance the weakness. The strength of the mixed methods strategies we employed is that the methods complement each other by providing two distinct views of the data, qualitative and quantitative, which provides a richer understanding of the complexity of large scale (in number of participants) networked learning. From a qualitative perspective we gain insight into the meaning making and collaborative knowledge creation of small group networked communication, whereas from a quantitative perspective, we get a bird's eye view of the important structural properties of the entire network. Taken together these two data sets provide more complete information about networked learning processes.

Conclusions and Suggestions for Further Work

The primary aim of this paper was to explore approaches to mixed methods research combining network-level and content-level methods. We addressed this by presenting three case studies, each applying a different mixed methods research design. Based on the implications derived from the three cases, we argue that mixed methods approaches can offer tools for researchers to capture students' meaning-making and online collaborative learning patterns in a more comprehensible way that would be obscured when using only one of these methods.

This article contributes to the literature by highlighting the potential of an analytic strategy that combines SNA with content analysis. This strategy means having two different levels of information (quantitative and qualitative) providing a macro and micro perspective on the dataset. From a quantitative perspective SNA provides a birds eye view of the total amount of data focusing on mathematical measurements of the actions and interactions in the network, and from a qualitative perspective a content analysis provides an empirical and in depth perspective on selected elements of the data accomplished in part by human interpretation. In total, one can say that the SNA is used as a zoom (macro perspective) for selecting what data to go into depth about (micro perspective). With SNA we identified key actors and their interaction patterns, according to centrality measures. We explored three different methods for content analysis (interaction analysis, discourse analysis, and visual artifact analysis). At the qualitative content level, we zoomed in on specific interactions or content areas, allowing focus on the details of the interactions. Conducting the quantitative analysis involved a four-step method (inspired by Andersen & Mørch, 2016): 1) the data were imported from the online community, 2) a data analysis tool was used to code the statements using thematic analysis, 3) the data were prepared for SNA analysis, and finally 4) a SNA software tool was used for computing centrality measures, Ucinet (Borgatti et al., 2002) in case 1, NodeXL (Smith et al., 2009) & Pajek (De Nooy, Mrvar, & Batagelj, 2011) in cases 2 & 3.

One possible idea for further study is to develop an integrated multi-level interaction analysis methodology, and we suggest two avenues to follow: 1) choose interaction as the unit of analysis and bring SNA level information (structural properties) to this level as parameters (tags) for interaction analysis, as we demonstrated in cases 1 and 3, and 2) start with the social structure as the unit for analysis and bring interaction level information (e.g., discourse data extracts) to this level. We plan to explore this avenue with case 2, using epistemic network analysis (ENA) tools to model learning processes by constructing networks that represent learners' cognitive connections (Shaffer, Collier, & Ruis, 2016). We argue that this might provide us with a thicker and richer description of the data and understanding of the learning processes, as it yields quantifiable and qualitative information about the network and visualization of learning trajectories over time for individuals and groups.

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Personal Networks Supporting Workplace Learning - A Case Study in the Finnish Defence Forces

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Abstract

This paper is a case study researching personal social networks and their meaning to individual-level learning processes in the workplace. The study was based on the knowledge-creation metaphor of learning. Employees' personal networks are seen as an important component of their learning potential and competence. Methodologically, the paper presents a relatively new technique of Social Network Analysis (SNA), namely, the qualitative egocentric network interview, and a new way of presenting research findings in visual form. The context of the study is the Finnish Defence Forces (FDF) and it was conducted in three companies of one brigade-level unit of the Finnish Army. An egocentric network interview was conducted with ten Non-Commissioned Officers (NCO). The interview data was analysed with qualitative content analysis, and the networks were visualised with the Cytoscape software. The egocentric network analysis showed that the people in the same company created a major support structure for the NCOs' workplace learning. However, nearly all NCOs had important network structures that were formed around their individual expertise and tasks. The networks varied considerably in size and composition, but had certain connecting features. The networks had three main components; one, the personnel of the NCO's own unit provided important social support. Two, every NCO had networks related to their own specific task, and three, some NCOs had networks formed through various stages of their life that were still active and useful in their current job. The different ways in which the networks enable and support workplace learning are discussed. In addition, some methodological issues of social network analysis are addressed.

Keywords

Workplace learning, Personal networks, Social network analysis, Egocentric network interview

Introduction

Learning through work has become an increasingly important factor for organisational success. Organisational learning is a line of research that originated in the 1960s. How organisations actually learn is a debatable point, but organisational learning always starts from the learning individual. (Argyris 1999.) Workplace learning is a line of research that analyses these practices and learning at the worker level. However, a common misconception is that individual learning somehow accumulates into organisational learning (Adler & Cole 1993; Berends & Lammers 2010). Worker-level learning needs supportive organisational practices that enable formation and consolidation of team-level knowledge. Team learning has traditionally been understood as a mediating level between the worker and organisational levels of learning. Thus, this article focuses on the social dimension of workplace learning. However, due to the changing nature of work, instead of analysing team-learning, this article studies worker-level learning from the viewpoint of personal social networks.

Social networks have growing support within learning research, and they are viewed as a central part of today's work activity and organisation (Nardi, Whittaker & Schwarz 2002). However, the concept of network itself has multiple different meanings, and is ambiguous and even contradictory, which makes finding shared understanding even harder (Toikka, Miettinen & Tuunainen 2016). In recent years, similar metaphorical concepts such as rhizome (Huhtinen & Rantapelkonen 2014) and mycorrhizae (Engeström 2007) have been used. The growing meaning of networks can be traced back to globalisation, decentralisation of governance, the blurring of lines between public and private sector, and above all, the rapid growth of information networks.

(Mattila & Uusikylä 1999.) The significance of networks in current society has grown so much that van Dijk (2002) actually proposes that we live in a network society.

The changing organisation of activity and work also require new tools for analysing them, in order to capture the essence of change. This article utilises social network analysis in researching workers' personal social-learning networks. A lesser-known technique of social network analysis, namely, the egocentric network interview, is used to analyse these learning networks. The technique allows the interviewees to reflect on their networked support structures, and provides a deeper, more personal understanding of their significance for individual-level learning processes.

The context of the case study is the Finnish Defence Forces (FDF). Along with other sectors of public governance in Finland, the FDF view an organisation's capacity to learn effectively as an important predictor of success. Traditionally, the FDF have relied on extensive basic training in soldiers' competence development. However, due to large structural changes in the FDF's training system, major changes have taken place. The competence development of the Finnish Army's Non-Commissioned Officers (NCO) is based on guided workplace learning and in-service training system. Consequently, there are growing demands on the conscript-training companies to serve as supportive learning environments. Traditionally, experienced instructors have mentored the novices, but the new concept of guided workplace learning puts strong emphasis on planning individual learning pathways and extensive monitoring of the learning outcomes.

Personal social networks as a learning resource

Traditionally, learning is defined as a psychological process where the knowledge, skills, and attitudes of the learner undergo relatively stable transformations. Consequently, the traditional view of learning is depicted with the metaphor of knowledge-acquisition (Sfard 1998). This metaphor views knowledge as stable and quantifiable. The learner acquires more knowledge, refines and combines it, and forms a more complete understanding. However, social support is seen as a central component of an effective learning process. The participation metaphor is a commonly used concept when we try to understand the social view of learning (Sfard 1998; Paavola, Lipponen & Hakkarainen 2004). This metaphor emphasises the social construction of knowledge. Communities of practice (Lave & Wenger 1991) is a widely used theoretical concept of the participation metaphor of learning. It views learning as a situated process, where the learner gradually moves from the peripheral areas of learning towards full participation and membership of the community (Lave & Wenger 1991).

However, the notion of participation was formulated by researching traditional handicraft occupations. Work of today is often described as knowledge-rich, and the linear concept of "legitimate peripheral participation" introduced by Lave and Wenger (1991) does not capture the essence of work in the 21st century. Several work communities of today operate in various networked forms, instead of traditional teams (Nardi, Whittaker & Schwarz 2002; Engeström 2008). Traditional organisational boundaries have opened, and today's work requires more and more collaboration between organisations, which often takes the form of multidisciplinary working groups, where experts from different vocational fields come together (Edwards 2010). In addition, the developing field of technology makes new forms of organising and communication possible (Nardi et al. 2002). Several researchers (e.g., Nardi et al. 2002; Engeström 2008; Milligan, Littlejohn & Margaryan 2015) have argued that teams are still relevant, but no longer the centrepiece of labour. Instead, they propose more fluid forms of organisation, such as knots, which refers to constant tying and untying of work activities in order to achieve the goals and objectives of working (Engeström 2001; 2008).

On the worker level, these fluid forms of organisation are realised as social personal networks. Personal networks of the working team's members serve as important knowledge resources that can enhance the working team's knowledge (Nardi et al. 2002; Hakkarainen et al. 2004). The significance of social networks for learning has been emphasised especially within the so-called trialogical knowledge-creation metaphor of learning (Hakkarainen et al. 2004; Paavola et al. 2004). Within the knowledge-creation metaphor of learning, development of expertise requires collective work on a shared object, thus the nature of expertise is seen as more relational and collaborative than before (Edwards 2010; Gorman 2010). The knowledge-creation metaphor combines the aforementioned metaphors, and rejects the Cartesian split of mind and matter into separate entities (Hakkarainen et al. 2004).

The demands of today's knowledge-intensive work require a continuous effort to learn. The third metaphor of learning views learning as a collective, sustained, progressive problem-solving process for producing new knowledge artefacts. (Paavola et al. 2004.) Hakkarainen and his colleagues (2004) call these networked work groups Innovative Knowledge Communities (IKC), which produce new knowledge and social practices that support the knowledge-creation process. They bear a resemblance to communities of practice, but their hierarchy is lower, as novices can add important knowledge to the community with their own personal networks. The innovative knowledge communities can be viewed as communities of practice of the 21st century (Hakkarainen et al. 2004).

Egocentric network analysis as a tool in learning research

Social network analysis, a methodological approach that studies social relations and networks, became popular during the 1990s (Scott & Carrington 2011; Prell 2012).A social network refers to a set of social actors and the relational ties between them. In social network analysis, this network of actors is made visible and analysed to gain a deeper understanding on the logic of its relations. (Robins 2015, 18; Hollstein 2014, 6-7.) The actors can be, for example, individuals, families, work teams, or even organisations (Hollstein 2014, 6; Prell). Social network analysis often utilises quantitative research, but at its core, it is a mixed-methods approach that utilises both qualitative and quantitative research (Hollstein 2014; Robins 2015).

Social network analysis requires a systemic approach that takes into consideration both the individual and collective levels of activity. The systemic point of view offers theoretical insights in the form of social structures connecting individuals to each other. On the individual level, one can analyse the individuals' capacity to navigate the social structures successfully. A central theoretical concept of networks is connectivity, because at its core, social network analysis is interested in how actors are connected with each other and how information flows between them. (Robins 2015, 9, 12–14; Carrington 2014, 55–56.) However, it is important to note that social network analysis is, above all, a methodological approach that in itself does not offer sufficient theoretical tools to conceptualise the researched phenomena (Mattila & Uusikylä 1999, 7; Toikka, Miettinen & Tuunainen 2016). A theoretical framework creates meaning and content to the actors' connections with each other. Influential theoretical social-network-related approaches are, for example, Granovetter's (1973) theory of strong and weak ties, and Burt's (1992) theory of structural holes. In general, social networks are often seen as positive, but it is useful to note that networks can also be based on various negative factors, such as bullying or even terrorism (Robins 2015, 33). Social network analysis can be divided roughly into two different approaches, the whole network approach and the egocentric approach (Mattila & Uusikylä 1999, 10). A whole network study is interested in all connections in a certain network, and egocentric studies are interested in networks around certain actors (Hollstein 2014, 9).

The egocentric network interview is a technique of social network analysis. The roots of egocentric or personal networks come from the 1960s United States. It provides the researcher with an empirical tool for analysing the personal networks of the participants (Wellman 1993; Hogan, Carrasco & Wellman 2007; Robins 2015; Jewson 2007). Egocentric data can also be gathered with a questionnaire, or separate it from whole-network data (Robins 2015), but one popular technique is the egocentric network interview that is based on the name-generator technique (Hogan et al. 2007; Hatmaker, Park & Rethemeyer 2011). In the network interview, the interviewee draws his/her network on paper, following the interviewer's instructions. The network interview can be used to form and visualise the participants' different networks (Palonen 2006; Hatmaker et al. 2011; Hogan et al. 2007, 2–3). The technique used in this article is based on professor Kai Hakkarainen's interpretation of Hans Gruber's method, and is a variation of the technique used by Hogan, Carrasco, and Wellman (2007).

In the name-generator technique, the researcher asks the interviewee (ego) to name people (alters) with whom he/she has a connection. After naming the alters, their meaning to the interviewee is discussed, and the interviewee is asked to assess the named alters' relationships with each other. (Hogan et al. 2007, 2) Mattila and Uusikylä (1999, 19) call this technique the cognitive social structure approach, whereas in regular egocentric networks, the relationships independent of the respondent are not assessed. The network drawing can be used as a memory aid during the interview, where the respondent assesses his/her relations with the alters. Hogan, Carrasco, and Wellman (2007, 1–2, 9) consider visualisation of the network during the interview an advantage compared with traditional network studies, where the network is put together and visualised after the data-collection phase. The drawing serves as a cognitive tool, and allows the researcher to ask specified further questions. The drawing of the network also requires the respondent to assess alters' relationships with each other. Data collection based on paper and pen is a cost-effective and easy alternative to computer-based data gathering, and it has its unique advantages compared to digital network data (Hogan etc. 2007, 17).

The purpose of the network interview is to assess qualitatively the alters' meaning to the respondent. Interview data based on the network enables deeper analysis of the network relations. The researcher can also assess the regularity of the information flow in the network, as well as the means and ways with which people communicate with each other. In addition, the researcher can calculate quantitative statistics from the data, such as the density and the number of network components and isolated alters (Robins 2015).

Research design

This study draws from the knowledge-creation metaphor of learning, and conceptualises the collective dimensions of learning as personal social networks. Employees' personal networks are seen as an important component of their learning potential and competence. The view adopted in the article draws attention to "creation, maintenance, and activation" of these personal social networks (Nardi et al. 2002, 206). Consequently, the unit of analysis in this study is the personal networks of the NCOs. The study seeks to make these personal networks visible, and analyse them further to obtain new knowledge about their meaning for the individual-level learning processes. The article seeks to answer the following two research questions:

1. What kind of personal networks support the Non-Commissioned Officers' workplace learning?
2. How are these personal networks formed?

The collective social support system of the NCOs' workplace learning is approached from the perspective of social networks, to understand the activity-based learning networks instead of following the formal organisational boundaries of the studied organisation (Nardi etc. 2002; Milligan, Littlejohn & Margaryan 2015). The NCOs represent the trainers of the conscripts of the studied companies, and by making their social support structures visible, the researcher can obtain important practical knowledge about the social structures and practices supporting their workplace learning.

The research is a case study in one brigade-level unit of the Finnish Army located in Southern Finland. The unit consists of battalion-level units, which, in turn, are divided into company-level units. The main task of the unit is to train peacetime and wartime troops for the FDF. The studied unit employs approximately 400 people. Empirical data was gathered with egocentric network interviews from the NCOs (n = 10) of three companies, which were chosen from different battalions to provide better potential for generalisation of the results (e.g., Larsson 2009). The interviewees' age was between 25 and 39 years, with a mean age of 29 years.

All interviews were recorded to make rich qualitative analysis possible. In all, there was 370 minutes and 12 seconds of interview data. In the case study, NCOs recalled different people who had helped their workplace learning, and noted them on paper. The guiding question in the network interview was "who has helped you the most in carrying out your job tasks during last six months". The interviewees were given an A3-sized paper, and they marked themselves (ego) in the middle of the paper. They then positioned the names around the ego as they felt represented reality most accurately. Finally, they circled similar alters in groups, and connected alters who knew and communicated with each other, to the best of their knowledge. After the interview, a picture of the drawing was taken, in order to save it for further analysis (Hogan etc. 2007, 16). The interview data was analysed with qualitative content analysis. The egocentric network data was visualised with the Cytoscape software, which was found to be useful for small network data.

The studied companies had three to four NCOs working during the case study, and the researcher felt that reporting the networks individually would not be very informative. Instead, it was decided to combine the networks of the NCOs serving in the same company. This enabled a more holistic view of the NCOs' learning networks and their interconnectedness. To ease the qualitative analysis, the researcher visualised the alters in geometric shapes that were labelled accordingly. To make the visualisation clearer, it was decided to mark the same company's alters with an ellipse, the unit's alters with a round rectangle, alters from elsewhere in FDF with a hexagon, and finally, civilians with a diamond. The regularity of communication was also taken into account. Frequently communicating alters were connected with straight lines, and more infrequent communication with a dashed line.

Results of the egocentric network interview

The results are presented one company at a time. At first, the Cytoscape visualisation of the combined learning networks is presented. Then, the networks are analysed qualitatively, also utilising excerpts from the interview data. Quantitative analysis in the form of quantification was also used to make the data richer and more precise.

The combined egocentric networks of the NCOs in company 1

The first company studied was an infantry unit with three relatively inexperienced NCOs, with work experience ranging from under a year to five years. The combined egocentric networks of the NCOs in company 1 is presented in Figure 1.
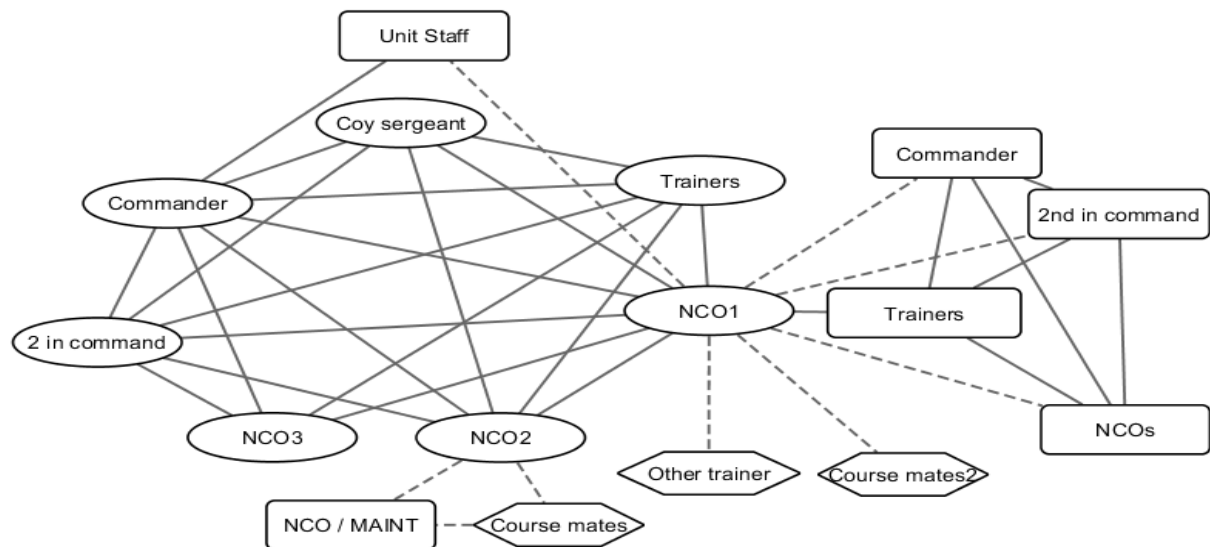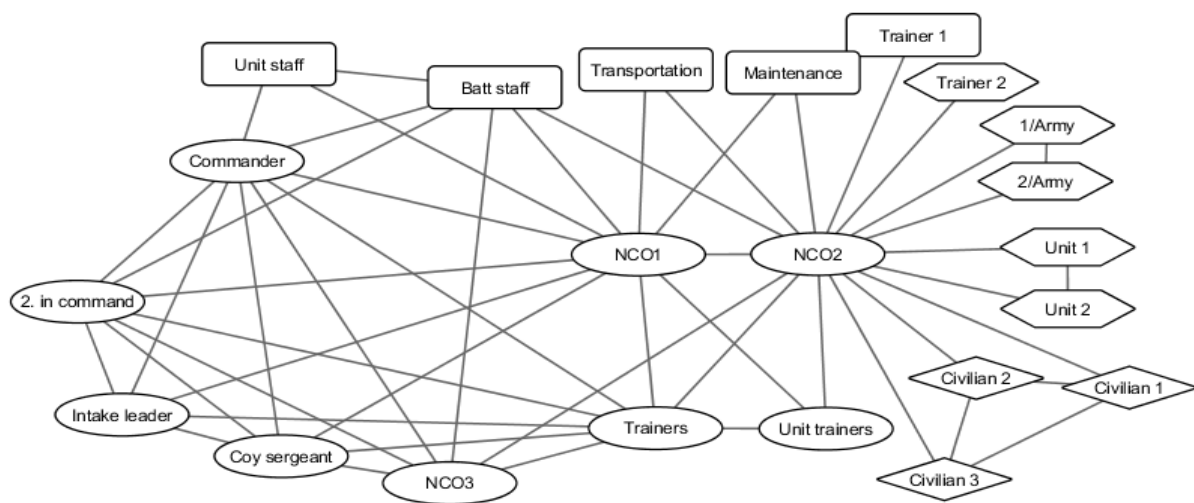

Figure 1: The combined egocentric networks of the NCOs in company 1

Drawing on the visualisation, one can state that the NCOs' own company formed a clear collective, accounting for 53% of the whole networks' social relations. The network as a whole reached out to other companies, and even other units and outside the FDF. However, contact with actors outside the company was weaker than inside the studied company. Especially NCO1 had several outside contacts, which formed 31% of his network. NCO2 kept in touch with a former course mate serving in the same unit in the local maintenance centre. NCO3 did not have any contacts outside his own unit.

NCO1 was the most experienced NCO in the company, and the Commander and other NCOs thought that he had an important role in mentoring the other NCOs, because he knew all the "tips and tricks" (NCO2). He had served in the unit for five years, and this showed in his network, which had many contacts in the unit outside his own company. These contacts were mainly his former colleagues, with whom the NCO was still in touch. The majority of these contacts served in a nearby company, which enabled interaction with one another. In addition, a former colleague who had been transferred to another unit was still a part of the NCO's network. The NCO described these contacts as "competent people, who are also a little bit more experienced… they have been here for years and are easy to talk to". The interactions were mainly based on friendship instead of work-based needs. The NCO also had as a part of his network his former course mates, who kept in touch infrequently on matters related to their training branch.

The Commander was seen as an expert of management, but simultaneously, the NCOs valued his infantry-branch competence, so he was seen as the head trainer of the company. Staff Sergeant was seen as an expert in material-related management and administration, but he was also a mentor for many of the younger trainers. Especially NCO3 told that the Staff Sergeant had supervised many of his first exercises, and had frequently given him constructive feedback. NCO2 also kept in touch with his course mates in branch-related matters. He said, "people do things a little bit differently in other places so it is useful to ask now and then how you are

handling this matter". He mentioned especially a former course mate serving in the maintenance centre, who could sometimes help him in transportation and maintenance-related issues.

NCO3 had five years of working experience, but he thought that only the Commander and the more experienced trainers were important for his learning. His interactions with people outside his own company were infrequent, so he did not feel that they had an impact on his learning.

The combined egocentric networks of the NCOs in company 2

The second company studied was an infantry unit with three relatively experienced NCOs. One NCO had over 10 years of work experience, and two others had three to five years of work experience. NCO2 had much expertise and experience from his job before serving in FDF that helped him in his current job. The combined egocentric networks of the NCOs in company 2 is presented in Figure 2.
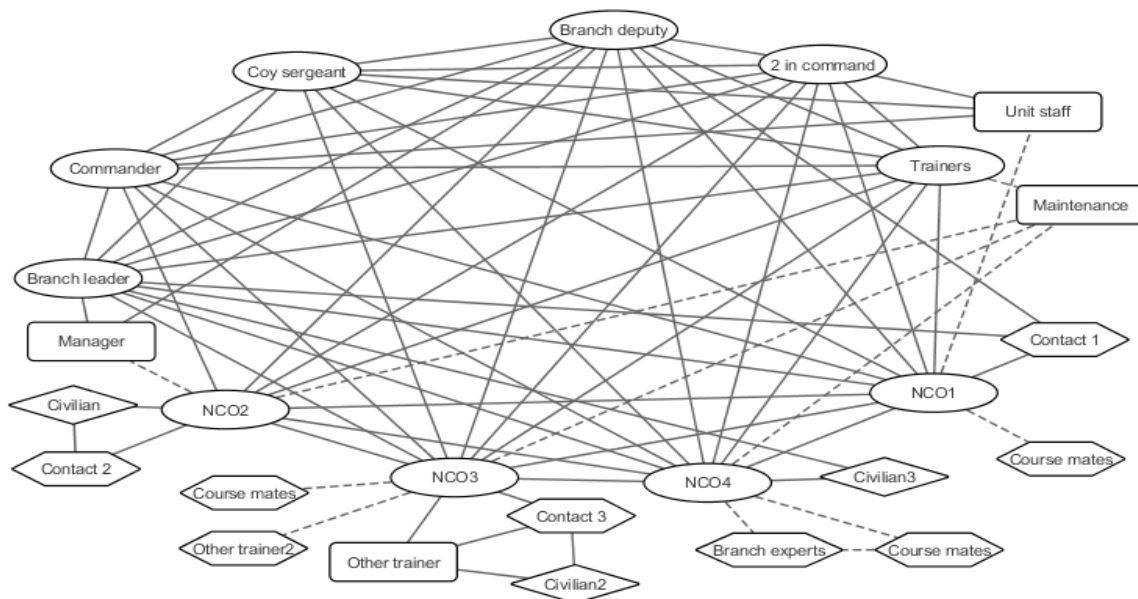

Figure 2: The combined egocentric networks of the NCOs in company 2

Drawing on the visualisation, one can state that the NCOs' own company formed a collective that accounted for 42% of the whole networks' social relations. The network as a whole reached out to other companies, and even other units and outside the FDF. However, contact with actors outside the company was weaker than inside the studied company. Especially NCO2 had several outside contacts, which formed 38% of his network. An interesting observation was that two NCOs (NCO1 and NCO2) named the trainers of another unit (Unit trainers) as being as important to their learning as people from their own company. This became understandable, when they pointed out that the two companies had many shared training responsibilities, and had many common exercises and large training events. NCO2 described them as "battalions' other similarly experienced trainers, who have special knowledge and competence that you can rely on".

The company Commander was viewed as director of operations, and the NCOs often made sure that the training activities were carried out "as he has planned" (NCO2). The company Commander was seen as the expert in management-related issues, and he, the 2nd-in-Command, and the Coy Sergeant formed the "managerial cell" of the company (NCO1). The leader of the intake was consulted often in training-related matters and smaller details; "he's the one who gives guidance on training details even more than the Commander" (NCO2)

Interestingly, all NCOs named an older officer from the battalion staff as part of their learning network. He was described as "master of the training branch" (NCO3) and "godfather" (NCO2), and the NCOs had frequent discussions about "training guidelines" (NCO1) with him. Two of the experienced NCOs had contacts in the logistic centre (maintenance & transportation) useful during planning of training events. NCO2 also had a few

contacts from his previous position (trainers 1 & 2), who were still important to his work, because "they can tell you all you need to know about my branch" (NCO2).

NCO1 had served in the unit for almost 10 years, which explained his strong networking to different actors around the unit. His network was relatively stable and supported his work. He described his network by saying "you always learn new things when you interact with different people around the garrison". NCO2 had a surprisingly large network that included people from different army units (1 & 2/Army, Unit 1 & 2) and even civilians (1-3). His network outside his own unit consisted of a couple of experienced trainers in Army School, so his network was essentially one of training-branch expertise: "the guys there can always tell you the latest developments in the field and recent training guidance given out". The civilian network included a former colleague of the NCO, who was still working in the same branch in a civilian corporation. The NCO occasionally kept in touch with them, and described them as having similar expertise due to their respective jobs sharing several similar characteristics, thus providing him with "informal and experience-based support and they provide a different point of view to your work problems". The contacts of NCO2 were largely personal contacts formed during different phases of his career that supported and enlarged his expertise in his own field. NCO3 was relatively new in the unit under study, so his network consisted mainly of people from his own company and various other people from the unit, who were important for carrying out his tasks.

The combined egocentric networks of the NCOs in company 3

The third company studied was a unit specialized in certain training branch with four NCOs, who were relatively experienced, ranging from two to nine years. The division of labour was a little different compared with the other companies. The combined egocentric networks of the NCOs in company 3 is presented in Figure 3.

Figure 3: The combined egocentric networks of the NCOs in company 3

Drawing on the visualisation, one can state that the NCOs' own company formed a clear collective that accounted for 61% of the whole networks' social relations. All the NCOs interacted frequently with other trainers of the company, but in addition, they all had their own separate areas of responsibilities connected with their own tasks. These individual networks consisted mainly of people from other units and civilians from the same branch. The NCOs had frequent collaboration with these outside contacts from other units and civilians.

The NCOs considered the Commander as "very skilled in his branch-related knowledge" (NCO2), valued his expertise, and felt that he was easy to approach (NCO1 & 3). Much like in other companies, the Commander,

2nd-in-Command, and Staff Sergeant formed the "administrative cell" of the company (NCO4). Central actors in the company's training network were branch leader and deputy, who "control all the training activities and financial decisions" (NCO2). Branch leader and deputy coordinated all training activities, and the NCOs kept in touch with their own separate networks directly. The NCOs had many individual responsibilities and much expertise.

The NCOs handled many of their responsibilities directly with their FDF contacts and civilian contacts. The NCOs described their contacts as "important collaboration partners" (NCO2 & 3) and even as a "safety-net" (NCO1). The NCOs were in charge of the day-to-day management, and the contacts were responsible for the actual training. The NCOs had contacts with the unit staff and logistic centre (maintenance), which supported them in administrative duties. Three NCOs kept in touch with their course mates with WhatsApp, email, and telephone. The information they exchanged was branch- and training-related, so the course mates formed a low-hierarchy branch-expertise network. One NCO also kept in touch with branch-trainers from Army school, because their knowledge was "more general and different" (NCO4).

Discussion

The aim of this article was to make visible the personal social networks supporting the workplace learning of Non-Commissioned Officers working in the companies of the Finnish Defence Forces. The research questions addressed the nature of these social networks and how these personal networks are formed. The egocentric network analysis showed that the co-workers in the same company formed a major support structure for the NCOs' learning. However, nearly all NCOs had important network structures that were formed around their individual expertise and tasks. For instance, the NCOs specialised in a certain branch needed much detailed technical knowledge that they received from outside their company, for example, from contacts in the unit's logistic centre. These NCOs were experts in their own branch of training, so they could not have sufficient support and information from their own company. The network structures supported the NCOs training and job-related activities organically, as they were formed in the same manner in which the work activities were organised. Several NCOs collaborated regularly with trainers from other companies. The network analysis made visible the fact that there were few centralised support structures. Instead, the NCOs own specialised networks helped them with many technical and detailed problems and challenges. The size of these personal networks varied considerably, ranging from four to sixteen alters with a mean of 11 alters, which emphasises the important role of social relations to the individual learning processes.

Course mates formed a surprisingly frequent support structure that was not necessarily very active, but the resource was activated when needed. They provided expertise and experience-related support that expanded the NCOs localised unit-related knowledge. In conclusion, it can be said that the NCOs' networks had three main components; firstly, the personnel of the NCO's own unit provided important social support. Secondly, every NCO had individual networks related to their own specific task, and thirdly, some NCOs had networks formed during various stages of their life that were still active and useful in their current job. The networks were often formed around local task-related activities, so local on-the-job training is essential for a novice to be able to make full use of these networks. (cf. Hatmaker et al. 2011.)

The research findings support the notion of traditional teams as important learning resources (Nardi et al. 2002). Despite the changing nature of work, studies researching workplace learning should be based on a situational socio-cultural view of learning (Lave & Wenger 1991), as workplaces and the organisation of labour are different and job characteristics are unique. Results from a single empirical context should not be generalised without careful consideration of the context of learning (e.g., Larsson 2009). However, the results also supported the growing importance of personal social networks for individual learning processes (Milligan et al. 2015). Nearly all of the NCOs had personal contacts around the studied units and even outside of their work community. These contacts supported the formation and deepening of branch-related knowledge, so it can be said that they were as important as the personnel of the NCOs' own company. It should be noted, however, that all the components of the networks served their own purpose, so it is not advisable to compare them with each other in a competitive manner (cf. Hatmaker et al. 2011, 412–413). The networks had also some common features with the theory of innovative knowledge communities (Hakkarainen et al. 2004). Their hierarchy was low and even the relatively young trainers had their own contacts formed around their area of expertise. The personal networks were often activated when the NCOs worked on shared objects such as preparing and conducting larger exercises (c.f., Hakkarainen et al. 2004; Edwards 2010).

The second aim of the study was to present a relatively new and lesser-known technique of social network analysis, namely, the qualitative egocentric network interview, and highlighted a new way of presenting egocentric-network-related research findings in a visual form. A social network often brings to mind large network structures with quantitative statistics, but this paper provided a concrete empirical example of how to do a qualitative network study making use of a pen-and-paper technique. Computer-based network software provides plenty of possibilities for a network-oriented researcher, but this paper aimed to enrich the field of social network analysis with a different methodological approach (Hogan et al. 2007). Especially, the interview data concerning the visualised networks enables the researcher to get more detailed data of the network, and provides complementary information as compared with quantitative data. In addition, the visualisation of the network can be planned to support qualitative analysis with different shapes and even colours. Both network approaches provide intriguing and complementary research possibilities, which support the notion of social network analysis as a mixed-methods approach (Hollstein 2014).

The study was based on the trialogical knowledge-creation metaphor of learning (Hakkarainen et al. 2004; Paavola et al. 2004). The trialogial view of learning combines the individual and social views of learning, showing that both approaches are needed for providing a holistic understanding of learning (Sfard 1998; Hakkarainen et al. 2004). This approach recognises the individual as the learner, and at the same time, views the social structures around the learner as important components of the learning process (Billet 2001). These social structures were conceptualised as personal social networks (e.g. Nardi et al. 2002; Milligan et al. 2015). The networks were positioned as the unit of analysis, allowing the researcher to grasp their scope and range fully. This approach combines the different metaphors, and allows the researcher to capture the micro-level individual features of the learning process, as well as make the social formations around the individual visible without losing sight of the learning individual (Nardi et al. 2002).

This study also served as an example of how theoretical frameworks are essential for a good network study (e.g., Mattila & Uusikylä 1999; Toikka et al. 2016). The case study analysed social networks supporting workplace learning. The researcher might also have asked about collaboration or social support (e.g. Palonen 2006), in which case, the formed networks are often similar, but connected with a slightly different theoretical lens. Therefore, it is important to make sure the network data is valid and connected with a certain theoretical framework.

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A Framework for the Analysis of Personal Learning Networks

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Abstract

This paper reports on research undertaken to map and analyse Personal Learning Networks (PLNs). PLNs are the total preferred connections to the different people, technological devices, services, and information resources an individual uses for learning activities and learning goals in all learning contexts. Drawing from Education, Web Science, Digital Sociology and Network Science, a Framework was developed which conceptualises PLNs as egocentric interaction networks involving a mode, purpose and endpoint. The Framework introduces the idea of measuring the frequency of interaction along paths consisting of pre-determined, generalised nodes (and node sets). This eliminates network differences at the micro level and allows meaningful comparison and aggregation of individual PLNs into groups or whole samples.

Quantitative survey data was collected as part of a FutureLearn MOOC and in real-time converted by a bespoke mapping and visualisation tool into an online PLN map. Analysis indicates that regardless of any contextual factors, individuals interact nearly three quarters of the time via digital devices, and just a quarter of the time face-to-face or non-digitally. One third of those interactions are with smartphones, most often for the purpose of gathering information from web searches. Individuals also interact more frequently with non-humans than they do with humans. Chi-square significance testing to examine the effect of a range of external shaping factors found that the PLNs of apparently diverse groups display a considerable homogeneity. Gender, country of residence and position on the Digital Resident-Digital Visitor spectrum have no effect on the size and use of a PLN. Age and being a UK HE student have the most effect. There may also be evidence of a Network Lifecycle, with a critical period of PLN growth occurring during the age of 18-25.

This means that universities are ideally placed, indeed may even have a duty of care, to foster PLN development in educationally and personally productive ways. If HE institutions are to respond to the networked student, living, working and learning in a network age, then no longer can the learner be considered separately from the network of people, devices, services and information resources they use for daily life. Transitioning towards a PLN-centred, networked learning HE pedagogy and learning design may arguably be the most suitable response to a study body which is increasingly and inextricably embedded in a sociotechnical reality.

Keywords

Personal Learning Network, networked learning, analysis framework, pedagogy, social network analysis, methodology.

Background

Although a long established physical phenomenon, it is particularly since the evolution of the World Wide Web in the early 1990's that networks have become increasingly central to how we understand the world and undertake daily life. In academia, networks have appeared as an analytical, conceptual or explanatory approach since the 1920's (e.g. Bott, 1927; Moreno, 1937; cited in Scott, 2017). However, it is over the past thirty years that networks have grown in importance and application across diverse academic fields, (e.g. social sciences (e.g. Castells, 2011 vol.12; Law, 1992, 2008; Raine & Wellman, 2012), mathematics (e.g. Scott, 1998), and education (e.g. Siemens, 2005a, 2005b; Downes, 2005, 2006; Goodyear, 2002, 2005). Networks today are also a central feature of daily life, not just of academia. The availability and affordability of mobile digital

technologies, social media networks and wifi networks (for many but not all), mean that by the age of thirteen, 79% of UK children have a smartphone, 74% have an active social media profile, and they spend fifteen hours per week online (Ofcom Media Report: Children & Parents, 2016). Social media networks have become an influential part of how many individuals form their identity and their relationships to others (e.g. BBC School Report, 2016; Davis, 2015), earn an income (e.g. emarketer, 2017), or feel excluded or isolated (e.g. O'Keefe & Clarke-Peterson, 2011; Luxton et. al., 2012). In short, digitally enabled networks have become embedded in the activities of living, learning and working to such an extent that it is not possible, or even productive, to consider an individual separately from their network.

Sociotechnical Theory (e.g. Cummings, 1978; Bijker, 1997; Geels, 2002) formalises this interdependence by suggesting that the development of societies and technologies are reciprocally co-dependent and that both social and technical phenomena can not be fully understood in isolation from the other. Applied to education, this means that learning, as a process, can not be separated from the networks used for learning. In practical terms, a typical HE undergraduate arrives at their institution with a well-established network of digital (online) and non-digital (offline) relationships to people, devices, services and information resources that they have seamlessly integrated into their regular activities in all contexts. In short, they are at the centre of their own Personal Learning Network (PLN).

Given this sociotechnical relationship, and the increasing centrality of networks to daily life and study, it is important that researchers can meaningfully map and analyse PLNs in order to identify commonalities and differences. These can then be used to inform HE pedagogy and learning design. The knowledge thus gained can be applied to avoid a potential disconnect between a student's personal learning behaviours and the formal learning experience they receive from their HE institution, and the potentially negative consequences for learning, engagement, student satisfaction and TEF ratings which such a disconnect could cause.

What is a Personal Learning Network (PLN)?

Personal Learning Networks (PLNs) are complex to define and there is no consensus on a single definition within the literature. It is perhaps therefore worth beginning with what PLNs are not. PLNs are not the same as a Personal Learning Environment (PLE), which is an institutionally supported system for student interactions with learning technology (White & Davis, 2013), or an institutional Virtual Learning Environment (VLE). Rather, PLNs are autonomously created by an individual and feature the people, devices, services and resources for which they have a personal preference at a given point in time.

Also, although there are a number of similarities between them, PLNs are also not Professional Learning Networks (Trust, 2012), Personal Professional Learning Networks (Rajagopal et al., 2012), or Personal Knowledge Networks (Grabher and Ibert, 2006). This is because PLNs are not 'professional' (i.e. based in a workplace), and 'knowledge' implies something different from learning (an outcome rather than a process). Also, a PLN is not a 'learning network', which in the literature is synonymous with a community of individuals intentionally interacting for a shared learning goal, interest or need (a community-network view). It is instead an ego-centric network focussed on the individual (and their personal connections) as the unit of analysis.

Consequently, this paper will adopt the terminology Personal Learning Network (e.g. Siemens, 2005b; Downes, 2007b; Kop & Hill, 2008; Carvalho & Goodyear, 2014). A PLN is both a learning artefact (and therefore

capable of becoming a unit of analysis) and a vehicle which *"foster[s] interaction amongst and a learning process 'within' its participants"* (Rusman et. al., 2016). Drawing together the key elements of the various definitions in the literature, and taking as broad a view of learning as possible, this paper defines a PLN as the total preferred connections to the different people, technological devices, services, and information resources an individual uses to assist them with their learning activities and learning goals in all learning contexts.

PLNs are autonomously built, maintained and used by the creator and are heavily shaped by the wider socio-cultural contexts within which the creator and the network are situated. PLN interactions can occur online and off, and in formal, non-formal and informal learning contexts. They are dynamic and subject to constant change and evolution as a result of individual drivers and contexts, wider contextual influences, and the technological affordances of the time.

A Framework for the Analysis of Personal Learning Networks

This paper will present a Framework for the Analysis of PLNs that aims to bridge a gap revealed in the networked learning literature. Traditionally, it had been difficult to meaningfully compare individual network maps, as they are so different from each other and are often constrained to small sample sizes, making meaningful generalisations from individual egonets to larger populations hard (e.g. Moses & Duin, 2015; Van Waes et al, 2016; Jordan, 2016). Equally, it has also been difficult to account for the shaping effects of personal, contextual factors which lead to individual differences in network behaviours, attitudes and connections when studying whole networks (e.g. Krutka & Carpenter, 2016; Trust et al, 2017; Visser et al, 2014). This framework aims to overcome this gap between the micro and the macro scales of network research.

The Framework for the analysis of PLNs is underpinned by connecting theories and concepts from a range of fields, including Education, Web Science, Digital Sociology and Network Science, as indicated in the graphic below:
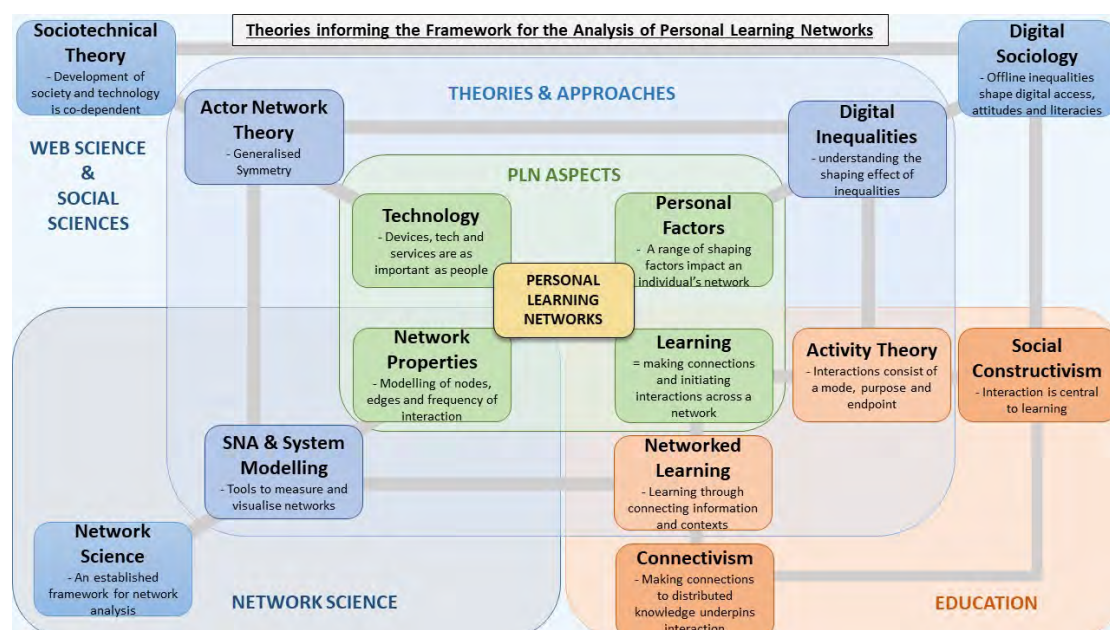
Figure 1: The networked theoretical foundations for the framework for the analysis of PLNs

Web Science suggests that it is impossible to understand a phenomena without understanding that it has both a social (human) and a technical (non-human) aspect, and that these can not and should not be understood separately. This is known as Sociotechnical Theory (e.g. Cummings, 1978; Trist, 1981; Bijker, 1997; Geels, 2002), and is formalised for analysis by the concept of Generalised Symmetry from Actor Network Theory (e.g. Latour, 1987; Law, 1992; Callon, 1999), in which human and non-human actors in a network must be considered as equally significant to the construction and use of the network.

Network Science (and Mathematics) also provides a toolkit for the empirical analysis and mapping of networks - Social Network Analysis (e.g. Granovetter, 1973; Scott, 1988; Borgatti et. al., 2018), where the frequency of network interactions can be measured and networks visualised. To this System Modelling (e.g. Checkland, 1981; Checkland & Scholes, 1990; Davies & Ledington, 1991; Wand, 1996; Checkland, 2000) introduces the idea of abstraction and generalisation for modelling networks across different domains. From the Social Sciences, research by digital sociologists has identified a considerable range of shaping factors which can result in digital inequalities in access to technology and differences in digital literacies, and motivation to use and attitude towards technology. These are predicted to have a shaping effect on the size and use of a network (e.g. Pew Research Center, 2018; Ofcom, 2017; Orton-Johnson & Prior, 2013; Davies et. al., 2012; Daniels et. al., 2016; Witte & Mannon, 2010).

From Education, social constructivism focusses on the key role played by interaction in learning, suggesting that these interactions should be meaningful if they are to be effective for learning purposes. In PLN terms therefore, every interaction has an Interaction Purpose. In addition, Activity Theory introduces the importance of the mediating artefact (e.g. Engestrom, 2001; Carvalho & Goodyear, 2014) in interactions. From this the concept of the Interaction Mode, was developed. Drawing from Connectivism (e.g. Siemens, 2005a, 2005b; Downes, 2005, 2006) and Networked Learning (e.g. Illich, 1971; Goodyear, 2002, 2005; De Laat et. al., 2006), it is also the case that before meaningful interaction can occur, connections to distributed knowledge and diverse others must be made and patterns of relationships across learning contexts and knowledge domains identified. These connections constitute the Interaction Endpoints in the PLN Framework.

This allows for a full conceptualisation of PLNs as an interaction network consisting of an Interaction Mode (the medium through which it is conducted), an Interaction Purpose (a learning activity) and an Interaction Endpoint (a human or non-human other). The Framework views learning as simultaneously individual (autonomous and uniquely shaped by contextual factors – 'personal'), social (involving meaningful interactions with human and non-human others – 'learning') and networked (involving the making and maintaining of diverse connections – 'networks'). Learning is, in other words, centred on a learner's Personal Learning Network.

Consequently, a Framework for the Analysis of PLNs has been developed (see Fig 2 below)
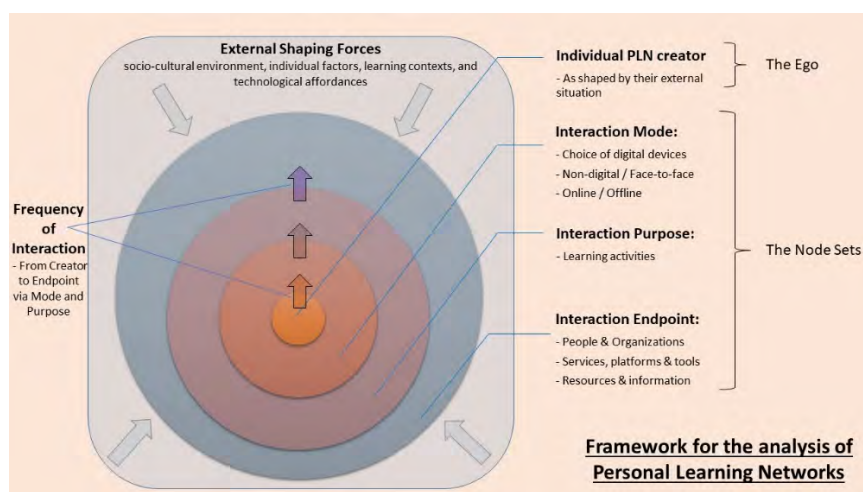
Fig 2: The Framework for the Analysis of Personal Learning Networks

This framework allows for the mapping of individual PLNs based on an interaction path from the Ego to a Mode, used for a Purpose, to interact with an Endpoint. However, in order for each individual PLN map to be usefully aggregated for analysis and comparison (thereby reconciling the micro and macro levels of network research), the Framework proposes two approaches adapted from System Modelling. The first is that the researcher must define all the nodes in the network in advance of going into the field. By defining the nodes in the network in advance, every individual PLN will consist of the same nodes (if present), meaning that there will be no variation between individual respondents at the network scale. This means that individual PLNs can be usefully compared and aggregated. However, this solution requires very considerable thought about what choices the researcher makes concerning what nodes to include.

The Framework therefore proposes a second approach – the identification and use of generalised nodes, grouped into generalised node sets. For example, it is not particularly informative to know that John interacts with Jane or with Facebook, if the aim is to try to compare John's network with a Random Other, who is unlikely to know Jane and who might not use Facebook. Therefore, within the generalised node sets laid out by the Framework – mode, purpose and endpoint - generalised nodes such as Smartphone (as opposed to 'iPhone10') and Face-to-Face (to encompass all non-digital interactions, including with non-humans) form part of the Interaction Mode node set; Gathering Information and Collaborating & Communicating (instead of 'reading about crystalography' or 'groupwork on my module assessment') form part of the Interaction Purpose node set; and Social Network Services or Friends (rather than 'Facebook' or 'Jane') can be found in the Interaction Endpoints node set.

This pre-determining of generalised nodes (and node sets) does mean that some granularity is lost, however, that is a necessary consequence of reconciling the micro and macro. It also means that individual PLNs can be aggregated into subsets, according to a range of shaping factors (e.g. age, gender, ethnicity…etc), thereby allowing the significance of the effect of these factors on the size and use of PLNs to be statistically analysed.

In summary, based on existing theories and research, the Framework for the Analysis of PLNs conceptualises PLNs as an egocentric interaction network, featuring pre-determined, generalised nodes, grouped into pre-determined node sets (Interaction Mode, Purpose and Endpoint). This ensures continuity between the networks of individual respondents, meaning that PLNs at the individual, group and whole sample levels, at large sample

sizes, can be meaningfully and robustly analysed. The Framework contributes to bridging the gap between the micro and the macro levels of network analysis, potentially opening new possibilities for Networked Learning research.

Methodology

The framework was used to inform the design of an online, closed question, quantitative survey, hosted on iSurvey. The survey asked respondents to recall the number of times (frequency) they interacted along single paths through their learning network during a single day. These paths emanate from the PLN creator via an Interaction Mode (mobile/smartphone; tablet; laptop; desktop; and face-to-face/non-digital), through an Interaction Purpose (searching & browsing; gathering information; communicating & collaborating; creating & sharing; socialising; and gaming/hobbies), to an Interaction Endpoint (too many to list, but which includes humans and non-humans).

In an original approach to sampling and data collection, this survey was hosted on the 'Learning in the Network Age' MOOC (University of Southampton/FutureLearn), which was written and produced by this author, in collaboration with others, specifically for this research. A unique, bespoke, automated analysis and mapping tool was commissioned to immediately turn the survey results into an individual online PLN map, and provide access to the aggregated (and filterable) PLN map for the whole sample (see figure 3 below).

However, the use of the MOOC also meant that a certain sample bias was inevitable. Clearly those who do not/can not access the web (still about half the world's population), and those who can access the web but do not have the motivation or digital literacies level to undertake self-directed online learning, or who do so using other MOOCs and platforms, are excluded from this sample. Post-event Recall is also a limiting factor to consider.

Data Analysis and Results

This innovative methodology resulted in one of the largest and most diverse samples for a research programme with the aim of mapping learning networks to date. In total, 737 respondents resident in 84 different countries, from 20 different ethnicities and from the full range of ages, positions on the Digital Resident – Digital Visitor spectrum (White & Le Cornu, 2011) and main daily activities (working, studying, volunteering or at leisure) were returned. In total, 58% of respondents were female (n=425); 25% were aged 18-25 (n=180); 65% were of White ethnicity (White British, American, Irish, Any Other White) (n=474); 36% were resident in the UK (n=264); 61% placed themselves on the Digital Resident side of the spectrum (n=451); and 70% were either working or studying as their main activity (n=508).
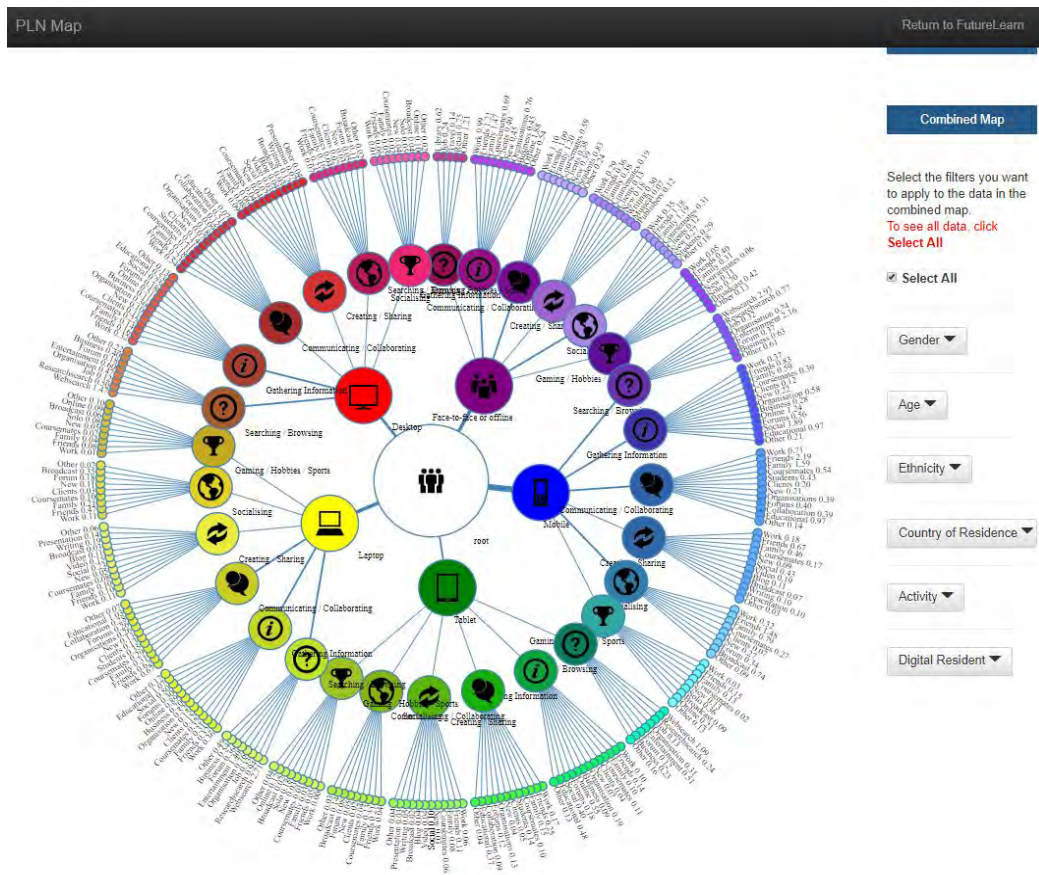
Fig 3: The aggregated PLN map for the whole sample (n=737)

The network map mirrors the Framework in that the PLN creator (the ego) sits at the centre and interactions proceed from them to Interaction Mode (the first ring of nodes), then to Interaction Purpose (the second ring of nodes), before culminating in an Interaction Endpoint (the third ring of nodes). The thicker the edge connecting each node, the more frequently that interaction has occurred. This provides a clear visualisation of the data returned from MOOC participants through the online survey.

Early results for the whole sample indicates that regardless of who we are, where we live, and our contexts, attitudes and activities, almost one third of our total daily network interactions are with our mobile/smartphones (33%), and almost three quarters are with technological devices (74%). Face-to-face and/or non-digital interactions constitute just over one quarter of our interactions (26%). [Note - All percentages provided here are the percentage of total network interactions].

Over three quarters of our interactions are for the purposes of gathering information (28%), searching & browsing (26%) and communicating & collaborating (23%). We interact more often with non-humans (e.g. websites, platforms, digital services…etc) (52%) than with humans (42%), with the remainder being non-discernible. Those interactions will most often be with web search engines (9%), educational platforms (possible sample bias here) (6%), friends (13%), and family (10%).

The Framework also returned results for a range of sample subsets, including different genders, ages, ethnicities, countries of residence, position on the Digital Resident-Digital Visitor spectrum and main activity on the day of reporting. Differences between subsets were tested for statistical significance by conducting Chi-Square tests

with a p-value of <0.05%, or at a 95% confidence level. Input values were weighted according to their occurrence in the sample (*n*). Tests were conducted to identify any significant differences in network size, interaction mode, interaction purpose and interaction endpoints (top-level, human and non-human) between the subsets.

The results indicate that there are far more similarities than significant differences between apparently diverse groups. Gender, country of residence and position on the Digital Resident-Digital Visitor spectrum (White & Le Cornu, 2011) has no statistical effect on the size, mode, purpose or endpoints of a PLN. In contrast, ethnicity and the main activity an individual is engaged in on a given day (e.g. working, studying, volunteering/caring, at leisure) will significantly affect the human interaction endpoints in a PLN, but not any other part of the network.

Being a UK HE student (subset = aged 18-25, resident in the UK and studying) will have a significant effect on interaction mode, but not on any other aspect of a PLN. UK HE students make statistically significantly higher use of mobile/smartphones and laptops than the whole sample (48%), but have significantly fewer face-to-face/non-digital interactions (18%) and make almost no use of tablets or desktops (4% combined). There is also no statistical difference between the PLNs of female and male UK HE students in any aspect.

The largest effect, however, is a result of the age of the PLN creator. Age will significantly affect not only the people with whom the PLN creator interacts (human interaction endpoints), but also their choice of interaction mode. The data provides some evidence for the possible existence of a Network Lifecycle, featuring phases of change which parallel age (see table 1 below). This 'Lifecycle', consists of periods of immaturity, expansion, maturity and decline.

Table 1: The differences in PLNs based on age, which hint at a possible 'Network Lifecycle'

Network Lifecycle phase / PLN aspect	Immaturity – age Under 18	Expansion – age 18-25	Maturity – age 25-65	Decline – age Over 65
Network size (nodes)	236	333	333	303
Most frequent interaction mode	Face-to-face / non-digital (36%)	Mobilephone (43%)	Mobilephone (30%)	Face-to-face / non-digital (31%)
Most frequent interaction purpose	Communicating & Collaborating (24%)	Searching & Browsing (28%)	Gathering Information (29%)	Gathering Information (32%)
Most frequent interaction endpoints	Humans (53%) – friends (18%) – family (17%)	Non-humans (52%) – web search engines (8%)	Non-humans (52%) – web search engines (8%)	Non-humans (58%) – web search engines (8%)

Discussion

The Framework and methodology proved effective in mapping and analysing PLNs at the individual, group and whole sample scales. The findings clearly indicate the extent to which interactions with digital devices and non-

human endpoints are inextricably embedded in daily life and learning. Individuals, no matter who they are, where they live, or what their contexts are, reside at the centre of a sociotechnical network, which frames and enables their daily interactions.

The data has also revealed a surprising degree of homogeneity between the PLNs of diverse groups, with only four significant shaping effects found (age, ethnicity, main activity, UK HE student), which only affect two aspects of a PLN (interaction mode and human interaction endpoints). In a challenge to the literature, gender, country/region of residence and position on the digital resident-digital visitor spectrum have no significant effect on a PLN. PLNs are more similar than they are different.

The data also suggests a possibility of a Network Lifecycle, with the critical growth phase coinciding with being 18-25. Changes occur in interaction mode, with mobile/smartphone use significantly increasing, while face-to-face/offline interactions decline, even more so for 18-25's resident in the UK and studying (i.e. UK HE students). Further significant changes occur to human interaction endpoints, with family interactions falling to their lowest point in life, while friend interactions climb to their highest level, which again is more pronounced for UK HE students. The data also suggests non-significant, but potentially interesting, changes with networks growing considerably in size, searching & browsing replacing communicating & collaborating as the main interaction purpose, and, for the first time in life non-human interactions outnumbering human ones.

This raises challenging questions for HE educators and learning designers, concerning among others, the ratio of face-to-face vs independent study hours; the importance of mobilephones in learning; the role of humans (especially educators) in the network; the value of literacies and skills vs content transmission; and what constitutes appropriate assessment activities.

In short, while at university, UK students become more deeply embedded in their networks as both they, and their PLNs, undergo change and develop patterns which will remain for the rest of our working adult lives. This means that HEI's are critically positioned, and may even have a duty of care, to guide and facilitate this network growth in educationally and personally productive ways. The findings have helped inform a PLN-centred networked learning pedagogy, where learning is sociotechnical and networked, and which, due to PLN homogeneity, likely to be largely inclusive (rather than exclusive). This pedagogy prioritises nurturing and developing the growth, maintenance and use of PLNs, by aligning learning design to the modes, purposes and endpoints that are most frequently activated in a PLN, and identifying and developing those parts of a PLN which are under-activated. This development would equip graduates with a mature, fully functioning and well-maintained learning network, which would have an immediate educational value by aligning the HE learning process with student's behavioural norms, as well as having value beyond university in the workplace and for lifelong learning.

A PLN-centred pedagogy also focusses on developing digital literacies and networking skills through blended, peer, social, autonomous and self-directed learning as a default. It also demands appropriate assessments, which reward collaboration, creativity and PLN development, and a reassessment of the role of educators (and their re-skilling). Finally, it also recognises some of the structural barriers to transitioning to this pedagogy, including the limitations of the contractual model of HE currently en vogue in the UK.

To conclude, this research indicates that PLNs can not be ignored in Higher Education, that learners and their learning networks are inseparably linked and that those personal learning networks, when fully understood and correctly developed through innovative PLN-centred networked learning pedagogy and learning design, can provide one valuable approach to responding to the needs and expectations of networked HE students living, learning and working in a network society.

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Leadership and cooperation in Google Docs based group work – a video ethnographic examination of group work in a Danish upper secondary school.

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Abstract

This paper examines how Google Docs is used and affects group work in the classroom. Methodologically, the study applies video ethnography and focus group interviews with pupils in two first year classes at a Danish upper secondary school. Google Docs is a widely used digital tool at Danish upper secondary schools and has been associated with "considerable potential […] to serve as a platform for collaborative work" (Chu & Kennedy, 2011). However, contrary to these assumptions this case revealed that actual written collaboration on Google Docs was minimal. Instead, in all the examined groups, a leader was identified that dominated the groups' work and writing.

Theoretically, the paper take inspiration from Networked Learning and its critical approach towards usage of digital technologies in education. This includes acknowledging that, increasingly, learning combines digital and non-digital forms, and that, generally, technology play an active role in learning (Hodgson & McConnell, 2019; Fawns, 2018). Also, perspectives on affordances (Gibson, 1979; boyd, 2014), socio-material interactions (Sørensen, 2009), and leadership (Goffman, 1981) provide insights into the group work analysis.

Video ethnographic method enables a detailed analysis of the group members' oral as well as written interactions in Google Docs, thus paying "attention to the whole ecology" of the group work settings (Bhatt, de Roock & Adams, 2015). The aim is to analyse the socio-material interactions in the groups, specifically the interactions between the pupils and Google Docs. This includes 1) how the pupils use Google Docs in relation to their group work, including how they combine oral and written communication, 2) how different leadership roles emerge, and 3) how the hybrid learning spaces (Ellis & Goodyear, 2016) afforded by the material surroundings in the group work settings seem to promote or inhibit collaboration within the groups. In specific, the case discusses how Google Docs configures space in a way that seems to afford cooperation (i.e. divided work among the group members with each person responsible for solving a different portion of the problem) rather than collaboration (i.e. coordinated, synchronous work activity on a shared problem). The final part of the paper will touch upon some didactical implications of the findings in the study.

Keywords

Introduction

The digital media environment is characterized by networked infrastructure and user-centred communication as demonstrated by the internet and social media in general. These network logics (Castells, 1996) challenge the education sector with needs for the development of new educational and learning cultures and practices. The aim is not to apply digital technologies in every learning situation, however digital technologies offer exciting new functionalities that possess the potential to facilitate activating and individualized learning methods and working patterns (e.g. Davidson & Goldberg, 2009; Beetham & Sharpe, 2013; Bates, 2015). Thus, the digital environment challenges us to rethink pedagogy and learning and develop new forms of learning activities in which the pupils on their own and in collaboration with other pupils or external resource persons collect information and participate in the creation of knowledge. Didactically, this involves far more than simply transferring teaching activities from the black board to digital platforms.

> E-learning needs to be more than the 'use of technologies' and it is more than a 'communications and delivery tool … to support students and improve the management of learning'. At its best, e-learning is a reconceptualization of learning that makes use of not only instructor-led pedagogy but all the flexibility that asynchronous, multi-party contribution can bring. At its worst, e-learning is a substitution of one delivery mechanism for another (Andrews & Haythornthwaite 2007: 19).

This project examines the use of Google Docs within group work settings in two first year classes at a Danish upper secondary school. Google Docs has become a widely applied platform in educational contexts due to its functionalities that affords a learner-centred approach enabling users to easily create, share, and edit documents, spreadsheets, presentations, and forms online (Perron & Sellers, 2011). Presumably, "there is considerable potential for Google Docs to serve as a platform for collaborative work. However, empirical evidence of the impact on online collaborative work is yet inadequate" (Chu & Kennedy, 2011: 585). By examining the effects of Google Docs as a learning environment that affords "socio-material interactions" combining physical and digital spaces (Sørensen, 2009; Ellis & Goodyear, 2016), this study hope to contribute towards more insight into this research area.

Research Context

One of the main areas of attention within Networked Learning theory has centred on the use of ICT to connect learners in "learning communities" (Hodgson & McConnell, 2019). While this often focussed upon online communities of learners separated physically, this study examines group work in the classroom with pupils seated facing each other around a table, each with a laptop. Thus, the learning environment in this case consist of hybrid spaces (Ellis & Goodyear, 2016) combining a physical dimension with oral communication and a virtual dimension with written communication on Google Docs.

A central point in Networked Learning concerns the agency of technology in any learning context. As a supplementary perspective, affordance theory offers a holistic, analytical perspective for examining the complementary relationship between learner and the learning environment. The concept of affordance captures the "possibilities for action" (Gibson, 1979) by referring to both the enabling and the constraining qualities of technologies. Thus, the affordance concept captures the insight that material qualities frame, without determining, the possibilities for agents' actions in relation to an object (Hutchby, 2001). Importantly, the specific effect depends on the user as the same tool or technology has different affordances for different users: "Understanding the affordances of a particular technology or space is important because it sheds light on what people can leverage or resist in achieving their goals" (boyd, 2014, p. 10–11).

Day and Lloyd (2007) stress the holistic quality of this perspective by pointing out that learning technologies are only one of several contextual factors that constitute affordances for learning. Other aspects such as teachers, other pupils', and the learner's own experiences and attitudes also influence the capabilities to perform the desired learning activities. In this paper, attention focusses upon how Google Docs frames the interaction among the pupils, how they collaborate and how leadership is distributed. Here, the study takes inspiration from Estrid Sørensen's "socio-material approach" to learning that builds upon "the assumption that new as well as established technologies take part in and contribute to forming school practices" (Sørensen, 2009, p. 3).

Aims and Objectives

The aim is to analyse the socio-material interactions during Google Docs-based group work in a Danish upper secondary school. The main research questions are: 1) How do the pupils use Google Docs in relation to their group work, including how do they combine oral and written communication? 2) How does different leadership roles emerge? 3) How do the hybrid learning spaces (Ellis & Goodyear, 2016) afforded by the material surroundings in the group work settings seem to promote or inhibit collaboration within the groups?

A general question concerns how Google Docs configures space in a way that seems to afford cooperation (i.e. divided work among the group members where each person is responsible for solving a portion of the problem - which is deemed problematic by the teachers) rather than collaboration (i.e. coordinated, synchronous work activity on a shared problem). The laptops constitute a significant part of their material surroundings, but while

providing a platform for written group interaction, the laptops simultaneously afford individual spheres in which pupils seamlessly are able to divert attention from the group to carry out on-task as well as off-task actions individually. That is, sometimes they take a moment to read to solve difficult questions related to the task, and sometimes they seem to use the screen to hide from the group work. This analysis of what kind of learning space and what kinds of learning activities are afforded by Google Docs provides an empirical foundation for the final part of the paper which discusses didactical implications of the findings, including what kinds of group work activities are best suited to Google Docs.

Design

With the influx of digital technologies such as laptops in the classroom, new methods are needed in order to observe activities and practices with and around digital technologies. Ethnographic and multimodal approaches in combination are necessary to observe how agents choose communicative modes and how contextual factors inform these choices.

This study applies video ethnographic methods and focus group interviews with pupils in two first year classes at a Danish upper secondary school. Video analysis enables the studying of how "interactions and literacy practices are increasingly played out in digital environments" (de Roock, Bhatt & Adams, 2016, p. 106), including the "complexity of socially situated activity" and "the complexity of how multiple modes are used as organized resources" (Flewitt, 2011, p. 308).

Hence, multiple data collection methods have been applied in the two upper secondary classes studies, allowing the paper to pay "attention to the whole ecology" of the group work settings (Bhatt, de Roock & Adams 2015), including how pupils communicate and collaborate in the hybrid learning space afforded by Google Docs. First, observations and informal interviews were performed before five group work sessions were recorded using two kinds of video sources: a video camera recorded the groups situated around a table in order to capture their social interactions, and individual screen-recordings captured activity on the laptops. This setup enables a detailed perspective into the pupils' activities in a hybrid learning space consisting of face-to-face and online communication. Afterwards a short survey and focus group interviews with the recorded pupils were made. Finally, the data were coded and categorized using Atlas.ti.

Preliminary findings

So far, two main types of preliminary findings were identified:

Firstly, collaboration on Google Docs in the groups mainly takes place as parallel work forms at the expense of coordinated, synchronous work activities on a shared problem. Parallel work describes situations when the group members distribute work between themselves with each person responsible for solving a portion of the problem - a practice considered problematic by the teachers. While Google Docs has being linked with "considerable potential […] to serve as a platform for collaborative work" (Chu & Kennedy, 2011), this study observed that actual written collaboration is hardly ever achieved. On the contrary, Google Docs appear to enhance dominant leader roles, which leads us to the other finding.

Secondly, in all the examined groups, a distinct leader was identified with the other members performing more or less peripheral roles. Shortly put, the leader was the one who took care of the writing in the Google document. Other leadership activities include planning and pacing the group's work, asking questions to the group, deciding on answers and seeking supplementary input.

The presentation will consider didactical consequences of this study. All the examined group work cases used traditional assignments where their pupils answered questions to texts. Insights into the learning spaces afforded by Google Docs suggests a need for didactical reconsiderations.

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Nurturing creative confidence and learner empathy: designing for academic staff development

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Abstract

As a contemporary and boundary spanning approach, design thinking is gaining traction in higher education, but it has not yet been established in academic staff development. The aim of this study is to reflect on a recent staff development intervention on blended learning course design, aimed at promoting a 'design thinking mindset' among university lecturers. By analysing empirical data gathered through participant interactions, we discuss the implications and potential of design thinking for academic staff development. Data analysis shows an increased awareness of the complex and diverse student body, a recognition for interdisciplinary collaboration, mentoring and reflective thinking. Additionally, it is highlighted that adopting design thinking is not without challenges, which include the need for continued practice, securing departmental buy-in and upscaling initiatives. The findings emphasise the importance of creating a 'safe' space to experiment, modelling a designing-on-the-go approach, focusing on the iterative processes of (re)design, providing scaffolding for learning, making design thinking processes explicit, building a community of practice, regular feedback and maintaining the balance between playfulness and reflection. Success of such an intervention will rely on balancing the development of design thinking skills, a design thinking mindset and creative confidence.

Keywords: design thinking, blended learning, academic staff development, higher education, South Africa

Introduction

Higher education (HE) in South Africa has recently seen widespread disruptions as a result of national protests against untenable university fees, Westernised curricula and student exclusions. These student-led protests have highlighted the inequality that persists in the country's tertiary system, and pointed to the need for fresh approaches to addressing systemic problems in HE. While not a panacea to structural inequality, 'design thinking' has long been touted as a contemporary, boundary spanning and inclusive approach to 'wicked problems' in both academia and civil society (Buchanan, 1992; Goodyear, 2015). More recently, design thinking has witnessed an uptake in universities around the world - beyond design disciplines - as a learning paradigm that nurtures creative problem solving and multi-perspective collaboration (Von Thienen, Royalty & Meinel, 2017).

Despite its purported benefits, design thinking is under researched in academic staff development (Gachago, et al., 2017; Goodyear, 2015). The aim of this study, therefore, is to reflect on the first iteration of a staff development intervention that set out to foster a 'design thinking mindset' among university lecturers. Based on recommendations from a previous study, the authors developed a short course titled *Designing for Blended Learning,* structured around design thinking principles such as problem orientation, learner empathy and collaboration. In this paper, the authors evaluate the first iteration of the course, which ran in 2017, drawing from participants' feedback.

Literature review

Staff development in South African HE

Heavy investments in information and communication technologies (ICTs) for teaching, learning and assessment in HE in South Africa (Dahlstrom, 2015), don't always translate into visible change of practice as lecturers continue to replicate behaviourist/ teacher-centred teaching and learning methods (Ivala, 2016; Ng'ambi, et al., 2016). Academic development relies on the unlearning of assumptions developed through years of subjection to ineffective pedagogy – as academics instinctively draw on how they were taught as a primary mode of teaching.

Disrupting these practices are notoriously difficult. Bali and Caines (2018) argue that to convince academics to question their assumptions, reflect on their practices, and embrace alternatives after critically evaluating their suitability in context, to guide their actions, is as essential as it is difficult. Moreover, most training and support on the use of technology in teaching and learning focuses on effective use of technology, with little emphasis on course design and training of lecturers to effectively integrate technology in their practice (Dysart & Weckerle, 2015; Ivala, 2016). Academic staff development is often offered as a 'one-size-fits-all' (Bali & Caines, 2018); via once-off seminars, which raise awareness around opportunities of using technology in teaching and learning and showcase innovative approaches at the institution. What is missing, however, with some exceptions such as the regional Cape Higher Education Consortium (CHEC) short courses, are longer-term sustainable (inter)institutional strategies. These strategies must allow for follow-up and collaboration between academics and academic staff developers both in terms of technical and pedagogical support, such as short courses (ideally co-designed with potential participants) or the set-up of local peer-to-peer support/networks (Ivala, 2016).

Design thinking in academic staff development

Despite the establishment of the Hasso-Plattner-Institute of Design Thinking (HPI d.schools) at the Universities of Potsdam, Stanford and - most recently - Cape Town, the growing need for design thinking across diverse curricula is not generally associated with the domain of innovation in learning and teaching in HE, or employed for academic staff development. While the application of instructional design models such as ADDIE is not new in this field, design thinking differentiates itself from these models in a number of ways, such as its focus on interdisciplinarity and the iterative, exploratory and sometimes chaotic nature of design (Razzouk & Shute, 2012), human-centred design and creativity. Human-centred design offers what most instructional design models lack, namely a focus on the person we design for (Brown, 2009; Walling, 2014). In traditional instructional design models, there is also a limited focus on creativity (Clinton & Hokanson, 2011). Finally, the emphasis that design thinking puts on ethics is of particular importance in the context of student protests in South Africa, which highlight unequal access to resources.

Although there are a growing number of studies on the potential of design thinking in education (Koh et al., 2015) and postgraduate studies (Rauth et al, 2010; Ulibarri et al., 2014), in professional development the focus is primarily on teacher education (Garetta-Domingo et al., 2017; Hodgkinson-Williams & Deacon, 2013) rather than on academic staff development more generally (Gachago et al, 2017; Goodyear, 2015).

Context and intervention

This study was conducted at a University of Technology in South Africa. In 2016 the educational technology support unit servicing the six faculties at the institution embarked on the design of a short course on blended learning course design in collaboration with design experts at the institution. Design thinking was the chosen focus, drawing on a 2016 study on shared characteristics of eLearning champions at the institution (Gachago et al., 2017). The seven themes that emerged from interviewing these 'champions' were: collaboration and generosity; learner empathy; problem orientation; exploration and play; reflection and resilience; focus on practice and becoming change agents. We found that these characteristics corresponded largely to a design thinking mindset (d.school, 2011; Schweitzer & Groeger, 2016).

Research shows that design thinking is not necessarily a natural talent, but a skill that can be learnt (Rauth et al., 2010; Lawson, 2005) through unconscious adoption as much as through formal training (Porcini, 2009). Following design thinkers such as Rauth et al. (2010) who argue that design thinking education (i.e. the process of learning and teaching design thinking) can develop creative competence that 'assures the students of their own ability of acting and thinking creative' (p.7), we set out to design a short course that would incorporate design thinking methods, processes and promote a design thinking mindset. The course that was offered in a blended learning format, combining face-to-face workshops and online seminars, ran over a 10-week period. Presentations during the face-to-face workshops were kept to a minimum to allow for peer engagement and mentoring activities during those sessions. The online seminars were used for participant-led discussions on topics of blended learning, such as supporting diverse learners or the ethics of blended learning (link to course outline[1]). Following others (i.e. Ulibarri et al, 2014), this approach was employed to challenge lecturers to exchange their analytical, deliberate modes of being for an experimental, creative and playful approach. The course design was iterative ('designing-on-the-go'), and responding to participants' feedback (through, for example, weekly reflections and other forms of interaction).

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[1] See course outline

This study follows a qualitative interpretive approach. In total, eight participants completed the 10 weeks of training - none of them from Design disciplines. Six of these participants are lecturers in the Faculties of Business and Economic Sciences and Health and Wellness: Nazleen[2] and Riaan work in the Unit of Applied Law while Precious and Jody are employed in the Sports Management Department. Mark and Sonwabo lecture in Biomedical Sciences. Noma works for a central support unit as a language lecturer and Tasmeen is a librarian in the Nursing Department. Data was drawn from weekly reflections submitted by participants as part of the short course assessment requirements. Furthermore, a focus group conversation at the end of the course was organised, facilitated by a colleague from a partner institution, who is both an academic staff developer and interested in design thinking. Five participants took part in the focus group conversation at the end of the course, facilitated by an external colleague and in which participants discussed experiences during the course. Questions asked focused for example on whether and how participants' understanding of course design and blended learning changed and whether and how certain dimensions of the design thinking mindset were developed. The three participants who did not attend the focus group, completed an online survey, which followed the question design in the focus group. Coding was done independently by three of the authors who went through the written reflections, the transcript of the focus group and the open-ended comments of the survey, to come up with emerging themes. An open, axial and inductive analysis process was followed. Six major themes emerged from the analysis: interaction and collaboration (with the sub-themes of nurturing empathy and modeling tools and technologies), creativity, evaluation and feedback, experimentation, time and transferring theory into practice. These themes are discussed in detail in the next section. Ethical clearance was obtained through institutional channels.

Findings and discussion

In what follows, we describe themes that emerged from participants' feedback on the course.

Interaction and collaboration
One strong emphasis of the course design was collaboration among colleagues from within and outside their disciplines. Working with and from different perspectives allows participants to learn to cope with contexts that are messy, complex and ambiguous (Jobst, Endrejat & Meinel, 2011). Participants were encouraged to sign up as departmental course design teams and were grouped across disciplines for workshop activities. This was appreciated as Nazleen's comment shows: "But then because [my colleague] was here, we could bounce ideas and correct each other's understanding of certain things; ... doing it with someone who understands the context that you are working in was invaluable."

An activity that the design team introduced in this course was the world cafe methodology (Soeder, 2016) that is usually employed to facilitate large group dialogue. This methodology encourages everyone's contribution, connects diverse perspectives, promotes listening together for insights and shares collective discoveries, as Mark states: "I was pleased to learn that my fellow participants are all from *various disciplines*, it made the experience more varied. I especially liked the rotation between discussion groups [in the world cafe]"

Nurturing empathy
One of the key components of user-centred design (Brown, 2009), is focusing on the end-user and the importance of co-designing interventions with this end-user (in our case, the learner). To emphasise the notion of designing for a specific learner, to put the learner at the centre of the design process, the design team introduced the 'persona' activity at the beginning of the course. Personas (Seitzinger, 2016) are graphically represented user archetypes that help define the intended design activity (Van Zyl & De La Harpe, 2014). It is an informed and experienced description of a hypothetical (end) user (in our case, the learner), their context, challenges and goals. Respondents commented on their increased awareness of their students' diversity in circumstances, personalities and needs. The following comment of Precious illustrates this: "I have started to pick up *distinct differences* in my students that I have previously been unaware of."

Modelling tools and technologies
The course designers invited a variety of mentors / champions to the course and encouraged them to share their own practices in informal conversations (rather than formal presentations) with participants. Using their pedagogical innovations as case studies, to be analysed and used as examples or 'precedent' (Lawson, 2005; Hitge, 2016) by course participants, was an important strategy to encourage more creative uptake of technology. Jobst and Meinel (2012) call this strategy of constantly observing others as model in action, 'vicarious experiences. The success of this approach depends on mentors' ability to externalise their tacit knowledge, i.e. design thinking (Koh

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[2] All names changed.

et al., 2015), and the mindset that enables it, as the following comment shows: "Loved [the experts]. Inspirational and encouraging. More confident to try new things [survey]."

Design activities and assignments for the course focused on a participant's teaching practice and were chosen to be as authentic as possible. While we modelled certain tools in the course (such as the online conferencing tool, Blackboard Collaborate, as mentioned in comment 1 below), participants were encouraged to go beyond the course tools and experiment with a range of tools and technologies if they saw them fit for their context (see comment 2). In respondents' comments we found a growing understanding of the affordances of tools and technologies and an increase in sensitivity towards their students' established practices:

> …. using *Blackboard Collaborate* gave me ideas on how to use it in my own class (focus group)

> I think *Zoom* is convenient easy to use tool as it saves time, using 1 tool for various functions allowing the user/student to select which format (mp4/mp3) he/she wants to utilise (Tasmeen)

> I would like to try [*Twitter*] with my class, however something to think about is most of our students in South Africa are more likely to have Facebook accounts than Twitter, and if they do they are likely not very active users. Another popular social media platform these days is Instagram, though I'm not sure how effective it would be as an education tool; probably not very helpful as it is mainly to post pictures and short videos and such. In sport maybe we could use it to post pictures of events we attend and signage at the venue and such (Precious)

Promoting creativity

Research shows that creativity is best taught through domain-specific training and by developing skills associated with creativity, such as problem identification, conceptual combination, idea generation and idea evaluation (Clinton & Hokanson, 2011). Design agencies such as Ideo (2011) developed design activities for educators to model design processes. Such activities include stakeholder interviews, persona development, problem definition and the use of metaphors. Participants remark positively on the design activities, but mention the persona activity, the focus on problem definition and the learning metaphor as particularly useful:

> I have [...] begun to empathise more with students as [the persona activity] has opened me up to the idea that I have neglected the fact that there are *different personalities* in the classroom and they all behave differently, learn differently and face difference struggles and ... require different interventions to reach their full potential (Precious)

> Design thinking focuses on the process rather than finding a quick solution, which allows for flexibility to teaching interventions and testing of different ideas towards *solving complex problems* (Jody)

> ... the other highlight for me was the *learning metaphor* and having that graphical visualisation of what your subject is about was actually quite an eye opener (Mark)

Having participated in the course, respondents noted that they started thinking differently about learning and course design. Participants noted that the course helped stimulate both their individual and collective creativity, focusing more on the iterative process of course design rather than on outcomes.

> So for us it was – it actually *changed the way we were thinking* of designing our subjects and especially because we have students who will be going back to their communities, we will be doing block release with students and those sort of things. So, it's given us a lot of tools that we can use and it made us think about the whole process of designing our courses very differently (focus group).

> I think because design thinking pushes the boundaries of our "conventions", it will challenge me to think outside the box and bring *real creativity* to my delivery of my course. I think design thinking is very different from our "traditional" ways of curriculum design because it is not linear (Precious).

Hodginkson-Williams and Deacon note: 'a key component of the design thinking process is fostering the ability to not only solve problems, but to define problems' (2013: 84). Koh et al. (2015) warn that more experienced academics might jump too quickly to established solutions and design surface level change, finding it difficult to shift their established practices. Interventions such as the world cafe and the design brief development gave participants time to ponder a variety of problems from different viewpoints, thereby remaining in the problem space for longer (Lawson, 2005), as the following comment shows:

For me it never occurred that a problem could be understood. I just saw a situation; there is a problem and then what's the solution? That was my standpoint before I started this course but now I can understand that there is more to a problem than just what I see there, is the other person's point of view as well, where they are standing and how they see that problem. And what might be a problem to them might not appear to be a problem to me so for me, that understanding of what a problem is and looking at it from all angles or all possible angles was a revelation and I enjoyed coming to it (focus group).

Ongoing evaluation and feedback

Design thinking contains iterative cycles of creation and reflection (Rauth et al, 2010). As part of the assessment strategy in this course, participants were required to conceptualise and design actual course interventions. A strong emphasis was placed on continuous reflective practice (Hitge, 2016). Participants wrote weekly reflections on their design journey, and they were encouraged to obtain regular feedback from peers and students, as well as to take part in facilitated online and face-to-face reflective design conversations (Lawson, 2005) aimed at fostering creativity and innovation. In their feedback participants noted the value of regular feedback and evaluation loops in their current course designs.

The present feedback mechanism ... cannot ensure timeous intervention or a change in direction for those that raised issues. So [students] input in the design is limited and for them most probably meaningless. It seems then that feedback must occur as delivery takes place. So the design process must include *feedback and redesign* (Riaan).

Safe and supportive space to experiment

Ulibarri et al. (2014) highlight the importance of creating an emotional, supportive, non-judgemental atmosphere to foster creativity. One example of how we introduced playfulness is the introduction of learning metaphors. Learning metaphors prompt and guide the development of a learning activity or a course by framing all elements of the activity within a certain learning experience, such as 'sitting around a campfire' or 'the amazing race' (Morkel, 2015). We also tried to design activities that participants would experience as 'different' (as shown above) and challenging, such as facilitating online webinars. Participants noted that the course was challenging at times, and make reference to their lack of digital literacy skills, but also working in disciplines not known for their creativity, as Riaan notes: "As academic disciplines, Law is not known for encouraging risk-taking".

As enabling factors participants mention the support received from their peers and course facilitators, as this comment from the survey shows: "It's [the] continued support from facilitators and I feel I have an academic community I belong to... they are passionate about their work and exercise a whole lot patience... why not clone them perhaps?" Moreover, the course enabled them to experiment with various tools without the fear of failure within a community of practice, supporting each other. In this regard, the course was a safe space within which to explore options and alternative interventions, as discussed in the focus group: "And you *don't feel isolated.* I mean we could, when we went to report back in meetings, we could back each other up so it doesn't seem as if you're this mad hatter trying to convince everybody of something that you read off the internet somewhere".

Time commitment

As expected, the course did present a number of challenges. For participants who were mostly academics, already under considerable pressure from high teaching loads, administration and research expectations, signing up for a 10-week course, required a significant time commitment, as the following comment from the focus group shows: 'It could have been a little bit more *condensed* if it makes sense, to five weeks instead of ten'. Participants also commented that the course material was too much: "I didn't get the chance to do the readings that we got beforehand because *there wasn't time* to do it (focus group)."

The preparatory readings required for the online session, were discussed in depth during the focus group. While some reported to enjoy them, others argued for 'less academic' reading, that should have taken them outside the 'usual' academic space/practice: "*Ja, I think for me it's more of an escape.* I feel like we read a lot, every day it's always about reading. At work you read, most of the time you have to read. So, I thought it would just – just get an escape from your everyday" (focus group).

Transferring theory into practice

Most disappointing for us, however, for a course on blended learning course design, which should focus on iterative prototyping, was that participants expressed concern that the course did not allow enough transfer into their own practice, as exemplified by the following exchange during the focus group conversation:

Participant:	We would have liked, with the exercises that we did, designing the personas and all of that [...that] we can go back to class, maybe see how we can use that in class. I don't know if that makes sense.
Interviewer:	So you mean more applied or…?
Participant:	Yes, yes.

This is an important observation as the course specifically set out to support academics in the practical integration of tools and technologies in their practice.

Conclusions

This paper set out to reflect on the first iteration of an academic staff development intervention on blended learning design, aimed at promoting learning design / design thinking principles, processes and mindsets (Rauth et al, 2010). As Taheri et al. (2016) suggest, towards developing design thinking capacities, we need to consider three specific outcomes: skill-based, cognitive (i.e. design mindsets) and affective outcomes (i.e. creative competence). The data shows that the course was received positively and there is evidence of a shift in how participants understand and engage in course design. Participants also display a growing awareness of the complexities of designing learning for a diverse student population (both cognitive outcomes). The course encouraged playfulness and experimentation through the design activities selected, the informal atmosphere and the mentors (i.e. slightly more experienced eLearning champions), who shared their practice and experience - all of which has helped develop creative confidence in participants (affective outcome). As this was the first iteration of the course design, we were 'designing-on-the-go' which also added to the atmosphere of experimentation, openness and modelled risk-taking. Similar to other studies (Ulibarri et al, 2014), participants appreciated the course as a safe space to think, talk about design and 'play at design'. 'Designerly ways of knowing' (Cross, 2007) were modelled and are evident in participants' responses.

There was an important concern about direct application and more rapid prototyping of design activities in participants' practice (skill-based outcomes). Taheri et al. warn (2016, n.p.) that 'while design thinking trainings create a safe environment for failing and experimenting for trainees so that they develop beliefs in their own creative ability, the development of skills which foster their creative agency is important.' They argue that this is particularly important in professional contexts, where individuals need to apply their learning within their own working contexts. An exaggerated focus on cognitive and affective aspects of design thinking might result in unrealistic expectations of what can happen outside the training space. However, as Irwin (2015, p. 93) notes, when introducing design thinking into new contexts, at the beginning, the main value of design thinking processes may not be 'the ideas and solutions we developed but rather the cultural transformation that resulted…. [over time we] developed a (mostly) collaborative, consensual group process that became the basis for profound change'.

Another important point raised in the feedback was the need to (co)-design with and for *all* participants. Participants' responses reminded us to be sensitive to designing for a diverse group of people - those more and less digitally literate, those more or less risk averse, those in teaching positions and in other roles, those drawn to academic readings and those looking for more accessible information.

Our reflection on this course emphasises the difficulty to strike a balance between process and product, playfulness and structure, challenging tasks and feeling of safety and trust, lightness and depth. It encouraged us to create a 'safe' space to experiment, take risks and fail, and in doing so to challenge attitudes of perfectionism prevalent in academia. We also recognised the importance of combining established elements of academic staff development, such as academic readings, to establish trust, with activities that push participants' thinking about teaching and learning. We noticed the importance of modelling a designing-on-the-go approach through design team and mentors, focusing on the iterative processes of (re)design while working on larger projects (course designs) and providing scaffolding to help participants develop and gain creative confidence. Most importantly, it shows how follow-up and continued work including constructive feedback on lecturers' practice is crucial to strengthen cognitive, affective and skill-based outcomes of such academic staff development.

Design is a *slow* process (Goodyear, 2015; Irwin, 2015; Ulibarri et al, 2014) - not a quick fix. How to sustainably transfer design thinking into one's own and into a departmental practice is an important challenge to consider. Nurturing creative confidence and learner empathy requires a community of practice to draw from, on an ongoing basis. This suggests that a brief once-off academic staff development intervention is insufficient. Instead, academics should be encouraged to continually share their experiences (failures and successes), present their

approaches to blended course design, ask questions and share solutions, at various departmental, faculty or institutional meetings or other academic forums.

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Building a network for collaborative support in professional development

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Abstract

This paper aims to explore and describe important steps in creating beneficial conditions for networked learning in a project in organisations. In the inception phase of the project, four important steps were identified: creating a common virtual space, the handshake, the initial support and the mentorship. It is concluded that all the four described steps are important for a successful establishment of a networked community of practice.

Keywords

Collaborative support, Networked learning, Professional development, Technology enhanced learning

Introduction

To invest in human resources is an important and continuous process in the contemporary knowledge society (Chang, 2016). Continuous professional development has been defined as "The systematic maintenance, improvement and broadening of knowledge and skill, and the development of personal qualities necessary for the execution of professional and technical duties throughout the practitioner's working life" (Friedman and Phillips, 2004). Technology in a networked learning context has been used in academia and industry to better facilitate training and learning activities in professional development, both in technical and social networks. Advantages from the learner perspective might be to define an individual pace and schedule, and to have access to qualified instructors. From the teacher perspective, there are advantages such as dynamic course content and the opportunity to teach from different locations (Horton, 2000; Chang, 2015; Chang, 2016).

In this paper, networked learning is defined as learning activities which connect teachers as well as the learning community (Goodyear, Banks, Hodgson & McConnell, 2004) and the contexts in which the teachers participate (Rydberg & Sinclair, 2016). More recently there has been an increased interest work collaborative teacher teams (Gast, Schildkamp & van der Veen, 2017), which many times has involved professional development through professional conversations (Schuck, Aubusson & Buchanan, 2008). Participating in conversations and professional development activities can be understood as learning through participating in a community of practice (Wenger, 1998) of everyday collaborative work-based settings. More specifically, Wenger (1998) refers to three distinct modes for belonging for making sense of identity formation and learning: engagement, imagination and alignment. Professional development activities are often supported by social and technological networks involving both collaboration and individual development, which can be expressed in terms of creating

conditions for networked learning.

Aim and Research question

This paper aims to explore and describe the initial steps in the collaborative support for professional development, seeking to identify and understand the important steps that create beneficial conditions for networked learning. With inspiration from Wenger's (1998) three distinct modes for belonging, the research question is as follows: How might a support model for networked professional development be divided into important and fundamental steps?

Context

The context for this study is the BUFFL-project (Swedish, in translation: Industry development at banks and insurance companies through flexible lifelong learning), which aims to strengthen competencies in a specific labour market area (banking and insurance) while stimulating lifelong learning. The project initiates new and further development of ongoing efforts using flexible technology-based methods for learning in working life. Researchers from the fields of Business Administration, Education and Informatics work together with six private companies and one governmental agency to develop a framework for flexible, short higher education courses for professionals. The collaborative organisations are active in the three regions in order to provide a valid framework, including principles of how this kind of education can be designed. The project runs over two years and contains three phases that partially intersect. The pre-project phase was based on disciplinary competence and wishes from the collaborative organisations. The researchers created a preliminary educational framework embracing appropriate educational methods and technology supported learning. During the ongoing implementation phase, courses are tested together with the employees of the collaborative organisations. The evaluation phase will analyze completed courses with the aim of contributing to the further development of the courses and the preliminary educational framework.

Four important steps

In the inception phase of the project for networked learning, four important steps were identified: creating a common virtual space, the handshake, the initial support and the mentorship. The four steps and the embryo for a model have been based on a combination of a literature review, and on authors' experiences of earlier networked professional learning initiatives.

Creating a common virtual space

A virtual space, which created a common workplace to support networked learning, was important as a base for the collaborative work with professional development. This common virtual space for teachers in the project who were preparing for the upstart of their courses, with university teachers as mentors to support these teachers' work. The course modules were developed in the university's virtual learning environment (VLE) with the support of the university technical support team.

Creating new course modules in the VLE proved to be somewhat of a challenge. Teachers at the organisations involved needed to be registered. University work routines and administrative rules created barriers for external users who could not be considered as students. Other barriers included lack of information about the project among administrators who, understandably, found it difficult to comprehend the project design and the need for flexible routines for connecting teachers and users to the VLE.

The handshake

As identified in earlier studies the inception phase is a important, and if the initial handshake fails the result may be low motivation and a high dropout rate among first time adult online learners. In the first contact with technology supported education and virtual learning platforms the challenge is not only the learning content. What can cause frustration and cognitive overload is the need to also deal with technology and the VLE interface (Osika & Sharp, 2002; Tyler-Smith, 2006). This may be related in challenges in administrative routines such as the distribution of account information to online learners who are not university students. Studies that are more recent also highlight the importance of the initial handshake and early in-person or virtual joint sessions to establish contacts and collaboration. This can be seen as a basic action that could be carried out face-to-face or by videoconferencing (Gregori, Martínez & Moyano-Fernández, 2018). Sometimes the frustration of a bad handshake can be so strong that online learners quit after their first initial experience (Sun et al., 2008; Monteiro et al., 2016). These findings from studies conducted on students in higher education are

most likely applicable also for university teachers learning to teach environments supported by technologies. The initial problems described above would better be addressed by a corresponding initial support.

The initial support

In a teacher community with a majority new to technology-supported activities, the value of an initial support group should not be underestimated. Important initial training in the BUFFL project has been to offer technical training and support for the VLE and the video conferencing tool Zoom. To achieve realistic training sessions of the Zoom tool most of the initial distance support was carried out as Zoom sessions. Furthermore, two members of the support group arranged a face-to-face workshop with hands-on activities at one of the other participant universities for project participants without earlier experience of tools for technology enhanced learning.

Other important parts of the initial support were to offer pedagogical support, technical instructions, study guides, and examples of online assessment. Although all teachers have previous pedagogical knowledge, teaching with the help of digital technologies requires a modified instructional design. Teachers also need straightforward technical instructions to get started with recording tools, video conferencing tools and the VLE itself. Learners that have not studied online using VLEs can be helped by study guides that explain aspects such as course design, collaboration tools and how to navigate in the VLE. Finally, the construction of online assignments differ from traditional assignments, and VLE modules for peer-review are not always self-explanatory.

The mentorship

In the same manner as the initial support is an important pillar in the start of the BUFFL project, mentorship is also important. This work in creating beneficial conditions for networked learning within the project group as a community of practice (Wenger, 1998) can be described on three levels. On the first level, creating conditions for networked learning among mentors is important to exchange, evaluate and develop the work in mentorship to support the teachers in the organisations. This involves how mentors develop and create networks to support individual work in mentorship with other mentors. On the next level, how mentors through their mentorship support conditions for networked learning for teachers working on the courses as a community of practice is also vital. On the third level, as the project continues, it will be important that conditions for networked learning are also created for both mentors and teachers to share and exchange experiences and development work in the intersection between mentorship and teaching.

Discussion

As pointed out in several studies technology does not teach by itself, but technology supported teachers can. Teaching and learning should always have the prime focus, but technical support has an important role in blended learning. Skilled technicians can often indirectly influence the outcomes by reducing teachers' and learners' anxiety (Sun et al., 2008; Markova, Glazkova & Zaborova, 2017). However, it is important that teachers who are new in applying technology in educational settings not only learn how to use the new tools, but also receive information about why they should use the tools (Kirkwood & Price, 2005).

As highlighted by Comas-Quinn (2011), teachers play a key role in any learning approach. How a technology supported orchestration could work will largely depend on how well teachers make the transition from traditional classroom roles to the more complex teacher role in VLEs. The same can be said of university teachers as mentors. Several studies have identified the needs for new online teaching skills (Salmon, 2004; McPherson & Nunes, 2004), but acquiring the necessary new skills might not come naturally to all teachers and learners (Comas-Quinn, 2011). To achieve a successful transition from traditional teaching and learning settings to VLEs, teachers need initial, as well as continuous support. How this transition takes place and how the conditions for networked learning grow and develop as teachers slowly progress through the initial steps for professional development in the BUFFL project will be of interest to study. These steps will most likely be crucial steps creating belonging through engagement, imagination and alignment (Wenger, 1998), and beneficial conditions for networked learning in organisations through collaboration.

Conclusions

It appears that all the four described steps are important for a successful establishment of a networked community of practice. Neither the community, nor the project will fail if one step fails, but every step is important in the process of creating trust, motivation and collaboration.

Future research

This paper presented an embryo to a support model for networked professional development. The next natural continuation would be to carry out an empirical evaluation of the model and to get feedback from the various stakeholders in the BUFFL project.

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Place-responsive principles of sustainable networked learning

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Abstract

This work builds on the work of Hodgson and McConnell by extending the principles of networked learning to incorporate aspects of place-responsive pedagogy and sustainable education. Place-responsive education is traditionally situated within the outdoor education field, and invites a deeper recognition of the interwoven nature of learning. It aligns with a postdigital perspective of networked learning, embracing the complex entanglement of learners, environment, technology and everything else. Sustainable education focuses on the creative, participative and reflexive processes which underpin transformative pedagogies, recognising the importance of collaboration and time. The goal is learning to live sustainably as part of the ecosystem.

This extension of the principles was undertaken in order to strengthen the recognition of place and place-knowledge as part of the postdigital network, to find a way to give voice to the non-human participants in the learning environment. It will also demonstrate how networked learning is a sustainable educational approach. I will start by outlining the place-responsive framework that will guide the review of the principles. This will be followed by an overview of sustainable education, explaining what role this plays in networked learning and the importance in developing future-proof skills. Next, the eight principles will be extended, building on the framework. Finally, a case example will illustrate how this can be applied in practice.

Keywords

Place-responsive, sustainable education, networked learning, postdigital

Introduction

This paper will extend the eight principles of networked learning outlined by Hodgson & McConnell (2019) based on work by Ponti & Hodgson (2006). Previous networked learning research has focused on place-based spaces (Carvalho, Goodyear & de Laat, 2016). This work recognised the increasing importance of places as part of and participants in the process of networked learning. It demonstrates place-awareness, recognition of the involvement of the places within which learning happens. By extension, a place-responsive pedagogical approach is one which proposes that by being actively attentive to and with the places where we are located, we can potentially take a more active role in protecting these places for the future (Nicol, 2014). It recognises and includes the non-humans beyond the immediately recognised human learning community, and beyond the inclusion of non-human technology as identified in place-based networked learning. Sustainable education fosters "future-proof" skills, which include critical reflexivity, the ability to question, challenge and problem-solve. These skills, or "uncertainty competences" (Tauritz, 2016), are what Hodgson & McConnell (2019, p.50) call the abilities required for "handling complex situations" or supercomplex situations like climate change for which there are, as yet, no answers. They are the "uncertainty competences" that Tauritz (2016) reports, and which are encapsulated in a place-responsive approach.

Hodgson & McConnell (2019, p. 43) indicated that the networked learning principles emphasised "a critical relationship with the digital, the human and the current socio-political and material… context". The focus on the digital-human-material in this relationship matrix struck me. From a feminist posthumanist perspective, this recognition of the wider non-human, or "more-than-human", community is important. It is essential to make this explicit, as otherwise there is a risk of reducing non-human participants to "learning resources" rather than part of the networked learning community (Banks et al., 2003). This goes beyond the socio-material view of actor-network theory (ANT; Dohn et al, 2018). Instead, it operates from an agential realist view that humans are intra-acting in a mixture, are part of the phenomenon, "part of that nature which we seek to understand" (Barad, 2007, p.352). From this view, knowledge does not reside within individual human participants, or non-human, or the environment, it is an on-going becoming-with through intra-actions distributed through an entanglement.

In undertaking this work, I seek to acknowledge this entangled ontology by proposing extended principles within a place-responsive pedagogical framework. I aim to show how a networked learning approach can positively influence sustainable education practices. Following Hodgson & McConnell's (2019, p.45) reference to the early definitions of networked learning: the importance of connections offered by technology, which "could assist and extend important pedagogical thinking and ideas". I will start by outlining the place-responsive framework that will guide the review of the principles. This will be followed by an overview of sustainable education, explaining what role this plays in networked learning and the importance in developing future-proof skills. Next, the eight principles will be extended, building on the framework outlined in the following section. Finally, an example will illustrate how this can be applied in practice.

Place-Responsive Framework

Place (Wattchow & Brown, 2011, p.92) is defined as "a phenomenon that is manifest between person, location and community interactions". That reference to a phenomenon links to Barad's (2007) discussion of a relational ontology, where we are all part of the phenomenon, there is no "outside" to observe it from.

Place-responsive education is traditionally situated within the outdoor education field (Cameron, 2014). It moves beyond place-based learning (experiential activity in a set location), through place-awareness (conscious recognition of the participation of the place in the learning experience), and beyond to a deeper recognition of the interwoven nature of living learning. It aligns with a postdigital perspective of networked learning, recognising what Fawns (2019, p.142) refers to as "an integrated totality", the complex entanglement of learners, environment, technology and everything else.

Wattchow & Brown (2011, p.182) propose four signposts towards a place-responsive pedagogy:
1 Being present in and with a place
2 The power of place-based stories and narratives
3 Apprenticing ourselves to outdoor places
4 The representation of place experiences

These signposts form the framework within which the principles of networked learning will be reviewed. Each brings with it a range of learning approaches which are already evident within the current principles, demonstrating how a place-responsive approach to networked learning could be adopted. This integrated approach explicitly acknowledges the existence of the network ecology and our more-than-human kin can foster a sense of care for sustaining the places we are a part of (Cameron, 2014; Nicol, 2014). In the next section, I will provide an overview of sustainable education, as place-responsive pedagogies operate in the present, with respect for the past, and invite us to take action for the future.

Sustainable Education

In his description of the various terms associated with digital education, Fawns (2019, p.132) states that "A lack of conceptual clarity around such terms makes it easier for different groups to appropriate them in the service of conflicting agendas". The same could be said about sustainability-related terms in education. UNESCO (2014) designated the period from 2005-2014 as the decade of education for sustainable development (DESD). As a result, Education for Sustainable Development (ESD) has become a commonly-recognised term. I have deliberately chosen not to use this term in the paper. The focus on "development" links to what I perceive as an overly managerial, mechanistic approach to learning. Instead, I have used the broader term of sustainability, using it provocatively to encourage reflection on the potential for a new appreciation of the strength of a postdigital networked learning approach to sustainable education.

Sterling (2001) outlined three main educational approaches: about, for and as sustainability. Education **about** sustainability is the most widely used, where the focus is on content and fact. The assumption is that sustainability is an uncontested, known fact which can be learned through a set course as part of a curriculum. Education **for** sustainability includes a more critically reflexive element, focusing on "learning for change". Again the view is that a list of the values, skills and knowledge can be provided to be followed. ESD in its simplest sense falls within this category. Education **as** sustainability acknowledges that some aspects can be known, that some skills will be of benefit. It goes further by focusing on the creative, participative and reflexive processes which underpin transformative pedagogies, recognising the importance of collaboration and time. The goal is **learning to live** sustainably, a whole systems approach that Sterling views as a "participative epistemology". It is not bounded by the curriculum or the walls of the classroom, but rather engages the whole person.

The focus on sustainability and sustainable development is directly related to the principles. Ponti and Hodgson (2006) focused on "sustainable" networked learning from their work on the EU-funded project Engaging Networks for Sustainable eLearning (ENSeL). In this context, "sustainable" referred to a learning process that was effective and could be maintained long term. Further information on the project was not directly accessible online, so I reviewed articles drawn from the project. Stewart and Alexander (2006) cite a report by Hilton and Smith (2001) which specifically refers to "environmental and sustainable development training". Stewart and Alexander cite this paper for the key issues facing small- and medium-sized enterprises, not the sustainable education theme. When referring to sustainability associated with networked learning, this "maintenance" definition appears to be the primary theme. Work by Boud & Soler (2016) on sustainable assessment has provided a secondary theme, by focusing on learning and assessment "to equip students for learning beyond the end of the course", with skills for an uncertain future (Tauritz, 2016). It is in this and associated work where the concept of sustainable networked learning from the perspective of this paper becomes more tangible.

In the next section, I will review the eight principles of networked learning within a place-responsive framework, highlighting how this supports the concept of sustainable networked learning. While I will follow the structure provided in Hodgson & McConnell (2019), I recognise and will comment on some changes to the structure from Ponti & Hodgson's (2006) paper. By incorporating place-responsive and sustainable concepts into the principles, I will demonstrate how these are directly applicable to the theory and practice of networked learning, and in so doing, how networked learning is a key sustainable education approach.

Principle 1: The Focus Is on Learning Which Has a Perceived Value to the Learners

Hodgson & McConnell (2019; p.46) report how tacit and cultural knowledge is "rooted in the assumptions, norms and beliefs of the local context/situation and embodied in the relationships between the learner and other social actors". This principle links with the first signpost, "being present in and with a place". Here, Wattchow & Brown (2011) highlight the importance of the place having meaning for those present, whether that be the student and the teacher, or the student themselves. This links to Cameron's (2014) observations when talking to students about the meaning of places; the students did not appreciate the impact until they were asked to reflect on a location that had meaning for them as children. On reconnecting with that sense of childlike wonder for places in their past, his students were better able to understand why this process of coming to be and know a place could give meaning to their current learning.

The emphasis on being rooted and embodied in Hodgson & McConnell's (2019) work connects strongly with the importance of place for Indigenous peoples, where it is not learning about, but learning with and from the land - being present in and with. The value to learners in this context cannot be quantified. Wilson (2008, p.80) writes that "[i]dentity for Indigenous peoples is grounded in their relationships with the land, with their ancestors who have returned to the land and with future generations who will come into being on the land". The following sections will review the other principles while holding this sense of and search for relationship with the land.

Principle 2: Responsibility for the Learning Process Should Be Shared (Between All Beings in the Network)

At the core of this principle is how we "act in relation to each other" (Hodgson & McConnell, 2019; p.46). This principle also links with the first signpost, "being present in and with a place". I contend that it is not just responsibility, but also respect and reciprocity at the heart of relationality (Wilson, 2008). When coupled with the deeply reflexive approach of attending to self and others and places, this principle fits within a feminist posthumanist theoretical framing. It encapsulates the process of becoming-with all kin (Barad, 2007; Haraway 2016).

Wattchow & Brown (2011, p.189) say that humans "are part of the ecology of a place". In light of the ecological connection, and moving away from ANT, I have replaced the word "actors" with "beings" in this principle title.

> In the moment that we perceive our fundamental and constant reciprocity with the world it ceases to be a thing made up of objects. Instead it becomes an unfolding phenomenon and we come to stand within it, alongside all the other beings and integrated co-members…" (Wattchow & Brown, 2011, p.184)

Principle 3: Time Has to Be Allowed to Build Relationships

This is the fourth principle in Ponti & Hodgson (2006), and as this emphasis on time links strongly with the first step, I agree with Hodgson & McConnell (2009) that this needs to be located earlier in the list of principles. This is not to prioritise it over the other principles, but to recognise that time is essential to build the relationships upon which the learning is situated. The confidence that time is available provides the space to engage more deeply.

This principle links to all aspects of a place-responsive approach to learning. Wilson (2008, p.80) challenges us that "rather than viewing ourselves as being **in** relationship with other people or things, we **are** the relationships that we hold and are part of". Developing this kind of awareness of our connections, it is helpful to consider the concept of slow pedagogy. Coined by Payne & Wattchow (2009), this term refers to learning activities which provide time to muse, ponder and wonder.

> Time poorness, with all its consequences for the well-being of the body, in space, and nature is an enemy that can be de- and reconstructed in some educational spaces through and by the enactment, or praxis, of an intelligent ecocentric, intercorporeal theory of pedagogical experience. (Payne & Wattchow, 2009, p.29)

By contrast, the process of "fast" pedagogy can underpin examples such as that described by Hodgson & McConnell (2019, p.47), where a drive for consensus can "discourage recognition of differences and different perspectives".

Principle 4: Learning Is Situated and Context Dependent

Hodgson & McConnell (2019, p.47) state that "[c]ontext also becomes important within this view of learning and influences who interacts with whom and how interactions occur". Wilson (2008, p. 87) reminds us that "[k]nowledge itself is held in the relationships and connections formed with the environment that surrounds us". This principle links with the third signpost, "apprenticing ourselves to outdoor places". Here, Wattchow & Brown (2011) consider the role of the land as teacher.

> What is needed is both a felt, embodied encounter with a place and an engagement with knowing the place through various cultural knowledge systems… (Wattchow & Brown, 2011, p.190)

This also links back to Principle 2 as it is about coming to know other members of the community, the place and all within it. Wattchow & Brown (2011, p.192) provide four questions to guide the response to places:
- What is here in this place? - attuning to the place, non-human residents, history, culture, etc.
- What will this place permit us to do? - which includes considering how actions can help the place
- What will this place help us to do? - reflecting on learning activities
- How is this place interconnected with my home place? - looking at connections between places as well as people

Principle 5: Learning Is Supported by Collaborative or Group Settings

Hodgson & McConnell (2019, p.47) note that "collaborative group work is frequently seen as a main pedagogical method for networked learning". This principle links with the second signpost, "the power of place-based stories and narratives". Earlier work by McConnell had identified community-building and group work "within networked e-learning environments" (p.48). Research on mobile technologies and place-based spaces (Carvalho, Goodyear & de Laat, 2016) demonstrates that this is no longer restricted to being within an e-learning environment, but expanding to encompass the student-location-environment.

Dialogue is included in this principle in Ponti & Hodgson (2006). This is understandable as dialogue is key to collaborative work. As an example of the importance of storytelling and group work, Mike Brown outlines a small project he undertook with a group of students on a trip to a local area (Wattchow & Brown, 2011, p.129). Students were paired up and prepared talks on specific topics, e.g. history, culture, to give during the trip. At different times during the trip, the group would stop for a talk from one of the groups. Additional information and insight was shared by students and families local to the area. All members of the group were teachers, rather

than solely the staff member; students took on the role of teacher for their area of interest and it provided an opportunity to learn about the location, history, culture and geography.

Principle 6: Dialogue and Social Interaction Support the Co-construction of Knowledge, Identity and Learning

Hodgson & McConnell (2019, p.48) discuss how networked learning "moves the emphasis more towards learning that emerges from relational dialogue with both online resources and significantly, with others in either learning networks or communities". Part of this is the importance of "learn to listen" (p.49) as well as being able to question and challenge existing practices, all part of a sustainable education approach (Sterling, 2001; Tauritz, 2016). This principle links with the second signpost, "the power of place-based stories and narratives".

Turning to stories and narratives, Cameron (2014) reflects on the loss of many place stories and the sense expressed by his students that places were "poorer" for the loss. Collaboration and community can help with this, as Cameron explains in a way that echoes the student project from the previous principle:

> It is often the case that not all has been lost, however. The process of recovering and retelling those stories of country, of restorying the land, is an important collective act. (Cameron, 2014, p.300)

Interestingly, Hodgson & McConnell (2019, p.49) highlight how this approach to learning "holds considerable value in a world increasingly dominated by uncertainty and contradictions—where there is a need to develop a sense of multiple perspectives to handle differences and tensions". This connects to the concept of "pedagogy for uncertain times" that Tauritz (2016, p.95) discusses. Ponti & Hodgson (2006) focus on work- and problem-based learning in this principle. The focus on the practical, experiential learning ties back to Principle 5. Tauritz (2016) talks about problem-based learning as a valuable approach in education for sustainability, as a way of scaffolding learning to develop uncertainty competences, or future-proof skills.

Principle 7: Critical Reflexivity Is an Important Part of the Learning Process and Knowing

Hodgson & McConnell (2019, p.49) state that a "critically reflexive approach to learning aims to go beyond the immediate context in which the learner operates". This principle links with the fourth signpost, "the representation of place experiences". Here, Wattchow & Brown (2011) talk about the importance of critically reflecting on what has been learned through connecting with places. Critically reflecting, evaluating, challenging and questioning are key future-proof skills (Sterling, 2001; Tauritz, 2016).

In thinking beyond the immediate context, Wattchow & Brown (2019) invite students to explore how a location has been represented through time, by reviewing historical documents, maps and advertising materials. Students can create their own representations of the places they have spent time with and the experiences they have had. This can include a variety of work, including prose, poetry, art, sculpture and music. These creations can then prompt further reflection on the experience at a later date.

> When we talk about the relationship between experience, reflection and the representation of experience it is important to point out that we do not see these as discreet entities in a linear relationship. It is better to think of them as overlapping phases, with blurred boundaries, in the same phenomenon…We are already interpreting and reflecting on meaning when we are experiencing. We may continue to reflect later, after the active experience, but reflection on experience is an experience in its own right. Similarly, when we work from our notes or sketches…we are re-engaging and re-immersing ourselves back into the subjective experience of that place. (Wattchow & Brown, 2011, pp.194-5)

This is the eighth principle in Ponti & Hodgson (2006). I was initially inclined to restore it to the original order, as critical reflexivity should be equally important for learners and teachers. Then I saw that the same could be said for other principles, e.g. Principles 2 (shared responsibility) and 3 (time). Placing the facilitator/animator as the concluding principle instead provides a way of drawing together all the principles, and with that, all the steps of a place-responsive pedagogical approach.

Principle 8: The Role of the Facilitator/Animator Is Important in Networked Learning

Hodgson & McConnell (2019, p.49) describe facilitation as supporting students through the experience "to work with them, to manage learning resources and to sustain the dialogue with peers and/or experts etc.". Wattchow & Brown (2011, p.191) state that "[p]art of the work of the… educator then is to craft, through program design, a responsive negotiation between participants and place". This principle focuses on the process of supporting students in all aspects of the place-responsive experience.

It is important to find ways, as Brown did, of recognising the student as the subject-matter specialist (Wattchow & Brown, 2011; Tauritz, 2016). The student may be the person with first-hand experience of a given location, the staff contact helps them to reflect on that, explain their findings, build achievable actions, find their story, and cope with uncertainty and risk. In contrast with outdoor education activities, for distance programmes there is an added risk and uncertainty in not being in the location with the student. Here there is the challenge of potentially limited scaffolding and trust that student can handle complexity with support from staff. This is the importance that Tauritz (2016, p.94) speaks of, allowing uncertainty in and making it negotiable with students through student-centred and student-led activities. It calls on the teacher to learn to "cherish, tolerate and reduce" uncertainty, to admit they do not know all the answers, and that they are learning to deal with uncertainty too. As mentioned, this builds essential future-proof skills for learner and teacher in what Hodgson & McConnell (2019, p.50) identify as "handling complex situations".

In the next section, I will provide an example to illustrate how the principles can be applied. Again, extending the work of Hodgson and McConnell (2019), I will show how connecting with place demonstrates how sustainable education practices are central to networked learning.

Place-Responsive Sustainable Networked Learning in Practice

This section will focus on courses from two fully-online Masters programmes, the MVetSci in Conservation Medicine and MSc in One Health. Students take three compulsory ten-week courses in the Certificate year. Two of these are An Introduction to Conservation Medicine/One Health (Semester 1) and Ecosystem Health (Semester 2).

In the first course, as part of the formative activities, students are asked to share a brief description of an ecosystem local to them covering, for example, location, type, species, management, threats, plus any key local knowledge pertaining to the ecosystem. The first formative activity of the second course, starting the new semester, is a reminder of the work that was carried out in the first course. Students are asked to return to their chosen location, this time thinking about how they might conserve the ecosystem. As part of the task, students are reminded that ecosystems are not static and can change over time. They are visiting at a different time of year and may observe differences in the place, both in terms of what is visible at that time and what may have changed. They are also reminded that they must consider this process of change and factor time into their conservation plan.

These non-assessed, non-compulsory tasks serve two purposes in the course design. First, by helping students understand ecosystems and their inclusion in them by engaging with a place local to them. Second, by sharing information about the diverse locations where the globally-spread group of students are based. Thinking about the Principles, the activities encourage learning in place and communicating the learning with the network. Table 1 explicitly links the Principles with the activities designed into the courses. As an overview, students are recognised as being the source of knowledge about their chosen ecosystem. Through their questions, the group helps the student-teacher to explain and share their knowledge. The second course adds the key element of time, which is often a pressure for part-time students. Students return to the information they previously gathered; they are told the ecosystem may have changed, but on reflection they may see that they have also changed. They are asked to critically reflect about what they can do to conserve the ecosystem they are part of, based on the knowledge they have gained; this is at the core of being place responsive. The location they have chosen is important, is part of their learning, is valued by the group, and is part of the network.

Table 1: Activities mapped against principles to demonstrate how place-responsive networked learning may be integrated into course design.

Principle	Course Activities
1: The Focus Is on Learning Which Has a Perceived Value to the Learners	Students select a location to develop their understanding of ecosystem conservation. Their work may have a direct conservation benefit.
2: Responsibility for the Learning Process Should Be Shared (Between All Beings in the Network)	Emphasis in both courses is placed on the student as part of the ecosystem.
3: Time Has to Be Allowed to Build Relationships	Students revisit the locations in a later course a build and reflect on their initial work. This also emphasises the learning value (Principle 1) of the location.
4: Learning Is Situated and Context Dependent	Each student presents professional observations of their local ecosystems. Group responses are tailored to the specific locations and information presented.
5: Learning Is Supported by Collaborative or Group Settings	Asynchronous group discussion underpins the activities.
6: Dialogue and Social Interaction Support the Co-construction of Knowledge, Identity and Learning	Group discussion encourages student-teachers to share knowledge gathered for the activities. This may build on knowledge students had prior to starting the courses.
7: Critical Reflexivity Is an Important Part of the Learning Process and Knowing	Students return to data they collected, reflect and revise based on deeper understanding of the topics.
8: The Role of the Facilitator/Animator Is Important in Networked Learning	Staff provide guidance on how to classify ecosystems and determine ecosystem health. They respond to information shared by students, and encourage students to respond to peers. Staff must be prepared for the uncertainty of "not knowing" about new locations they have no direct experience of.

Conclusion

While providing an overview of the history of networked learning, Hodgson & McConnell (2019, p.44) discussed how networked learning programmes were seen as innovative in the 1990s, and perceived as "specialist and often niche and were not considered mainstream or very likely to become a main fare pedagogy or integral to campus-based institutions". Sustainable place-responsive pedagogies are in this position now, where there are some enthusiasts teaching elective courses, and some more extensive programmes. In the main, these practices are seen as suitable only for those working in a face-to-face outdoor context and/or involved in environmental education.

By extending the principles in this paper, my goal was to challenge that perspective by demonstrating how networked learning is a place-responsive sustainable learning approach. From this, I sought to bring together the strands of networked learning and sustainable place-responsive education in support of each other. As with many topics, the evidence was already there. A UNESCO report (Makrakis, 2010) talks about "ICT for sustainable development". In reality, the terms and examples they use are more aligned with a networked learning perspective (online sustainability communities of practice, portfolios, peer feedback and dialogue). Networked learning is already a sustainable education approach, open and responsive to the places, communities and learning that have meaning for us and that we are continuously becoming-with.

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Am I building a bubble around me? A phenomenographic study exploring students' perceptions of online personalised filters and information literacy.

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Abstract

For networked learning to be successful, students need good information literacy skills. These skills will enable them to move away from being "passive recipients of digitally distributed information" (Wiske, 2011) to become critical thinkers willing to challenge, discuss, collaborate and connect with other learners and teachers. This small-scale study uses phenomenography to investigate students' perceptions and experiences of personalised filters, which present a challenge for educators concerned with developing information literacy skills. Findings show that students are comfortable with filters to find basic information. However, for more complex ideas, students felt they needed to adopt sophisticated search strategies.

Keywords

Personalised filters; information literacy, phenomenography

Introduction

Networked Learning is defined by the Centre for Studies in Advanced Learning Technology (CSALT) as "learning in which C&IT is used to promote connections : between one learner and other learners, between learners and tutors; between a learning community and its learning resources" (CSALT, 2004). However, in order for students to be able to connect knowledgeably and for networked learning to be successful, students' technical and information literacy (IL) skills need to be sufficiently well developed (Kirkwood, 2006). This paper is concerned with investigating students' information literacy skills in the context of the ever-increasing amount of information that is available online and the requirement for students to become active learners, able to access, evaluate (Williamson et al., 2007) and challenge the sources of this information.
Head & Eisenberg (2009) and Komissarov & Murray (2016) found that Google and Wikipedia were the most frequently used sources by students. Yet, while students may often be given instruction on the reliability of sources in IL training, they may not be made aware of personalisation filters and how these can affect the information that is presented to them on search engines, such as Google. Supporters of personalisation argue that it enhances the user experience, while opponents such as Eli Pariser (2011) have claimed that extensive personalisation can lead to the creation of a filter bubble, where users are presented with information that confirms their perspective and contrasting views are withheld.

Purpose of this study

The purpose of this small-scale study is to examine a group of college students' experience and perceptions of personalised filters and how these might impact their information literacy. This research was conducted in a teaching-intensive higher education institute, where students are expected to have high levels of IL, yet no formal training is provided.
The research focuses on identifying the variation in these perceptions from the students' accounts of their experiences. The sub-questions below help to inform the study:
1. Is there variance in the reaction of students to the use of personalised filters?
2. What are the various ways in which students may have experienced personalised filters?
3. How do they perceive these personalised filters will impact their information literacy?

Literature review

The following section provides a brief overview of literature relating to issues that surround personalised filters in the context of this study.

Personalised Search

Personalisation is "the process of presenting the right information to the right user at the right moment" (Speretta & Gauch, 2005, p. 2). The concept of personalised online searches is not a new one, accompanying the introduction of the search engine in the late 1990s. Pretschner and Gauch (1999) wrote about ontology-based personalised searches, focusing on how "profiles [could] be used to achieve search performance improvements" (p.391). Chen & Kuo (2000) proposed a "personalised information retrieval system based on a user profile" (p.4), recognising that without this, the degree of relevancy of search results may be disproportionate to what the user had expected (p.3). Pitkow et al. (2002) also underlined the need for personal relevancy when a user conducts an online search, identifying both contextualization and individualization as key elements in achieving personal relevancy.

Qiu & Cho (2006) suggested that personalised searches could improve the user experience by presenting users with information, resources, services and products most compatible with their perceived preferences, simply identified by algorithmic search results (Venugopal et al, 2009). Others such as Xu et al. (2008) and Garofalakis et al. (2005) highlighted the amount of time a user could save through personalisation and the provision of relevant results, attempting to overcome the challenges of the attention crash (Pariser, 2011). As more and more users identified the web as their main source for information, personalisation became a way to sift through the masses of information available online.

Although many of the more popular search engines such as Yahoo and Bing introduced personalised searches for its users around the same time as Google, this study concentrates on Google specifically, since it pioneered personalised search in 2005 for its signed-in users, informing them that it would be able to provide users with more relevant search results, as their search history grew.

In 2009 Google introduced personalised search for signed-out users also, explaining that they would be able to customize search results based on "180 days of search activity linked to an anonymous cookie in [the] browser" (Horling & Matthew, 2009). Through the process of learning about a user's past history, based on their previous click history, user interests could be identified and used to rank pages that would be of specific relevance to the user (Qiu & Cho, 2006). The content analysis of a user's visited pages could also be used to gauge user interest. However, alongside the race to develop the most sophisticated web search engine, there were numerous discussions about the privacy concerns that personalisation needed to address, some of which are highlighted below.

Privacy concerns

Riedl (2001) presented personalisation as a double-edged sword. On the one hand, it allowed users to benefit from recommender systems, which could help them filter the mass of online information. On the other, these recommender tools could be used to invade users' privacy. Awad & Krishnan (2006) conducted secondary data analysis of a survey on 400 online users to establish if there was a willingness amongst users to be profiled for personalisation, and found that there were concerns about privacy. Nissenbaum (2011) published a comprehensive report on the intricacies of protecting privacy online, identifying the many ways that privacy can be breached, such as "data gathering, dissemination, aggregation, analysis, and profiling [of users]" (p.34).

As the debate over personalisation versus privacy continued, another discussion emerged - the effect that personalisation had on how we acquire and store information. This research study has been informed by the book The Filter Bubble (Pariser, 2011) which deals with this issue comprehensively.

While the previous authors cited were concerned about the storing of an individual's information, Pariser points to the danger associated with personalisation in the context of learning and creativity. He noted that personalisation was creating a "unique universe of information for each of us" (p. 9). More recently, Spohr (2017) points to an 'ideological polarization' because of this filter bubble. However, the objective of the search engine (Google in this case) was to "build a theory of identity" (p. 34) for each user, in order to produce a relevant list of results for that user. Pariser argued that this insidious filtering out of information was limiting "what we [were] exposed to and [could] therefore affect the way we think and learn" (p. 83). If the results of an Internet search were based on previous search history, or a combination of any or all of the data signals stored by Google, Pariser reasoned that users were at risk of confirmation bias, only "consuming information that conforms to [their] ideas of the world"(p. 88), confirming their ideological beliefs, without being challenged. Gentzkow & Shapiro (2011) shared Pariser's concerns, referring to the importance of exposing individuals to viewpoints that often contradict their pre-existing views, while Vallet & Castells (2011) suggested that the combination of diversification and personalisation factors could potentially overcome some of the concerns about the intrusive nature of the personalised search.

While the debate about privacy concerns continued, another debate began about the emergence of digital learners. The following section deals with some of the elements in this debate to provide context for this study.

A New Generation of Learners

As search engine algorithms increased in complexity and the web continued to provide opportunities for a rich user experience, the new wave of "digital learners" (Brown, 2000) was expected to navigate the "complex information spaces" (p.14) better than the non-digital adults. Hahn & Puybaraud (2012) also asserted that these

students were skilled in filtering the large amounts of information they were confronted with. Yet, their knowledge of personalisation is often limited, as highlighted by Powers (2017) in a study of college students on news personalisation.

However, there has been much debate about the emergence of a digital generation. Buckingham (2006) challenged the notion of a "Net-Generation", a term coined by Tapscott (1998), arguing that technological change can affect every generation, depending on how it is used. Bennett & Maton (2010) suggest that the debate about digital natives (Prensky, 2001) has particular relevance for the education sector, proposing that students may not be as skilled with technology as assumed, while others contend that this generation of students is not a homogenous one, and that they display much variation in how they engage with technology for learning Jones et al. (2010).

Margaryan et al. (2011) found that students from different disciplines had different relationships with technology and how they used it for learning. Additionally, different teaching approaches, for example problem- and project-based learning, require students to critically select information and "let the information contribute to their construction of knowledge within the group" (Nielsen & Andreasen, 2013, p. 12), underlining the importance of IL skills in the context of networked learning in a digital era.

Information literacy in the digital age

The American Library Association (1989) defines IL as a set of skills called upon to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information". SCONUL (2011) states that information literacy "encompasses concepts such as digital, visual and media literacies, academic literacy, information handling, information skills, data curation and data management" (p.3).

The growth of the Internet increased accessibility to information and a number of research studies focused on the information literacy of the students who used this new medium. A report by Head & Eisenberg (2009) examined how students accessed information in this digital age, and found that over 90% of the 2,318 college students surveyed accessed Google and Wikipedia to research everyday topics. In 2010, a comparative study was carried out by Head & Eisenberg with a total of 8353 students and results indicated that "students intentionally [made] use of a small compass for traversing the ever-widening and complex information landscape they inhabit, whether they are finding information for course work or for use in their daily lives" (ibid, p.36). In terms of evaluating the information they found, students had devised strategies for identifying what they considered useful such as how current the information was, the design of the site and how familiar they were with the site (ibid, p.36). However, while this provides valuable insight into what it is like to be a student in a digital world, it does not drill down to the level of the search results carried out by the students, to identify whether students are aware that these search results may be influenced by personalisation.

Powers (2017), on the other hand, interviewed 37 college students at one American university (Study 1) and surveyed 147 at another American HE institute (Study 2) to ascertain how aware they were of editorial judgements as a result of their search terms. The majority of students in Study 1 were aware that data was gathered, but not that this led to changes in news selection. In Study 2, only one participant used the term 'personalisation', with only 23% of participants indicating that they knew editorial choices could be made based on their searches. Interestingly, none of the students in either study referred to strategies for circumventing personalisation, such as those highlighted by Bozdag & van den Hoven (2015).

It is in this context that the present small-scale research study contributes to the discussion on the impact of personalisation filters on information literacy in a higher education setting.

Methodology

Since this study focuses on the variations in students' experiences of personalised filters and the impact on information literacy, phenomenography was chosen as the most suitable approach. Additionally, phenomenography has been successfully used elsewhere in studies on information literacy, for example in research carried out by Andretta (2007) and Diehm & Lupton (2012).

Phenomenography takes a non-dualistic ontological perspective, noting that the subject and object (in this case the experience) cannot exist independently of each other. This second-order perspective, i.e. the focus is not on the phenomenon itself but how people experience the phenomenon, provides descriptions of how people experience "various aspects of the world" (Marton, 1981, p. 178).

Phenomenographic studies are designed to reveal variations in participant experiences, organising these variations into logically related categories, known as an outcome space (Trigwell, 2006). Each phenomenon, concept, or principle can be understood in a limited number of qualitatively different ways (Marton, 1986) and these ways of experiencing are considered the "unit of analysis" (Säljö, 1997, p.177).

The most common means of data collection is the semi-structured interview. However, while the research provides insights into the individual experience, it is most interested in results at a collective level (Booth,

2008). Booth (1997) also identified three distinct criteria for examining the quality of the outcome space. Each category should reveal something distinctive about the understanding of the phenomenon and be logically related to the other categories, in an outcome space that is most usually a hierarchy. Finally, variation should be represented in as few categories as possible.

Method

Participants

Four students were purposively selected from two programmes within the researcher's institute. While the small number of participants may not identify all the "qualitatively different ways" (Marton, 1981, p. 181) of experiencing personalised filters, this study could form the basis for a more extensive investigation of the phenomenon. Criterion sampling (Creswell, 2013) was used to identify students in Year 3 of their programme, with the assumption that they had sufficient knowledge and experience of the phenomenon being investigated (Olsen, 2011), i.e. online searches and personalisation. The students were chosen from a technology programme and a social care programme, so as to provide contrast. The aim here was to see if it made any difference whether students were online more frequently or not, in determining whether they were aware of personalised filters.

Data collection

Semi—structured interviews, lasting approximately 30 minutes, were used as the means of data collection to elicit the students' experiences of personalised filters. Initially, questions were devised to provide a semi-structured schedule to the interview, such as:

- Have you heard of the filter bubble or personalised searches before?
- Can you give me an example of an assignment where you would have to look online for information and talk me through the process of how you would do that?
- How did you decide that (the source of information) was reliable?
- Do you think relevance (personalisation) is a good thing?

Asking participants to complete an activity would be typical of a phenomenographic study (Reed, 2006). In this case the activity would introduce the topic and provide some context for the research study. Participants were invited to watch approximately four minutes from a Ted Talk by Eli Pariser (2011) at the beginning of the interview. The purpose of this was two-fold, students would have a common understanding of what the term 'personalised filter meant and the Ted Talk would act as a prompt for the qualitative interview questions, to explore their reaction to personalised filters.

Data analysis

The recorded interviews were transcribed verbatim and the data was collated in an Excel spreadsheet, organised by question and colour-coded for each participant. Ethical approval was granted for the study by the two institutions concerned and BERA (2011)guidelines were used to inform the process.

Using an inductive process (Dawson, 2009) the transcripts were analysed for common themes, with the researcher bracketing assumptions (Ashworth & Lucas, 1998) about the phenomenon in question. Bracketing is especially important in a phenomenographic study to reduce bias and allow the researcher to concentrate on the data (Tight, 2015). Initial readings of the transcripts concentrated on identifying commonality and differences, "decontextualizing and recontextualising" the data (Booth, 2008, p. 453) to attempt to identify responses to the research question. Subsequent readings attempted to put a structure around the unit of analysis, i.e. the various ways in which students perceived personalised filters, identifying categories that were different but were deemed to construct a hierarchy (Booth, 1997).

Results

The study revealed that students perceived personalised filters in different ways, depending on the context and the purpose of their online searches.

Following analysis of the interview transcripts, two qualitatively different ways were constituted. However, these views are not distinct for each participant, but rather they represent variation across the group. Students had little or no objection to personalised filters in simple online searches to find basic, introductory information or entertainment. However, students felt that personalised filters presented too narrow a viewpoint for more complex ideas or information.

Outcome space

Åkerlind (2005) advises that the phenomenographic researcher should aim to constitute not only a set of different meanings, but also a logical structure which relates the different meanings. The outcome space described in the table below shows the way in which the different categories fit into an overall description of how the phenomenon is experienced (Ashworth & Lucas, 1998).

Structural	Referential	
	Facilitates information retrieval	Limits information retrieval
Introductory information and entertainment	1	
Complex information and advanced disciplinary knowledge		2

Table 1: The referential and structural aspects of the outcome space

The categories may be presented as an inclusive hierarchy, with each category subsuming the category below. However, these need not be developmental, since students may not move from one category to the next as they learn more about the phenomenon in question (Ashwin, 2006). This point is particularly relevant in this study, since the outcome space displays the complexity of how the phenomenon is experienced (Diehm & Lupton, 2012) and identifies that students actually have opposing views on the use of personalised filters, depending on the purpose and scope of their search.

As displayed in Table 1, the structural aspects focus on what is in the foreground or background as students recount their experiences of personalised filters. The referential aspects focus on what the use of personalised filters mean for the students who participated in this study. Together, these elements form each category of description: under category 1 students understand that through the use of personalised filters they can access simple facts and entertainment much faster, whereas in category 2 students recognise that personalised filters may limit their access to information which would deepen their knowledge of a particular topic or subject area. At this point it is useful to set out each of the categories and focus on the data from the transcripts which provided a rationale for the creation of each of the categories.

Category 1: Students had little or no objection to personalised filters in simple online searches to find basic, introductory information or entertainment.

Students' accounts that were aligned to this category showed evidence of how students were initially quite shocked by the thought that search results were filtered and personalised to match their perceived needs. However, as the interview progressed, it emerged that they felt personalised filters had a role to play in dealing with the masses of information online, particularly if they needed access to the information quickly.

> If it was just like a random personal search say if I was searching for Kardashian, you'd just throw their name in and they'd come up straight away, d'you know like TMZ [a celebrity news site]or something like that, like, […] you wouldn't really care where it was coming from.

> You know it's [content] filtered to my needs and that's exactly what I need this time or there's something relevant to that...

When asked if their new knowledge of the filter bubble would change how they looked for information online, some students admitted that it probably wouldn't affect their basic searches:

> It won't affect the more shallow [sic] kinda searches, you know like the celebrity searches, or TV searches.

Category 2: Students felt that personalised filters presented too narrow a viewpoint for more complex ideas or information.

In the students' accounts aligned to this category there was consensus that if they were researching a topic on an important social issue, or looking to deepen their knowledge of a topic related to their academic discipline, they did not want the information to be filtered, i.e. they wanted to get a general understanding of all aspects of the topic they were researching.

> ... it's kind of reaffirming that your opinion is right, cos you're not seeing the other side of things.

> It's kind of disturbing that I'm not getting the whole story when it's being tailored for me, I want to know all the other stuff as well.

This resistance to filtering also emerged when students were asked about other filters they had encountered offline:

> I think that someone that sits down and solely watches the […] news, no papers, just the news of the reporter, I think they're not broadening their minds with different perspectives on the one story. You got […] all the different news channels, all legitimately backed stuff, it gives a different definition and perspective of the actual story.

It is worth noting that the excerpts selected above were representative of the range in the experience of the group, rather than the individual, which is the focus of analysis in phenomenography (Trigwell, 2006).

Discussion

In discussing the variation in students' perceptions of personalised filters and how these impact on their information literacy skills, it is useful to refer to the research sub questions highlighted at the beginning of the study:

- Is there variance in the reaction of students to the use of personalised filters?
- What are the various ways in which students may have experienced personalised filters?
- How do they perceive these personalised filters will impact their information literacy?

Firstly, students noted that personalised filters had a role to play in the context of helping them to gain access to basic information and entertainment more readily. This supports the claim by Qiu & Cho (2006) that it could significantly improve the user experience and the students in this study could see the value of having relevant results, filtered for them and displayed on the front page of a Google search.

However, it was noted in the study that students were uncomfortable with the idea that information was withheld from them (as they saw it), when the research topic was of a more serious nature or if they wanted to deepen their knowledge of a discipline area. Their responses reflected a level of maturity, perhaps linked to the fact that they were in Year 3 of their respective programmes. It was quite important for them to have access to the whole story, rather than reaffirming that their opinion is the correct one, with some participants reflecting the view of Gentzkow & Shapiro (2011) who state that individuals should be exposed to differing viewpoints. Students identified the danger associated with the filter bubble, in particular the confirmation bias referred to by Pariser (2011).

Secondly, a lack of awareness of personalised filters underpinned both categories of description identified, as students revealed that they were only vaguely aware or not at all aware of personalisation and did not identify it as a filter that was being applied based on their search history or the other signals, as outlined by Horling & Matthew (2009). This is relevant in the context of the comment by Bennett & Maton, (2010) that students may not be as skilled with technology as assumed.

Finally, students agreed that personalised filters had significant implications for their information literacy. If, as they indicated during the study, they do not progress past the first page of Google, there is a clear need to develop their information literacy skills to identify what a reliable or credible source is and learn to navigate the mass of information available to them online, a point highlighted by Head & Eisenberg (2010).

Conclusion

This research study set out to identify the variation in students' perceptions of personalised filters using a phenomenographic approach. The study was situated in the context of the importance of information literacy skills for a networked learning environment. The outcome space represents this variation as extrapolated from the students' accounts of their experiences of online searches and shows two categories of conceptions of personalised filters. The context and scope of online searches were important, and the categories outlined students' views of personalised filters in differing contexts.

This study also showed that although students had developed strategies to help them conduct their online searches, when it came to personalised filters, there was a deficit in their knowledge, similar to Powers (2017), regardless of whether they were technology students or not. The literature review showed a chronological

development of personalised filters and the issues surrounding these, from privacy concerns to the filter bubble of information created as a result of extensive personalisation. Given the lack of awareness surrounding personalised filters, it would be useful for students to receive formal instruction about personalised filters as part of their information literacy education. For reference, the Consortium of National and University Libraries (CONUL, 2011) in Ireland has published a guideline document about the integration of information awareness of personalisation filters.

Acknowledgements

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No Size Fits All: Design Considerations for Networked Professional Development in Higher Education

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Abstract

This paper develops a framework for design considerations that can be used to analyse or design networked professional development (NPD) in higher education (HE) contexts. The model was developed after reflecting on three professional development (PD) courses, each with facilitators who are academic developers across the African continent. Using a collaborative autoethnographic methodology (Bali, Crawford, Jessen, Signorelli, Zamora, 2015), the three authors reflect on design considerations for different forms of blended and online PD courses, based on their experiences of designing and/or facilitating these interventions and with PD more broadly. We argue that design considerations, such as context, have become more complex and that understanding the dynamics between them are important. We suggest that course designs can be positioned along a range of dimensions, namely: open/closed, structured/unstructured, facilitated/unfacilitated, certified/uncertified, with/without date commitments, homogenous versus autonomous learning path, content vs process centric, serious vs playful and individual vs collaborative. Our design considerations framework is not meant to judge courses or provide a formula for how best to design them, but rather to highlight how courses can be understood on each of the dimensions we identify, and how design decisions place a course in particular positions along the spectrum, depending on context. We noted some relationships among dimensions and links to learning theories. We also identified various tensions that arise in the design of NPD, such as between academic developers' pedagogical advocacy vs. usefulness, the need to maintain volunteerism without exploitation of affective labour, and the struggle to create spaces for agency within institutional rules.

Keywords
online professional development, academic development, faculty development, online learning, blended learning, networked learning, learning design, instructional design, design considerations, connectivism, connected learning

Introduction

Academic staff juggle multiple responsibilities including teaching, research, leadership, professional involvement, community engagement and administration, so it is often difficult to make time for voluntary, non-certified Professional Development (PD). While literature on PD is growing, there is less research on the potential of PD via networked learning (which emphasizes learner collaboration and autonomy - McConnell et al cited in Bali & Zamora, n.d.), whether conducted fully online or in blended formats (Coswatte Mohr &

Sheldon, 2017)[1]. This paper reflects on three PD interventions[2] across the African continent: a blended course at a South African institution, a fully online course offered across the African continent and an online curriculum offered globally.

Using a Collaborative Autoethnographic methodology (Bali, Crawford, Jessen, Signorelli, Zamora, 2015), the three authors reflect on design considerations for different forms of NPD courses, based on their experiences of designing and/or facilitating NPD. We argue that design considerations, such as context, have become more complex and that understanding the dynamics between them are important for designing networked learning experiences. We suggest that course designs can be positioned along a range of dimensions, such as open/closed, structured/unstructured, facilitated/unfacilitated, or certified/uncertified. Using our three courses we will make a case for context-sensitive, complex and nuanced course designs, which need to be continuously reviewed and redesigned. While our cases are located in the landscape of PD, it may also be useful for emerging forms of blended and online university courses.

Literature review

Although interest in professional or academic staff development (as it is called on the African continent) is growing, there seems to be consent that in general it follows a 'one-size-fits-all' approach and is relatively inflexible in terms of time and space, making it difficult for lecturers to participate equitably (Bali & Caines, 2018; Rhode, Richter, & Miller, 2017). There is also a lack of research on NPD, essential to develop academics' understanding of the differences between teaching face-to-face (f2f) and online (Coswatte Mohr & Sheldon, 2017).

While studies on networked learning and design in Higher Education (HE) exist, few deal with design considerations of NPD courses for educators. Research indicates that effective PD is typically long-term, offers opportunities for practical application, is integrated in the educators' daily practice, includes collegial sharing, is project or action research based, and is well supported (McQuiggan, 2011). There is a small but growing field in the literature that explores more flexible, open, equitable approaches to PD (Bali & Caines, 2018). These approaches move PD online, allowing them to be 'untethered', which Leafstadt and Pacancsky-Brock (2016, n.p.) define as 'learner-centered, grounded in the use of online networks to share practices, and [which do] not require faculty to be on campus to learn. It places value on sharing and the relational ties between faculty, as opposed to the number of people in a room at a particular time'. However, literature on design principles for online and blended teacher PD (CADRE, 2017) and design issues resulting from lessons learned from online PD projects tend to read as 'do's and don'ts', recipes or advice (e.g.Vrasidas & Zembylas, 2004; Nokaelinen, 2006). We did not find studies that contrast the designs of NPD courses across different contexts, or studies located in or written by practitioners in the Global South related to NPD courses in HE contexts in Africa. This is not unique to studies of networked learning, but to the field of PD more broadly, where approaches "have been dominated by literature from the global North, which does not take into account conditions in resource-constrained environments" (Leibowitz, Vorster & Ndebele, 2016).

Goodyear (2009) proposes design considerations for networked learning located on an axis linking space, place and activity as an indirect approach, whereby activities, spaces and organisations that we design rely on being inhabited by the teachers and learners who will 'enact' our designs. While this framework is useful for analysing networked learning practices, it is less useful for *designing* networked learning experiences. The varieties of networked courses have multiplied since Goodyear's earlier work. We now have a greater variety of online platforms and tools, social media, as well as the open education movement where different approaches to 'open' in relation to online courses have emerged since MOOCs. Goodyear's (2009) indirect approach involves different kinds of relationships between the three axes which differs from the interrelations of multiple design considerations where particular combinations can result in different kinds of opportunities and constraints. In

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[1] We follow McConnell et al in defining 'networked learning', who position the philosophical roots of networked learning in the work of Dewey and Freire. Emphasizing relationships and collaboration rather than technology, networked learning promotes openness in attitude, learner collaboration, self-directed learning, and authentic learning. Goodyear (2019) adds the element of choice and control over how and how much one participates to the definition of NPD. While networked learning includes both offline and online learning, connectivism describes networked learning enhanced by social media (see Bali & Zamora, n.d.).

[2] We acknowledge that 'development' and 'intervention' are contested and normative concepts that imply a deficit when used in the HE context (Quinn, 2012).

this paper, we argue that design considerations have become more complex and that understanding the dynamics between them are important for designing networked learning experiences.

Methodology

We chose to build our framework on concrete experiences we had in developing networked courses in HE contexts. We are academic developers, supporting others with their teaching, yet the contexts of our courses are different, and providing rich, thick description of those differences allowed us to tease out various dimensions involved in designing such courses. Over the course of several weeks, we each explained our different courses to each other, wrote narratives, and discussed them together, in order to compare their designs and what influenced the design decisions. We commented on each other's drafts in order to clarify each narrative further.

Collaborative Autoethnography (CAE) involves the collective negotiation of meaning and interpretation based on our individual experiences expressed as narratives, then relating what we have to the literature (Geist-Martin, et al., 2010). We feel that autoethnography "challenges the hegemony of objectivity or the artificial distancing of self from one's research subjects" (Chang, Ngunjiri, & Hernandez, 2013, p. 18). CAE lies within the interpretive/critical research tradition and so does not conform to scientific/positivistic measures of validity and rigor. Autoethnography "seeks to describe and systematically analyze personal experience in order to understand cultural experience" (Ellis, Adams, & Bochner, 2011). Conducting collaborative research enabled us to collectively question, revise and refine our individual interpretations and conclusions. Our process of developing our model was iterative, growing from synchronous conversations, Google docs, WhatsApp chats, emails, and a shared Google Draw to visually compare our own experiences to our developing model (see Figure 1). The detailed narratives are not included in this document (due to space limitations) but are available in this commentable Google doc: http://bit.ly/NoSizeFitsAll

Findings & Analysis: Design considerations for NPD courses

The following section discusses three NPD courses where the authors have been involved in the design and/or facilitation along 11 dimensions which emerged through the process of reflecting on our courses, their similarities and differences in design: Facilitation, Openness, Structure, Voluntariness, Certification, Linearity, Eventiness, Content vs Process/Experience, Learning path, Playfulness and Collaboration (see table 1).

Course 1: Institutional course at a university in the Western Cape, South Africa (FLD)

Curriculum development is a complex process that requires a myriad of different skills and knowledges. Universities of Technologies in South Africa are undergoing an intense process of transformation including re-curriculation of its qualifications (Engel-Hills, Winberg & Rip, 2019). The institution I am based at is required to re-curriculate more than 60 programmes before 2021. The Curriculum Officers' (CO's) project was introduced in 2012 at the institution to address the capacity development of COs in their respective departments to develop these new qualifications. Key concepts emphasised are the promotion of greater inclusivity amongst students at our institution, including making the curriculum more meaningful, and to ensure greater flexibility in the delivery of teaching and learning. Our Centre works primarily with teams that design postgraduate diplomas and Honors degrees, which target learners in employment and need to offer increased flexibility.

In order to support these CO's we decided to develop a blended learning short course (Entitled 'Re-imagining Curriculum - Towards Flexible Learning Design', FLD in short) a collaboration of the Curriculum Development Unit and our Centre. We have been running blended course design workshops for a while, adopting ideas and structures from the field of design thinking, such as focusing on learner empathy, collaboration, experimentation, risk-taking, and problem orientation. Rejecting a 'one-model-suits-all' approach, we developed a methodology that considers disciplinary-context through design activities such as persona development, knowledge trees and storyboarding. These are hands-on, fun activities, which involve a lot of post-its, colorful pens and flipchart paper, but also conversations, discussions and sharing across discipline and faculty. We are also trying to encourage our colleagues to take more risks and work with possible failure, moving away from a desire for perfectionism, so abundant in HE. By creating safe spaces to experiment with technologies, reflect on what worked and what didn't, we aim to develop creative confidence in lecturers.

We offered the first iteration of this course over a period of 6 months f2f with 4-hour workshops every three weeks. In these workshops, a range of facilitators from the institution presented on important topics around curriculum design, and design teams were supported in design activities to help them develop the necessary documentation for submission of their qualification. Design happened 'on the fly', workshop by workshop,

responding to participants' feedback. Approximately 40 participants completed the course. Participants in their feedback commented on the vibrant atmosphere and the opportunity to engage with colleagues from different departments and faculties. Participants also spoke about the importance of action and reflection. Some design teams managed to work in parallel on their design activities, but not all. For those who did, using Google Docs allowed facilitators to give regular feedback.

However, although this was a great learning experience for both lecturers and facilitators, workshops have limitations. We are a small team and not able to scale this kind of intervention across our multi-campus institution and for the approximately 800 academics we support. This case study reflects on the second iteration of the course, which we decided to offer in a blended learning format. We chose this format to allow for more flexibility in terms of course participation for lecturers unable to attend due to their geographical location, but also workload, and to allow for a more authentic modelling of flexible/blended learning course designs.

This course runs over three months, with new topics released every two weeks on our institutional LMS, Blackboard. Weekly activities for Module 1, which focuses on Curriculum Design, follow a linear online learning structure: a screencast with an overview of the topic, some readings, a topic for the discussion forum and a reflective blog task for participants to create 'notes to self' about the content covered to highlight what would be of importance for their own projects. In total participants are expected to spend 2-3 hours a week on online activities. The module content and structure were set up before course start, although facilitators create content as the module progresses. Participants self-assess progress by ticking completed topics off. Participation is voluntary, although some of the participants might be sent by their Head of Departments (HOD) if they are working on new qualifications. Participants receive a certificate by the institution for completion of the module. The course is not accredited.

We have just finished the first module of the online course. What we can already see is that the model of engagement in workshops based on our combination of presentations/design activities/discussions, fueled by our own passion for flexible course design, is difficult to replicate online. Scheduled workshops allow for participants to carve out time to engage in conversations and learning that is difficult to achieve in an online context. This is aggravated, if there is no incentive to participate beyond personal interest. Also, the beauty of f2f engagements, the break from normal day-to-day work, to engage with colleagues across the institution, falls by the wayside. Furthermore, Module 1 focused on Curriculum Theory and is content-heavy, and often quite dry and procedural, which makes it difficult for self-study. We are now thinking of how to offer Module 2 to allow more engagement. This module will focus on flexible and blended course design and could potentially be more experience- and process-oriented. It is also not as content and theory heavy. We are planning to offer more synchronous engagement through weekly webinars, which should allow participants to adhere to a more structured learning routine and allow for more social learning and continuing, deepening conversations. We are also thinking of reducing the independent/online learning part to one or two online activities, which will focus on collaboration, such as collective annotation of readings and videos. We hope to find ways of re-inserting the atmosphere of joy and playfulness that usually characterize our f2f PD activities.

Course 2: Facilitating Online (FO), regional outlook (Africa)

This fully online Africa-wide course is offered by e/merge Africa, an online PD network hosted by the Centre for Innovation in Learning and Teaching at the University of Cape Town. It is funded by the Carnegie Corporation of New York. A team of facilitators (usually three) from across the continent and two course conveners led cohorts consisting of (usually) 20 to 30 participants. The course provides opportunities for educators and educational technologists to develop the necessary orientation and practices to become effective online facilitators. It adopts an active and experiential approach and is based on principles of fostering online learning communities, playful and reflective learning. Learners are expected to spend up to eight hours a week on course activities, and get a UCT short course certificate of completion for completing 75% of the assessed activities of the course including some mandatory activities.

While the course is a response to a continent-wide capacity building need, it attracts mainly Anglophone Africans as the course is offered in English. Ease of communication in English may be a hidden barrier. The majority of course participants are not first-language English speakers and writers. For many, English is their third or fourth language. Most instances of the course consist of half the participants being from South African universities and the rest from other African countries, predominantly Nigeria, Kenya and Swaziland. Participant diversity in relation to geographic location, job roles, educational backgrounds, experiences and exposure to blended and online learning are important features to achieve the necessary diversity and 'critical mass' for a successful course cohort.

While participation in the course is subject to application and participant activity takes place in a closed course site, the LMS used at UCT is open source (Sakai) and course materials are openly licensed. The course leader's guide is published as an OER and an open version of the course site without participant activity is available for view and LMS export upon request. Aspects of the course and course activities have been adapted by the South African Institute for Distance Education (SAIDE) and the University of the Witwatersrand in South Africa as part of a range of PD offerings.

The advertised length of the course is eight weeks. This includes a Week 0: Arrival online orientation week where participants can explore navigating basic information on the course site such as the course program and information about the conveners and facilitators. While there are suggested deadlines, the course structure includes three consolidation weeks where participants are able to catch up on activities and reflect. At the start of each week following a consolidation week, activities in discussion forums from earlier weeks are closed and participants are encouraged to progress with the course together. Getting a critical mass of participants to move along together through each stage of the course activities is crucial. So while the deadlines are more flexible, they are not overly so. Participants keep track of their own completion of activities on a dashboard called 'My Progress'. The different course weeks and activities are released in stages to avoid overwhelming participants. As the course progresses, the types of activities become more complex and the information on the site overall becomes more.

During the course, participants engage in individual and collaborative online learning activities. The right combination of these is important, as well as the use of appropriate tools at different stages of the course. Participants experience the use of different tools as the course progresses rather than all at once. At first, the course experience is likened to that of a student taking an online course and by Week 2, once they are comfortable in the space together and know each other better they take on a more active role as emerging online facilitators in the form of peer facilitation. Through experiencing online facilitation strategies modelled by the facilitation team, they start to use these themselves. From Week 3 - Week 5 participants each take on an online facilitation task in which they lead an online conversation.

Assessment in the course involves keeping track of satisfactory completion of activities rather than measuring how well a participant is progressing through the award of a grade for participant performance in the course. Individualized feedback happens via email on items such as their online facilitation capabilities, blog posts where facilitators and course participants comment on individual reflections, and end of course feedback on personal development plans. Some participants are more invested than others or become invested more or less as the course progresses, owing to diverse personal motivations and circumstances.

In addition to facilitated forum discussions, weekly synchronous online meetings allow for facilitators and course participants to share their voices. The potential for a more human connection and energy of the live meetings should not be underestimated. In addition to course progress dashboards, the weekly live meetings assist in clarifying, extending and deepening engagement with course activities. Each live meeting starts with ice-breakers where course participants and facilitators share their highlights for the week, acknowledging our lives outside of the course. Weekly reflections are encouraged in the form of individual reflections in the learning journals and shared reflections in the forum, where each week has a dedicated topic for reflecting on the week's course activities.

The course seeks to grow a community of practice of online facilitators in Africa, primarily in the public HE sector. Participants stay connected via a public Facebook group (across cohorts) and a private LinkedIn group (per cohort) after the course. They also most often become e/merge Africa members and join webinars and online conferences offered by the network. Many go on to promote practices of online facilitation and blended and online teaching and learning at their institutions and present at national conferences and symposiums. Some even present back to the e/merge Africa network about developments in their contexts. Understanding the motivations and values of participants and how these are tied to incentives and interest in being part of a broader community during and beyond the course is important. Many courses are learning communities and few are communities of practice, so how participants come to understand this difference and deciding which one suits their needs is important to consider. We are currently collecting value creation stories from course participants and will soon be designing a version of this course that global participants can apply to join.

Course 3: Equity Unbound (EqU), international collaboration

EqU is an "equity-focused, open, connected, intercultural learning experience across classes, countries and contexts"[3]. It is a collaboration between me, author 3 (American University in Cairo), Mia Zamora (Kean University in New Jersey, US) and Catherine Cronin (at the time employed at National University of Ireland, Galway). I teach a course that I designed myself locally at the American University in Cairo in Egypt (where English is the language of instruction) that focuses on digital literacies and intercultural learning. I felt students would benefit from additional forms of equity-focused intercultural interaction that build on connected learning principles (see Ito et al, 2013) which helped me personally with my own teaching.

The website curates relevant resources (reading, videos, podcasts) and activities on a variety of themes, and suggested dates for doing certain activities so that we can communicate and collaborate with others around the world. A few other educators joined in, whether to do similar activities, to propose other activities, or to join some of our live "studio visits" (live video conversations with experts) to discuss the various topics.

We intended EqU to be less structured than traditional courses, mainly because we consider ourselves to be emergent teachers: we allow our courses to evolve in different directions, depending on how it flows that particular semester for those students. It is a teaching philosophy and influenced by our experiences with connectivist MOOCs (see Bali et al, 2015) which put less emphasis on content and structure, and more emphasis on relationships and connecting/networking. However, for other educators to participate with their students, we added some "eventiness" that gave it more structure and content-focus than actually happens in our f2f classes.

EqU curriculum was open in several ways: the curated materials were openly accessible, anyone who had internet could participate and even contribute resources, and activities like public social annotation and Twitter chats were low barriers to entry and exit. But it was closed in other ways: a lot happened behind the scenes, and facilitators controlled the website. There was no certification for open participants.

EqU was not a cMOOC, but inserts connected learning into regular courses. Facilitators taught their f2f courses, curated online content and led Twitter chats and studio visits, but did not facilitate otherwise. Online engagement was largely via our website for disseminating information about upcoming events, Twitter and Hypothes.is for some semi-synchronous interactions like fast and slow Twitter chats and collaborative annotation, and via Google docs. Studio visits were the synchronous video element, which became a source of emotional support for us, the facilitators. I still used an LMS for assignments and grades within my class.

EqU became a supportive learning community for educators interested in equity and digital literacy but did not succeed as much in engaging our students in sustained interaction. We are in the process of creating a new iteration using the same site starting September 2019.

A Comparison Across Dimensions

Through discussing differences and similarities between our PD courses, we developed a framework for design considerations along 11 dimensions. Table 1 describes where each of our courses lies on the spectrum and Figure 1 represents it visually.

Table 1: Summary of courses along dimensions of NPD

Dimension	Flexible Learning Design - FLD	Facilitating Online - FO	Equity Unbound - EqU
Facilitation: to what extent were there facilitators working directly with learners?	There are weekly emails by facilitator but there are no further efforts to build community.	Daily announcements, individual progress reports shared during consolidation weeks, facilitated asynchronous activities, weekly online meeting.	Facilitators managed site, Twitter and facilitated studio visits. No learning facilitation for open participants, only our own students.
Openness: to what extent was course open to any participants	Closed course site. Only open to institutional participants. No pre-requirements. Invites are sent out	Open license version of the course site (without participant activity) and course leader's	Open to anyone to participate, public website and social media presence, public livestreamed

[3] See http://unboundeq.creativitycourse.org/about and on Twitter @unboundeq #unboundeq

outside an institution, and were materials openly accessible	by institutional channels, participants apply via online form.	guide. Course site is built using an institutional instance of open source LMS, Sakai. There are selection and funding criteria.	and recorded studio visits. Also open to anyone to contribute but only facilitators controlled web and Twitter content.
Structure: to what extent was there course structure that was planned and followed	Highly structured. Bi-weekly release of contents. Each topic follows the same structure: intro/screencast/reading/discussion forum and reflective blog.	Very structured with some flexibility, since participants have considerable leeway to work around their ongoing work and family commitments.	Semi-structured. Fortnightly themes; some events had dates/ times like Twitter quick or slow chats and studio visits, but asynchronous possible.
Voluntariness (related to structure): to what extent was participation of learners' voluntary versus part of something mandatory	Voluntary participation. Might be recommended by HOD if participant is part of curriculum design team.	Support from a line manager or HOD required for application.. Often participants want to take the course but for some, it is recommended to them by a colleague / boss. Participant agency is crucial for course completion.	Participation to anyone other than students in class was completely voluntary. They could join any activity whenever they wanted or use the site in other ways. The facilitators themselves were unpaid volunteers.
Linearity (related to structure): to what extent does the course flow in a particular order?	Linear.	Collaborative activities within a particular time frame. Critical mass and energy - focused rather than dispersed across too many activities is encouraged.	Fortnightly themes had dates so linear in that sense. But outside of synchronous activities, anyone could engage with the course in any way.
Certification: was there certification at the end for completion?	Institutional certificate of attendance (no credits)	UCT short course certificate for successful course completion i.e. 75% completion of course activities and all mandatory activities.	No certification for open participants. Students in our courses got credit for the course they took, which only partly included Equity Unbound.
'Eventiness' - deadlines and commitments	New contents are released every two weeks. Workshops scheduled every 3 weeks.	Consolidation weeks to catch up on activities two weeks prior after which activities are 'closed'. Some mandatory activities. Voluntary weekly online meeting (as a group).	Events included studio visits, Twitter and annotation activities over an hour or several days. No deadlines. Students in our courses had deadlines for things they did for course credit.
Content vs process: extent that course is designed around content/learning outcomes vs process goals (Smith, 2000)	Content-driven. Following HEQSF application forms for new qualifications. Little sharing of experiences.	A combination of process and content. As learning in this course is experiential people and processes are invisible 'content'. Value creation stories in progress indicate that networking and sharing of diverse experiences is valued among course participants.	Informed by connected learning, open pedagogy and process/critical curriculum approach. Values of equity and openness determine contents, not learning outcomes.
Homogeneous learning path versus autonomous pathways. (See Crosslin, 2018)	Homogeneous learning path, although participants are free to engage with the contents they are interested in.	While there is a designed path, participants can lead their own topics of interest for the facilitation task.	External participants choose learning path or follow the theme dates. Students in my class had some freedoms and some set deadlines for common experiences.
Playfulness: to what extent was "fun" used?	Low level of playfulness/experimentation online. Design activities usually done during workshop.	Playful learning is a course principle but depends on participants' perception of playfulness.	Playful learning was never explicitly used in our wording, but seems to come naturally to us. Example is Twitter Scavenger Hunt activity.
Collaboration: to what extent is collaboration	No collaboration. Mainly self-study and development of	A combination, the course design involves a progression from	Some interaction on activities like studio visit and Twitter

built into the course design?	qualification. Facilitators are drawn from the institution.	noticing individual needs to ways of being and working together. The course scaffolds socialization necessary to facilitate collaborative learning.	chats. But no collaboration towards a particular product by participants. Students in my own courses did collaborative activities outside Eq.
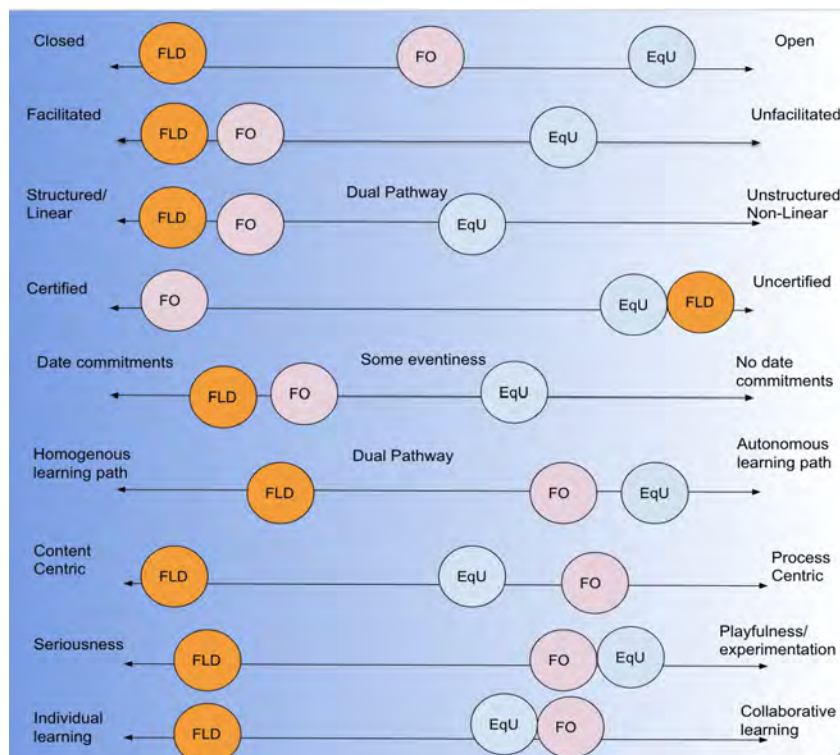
Figure 1: The three courses mapped along the dimensions of NPD

Anderson & Dron (2011) differentiate three generations of online/distance learning pedagogy: those based on cognitive-behavioral theory (not networked, self-paced or didactic online learning), those based on social constructivist theory (online learning for small numbers of participants within an LMS/VLE) and those that use connectivist approaches (Siemens, 2005) and leverage social media and the open web, which McConnell et al (2011) suggested would support networked learning more than designs confined within closed platforms.

A pattern emerged from the dimensions we described above. We noted that dimensions along the right-hand side tended towards more open and connectivist learning principles, whereas items towards the left-hand side and middle tended towards more traditional networked learning within LMS/institutional boundaries. For example, EqU, explicitly based on connectivist/connected learning encouraged more openness, less structure, more collaboration and less facilitation than other designs. FLD was built on a more social constructivist approach and thus had stronger facilitation and more structure within a closed platform. FO shows a combination of social constructivist and connectivist approaches, offering more autonomy and collaboration than FLD, and yet is more facilitated and structured but less open than EqU. Dual pathway approaches (e.g. Crosslin), which are not studied here, would give learners a choice between a more socially constructivist networked course and a more open, connectivist learning experience. Note that a cognitive-behavioral approach would actually mix between sides of the spectrum, in being highly structured, content-centric and individual but unfacilitated and may or may not offer autonomy and playfulness, and may or may not have specific dates and certification (the first iteration of FLD would be positioned here).

Emerging Tensions in NPD

Through the CAE process and working with the framework three broader tensions emerged which we will discuss below: the tension between advocacy and usefulness; the tension between promoting choice and agency vs institutional expectations and rules and finally the issue of certification, volunteerism, and unpaid labor.

Advocacy and Usefulness
Conducting PD for lecturers is complex, as we often think of modelling something that is meaningful and transferable to lecturers and at the same time pushes them out of their comfort zones, challenging teaching and learning practices. Meanwhile, we realize that lecturers are adult learners, not undergraduate students. To advocate for university teaching that promotes ownership and agency, PD for educators can model such practices (Bali & Caines, 2018).

However, designing and facilitating such learning experiences is difficult on three fronts: First, there are often insufficient numbers of staff with enough experience to design these activities. This is partly why EqU and FO have multiple facilitators from different institutions. Secondly, lecturers may resist new ways of learning and may not manage their time or engage at all. FLD faculty enjoyed the f2f aspects of courses, but online engagement was much lower. Teräs (2016) suggests to be careful and work with/support the 'learning culture shock', the accustomisation process the learners go through and which resembles the accustomisation phases in a new cultural environment. Also, transferring passion and enthusiasm of facilitators in f2f contexts into the online spaces is difficult. Online facilitation is a complex skill that is honed with experience. Finally, from our experience, it is often difficult for lecturers to implement more flexible approaches to teaching in credit-bearing courses, especially particular larger first-year courses, or in STEM fields, for example.

We acknowledge educators' desire for f2f contact and collaboration/networking. Relationship-building and on-going collaboration between staff developers and academics is important (Gachago et al, 2017). The value of doing so online becomes more visible when interaction online is with people in different countries or cities but who share a common goal or purpose, such as learning to teach online in Africa (as with FO) or equity-focused approaches to intercultural and digital learning (as with EqU).

As our cases have shown, it is important for academic developers to remain aware of, and take risks to explore, different pedagogical approaches. However, we also risk leaving colleagues in our academic development centres behind - and becoming more distant from educators at our own institutions who prefer teaching in familiar ways. We recognised in our conversation the need for a balance between remaining up-to-date in our field and growing our external networks of like-minded educators while continuing to be relevant and useful in our institutional context and for the spectrum of educators with various teaching philosophies.

It is also crucially important to ensure equitable access to the learning opportunities we offer for PD, and to recognize that a course may be successful for particular learners and not others (Bali & Caines, 2018). For example, for people whose students are not on Twitter or cannot join for safety reasons, some parts of EqU were inaccessible. For some people, YouTube is blocked by institutional firewalls. The FO course attempts to alleviate some of these issues by creating a collaborative networked environment within the course, e.g. using the blog and discussion forums of an LMS rather than public blogs and social media.

Choice and Agency vs Institutional Expectations / Rules
Our model challenges a one-size-fits-all approach and promotes recognition of disciplinary and institutional contexts. Thinking through the different dimensions of our framework could support staff developers to choose the right model for their own context and audience. Choice and agency are paramount, both for staff developers and lecturers. But this may clash with institutional expectations; eLearning policies may favour institutional LMSs over open approaches, thus limiting engagement and online collaboration and engagement. What helped us think through our model was the concept of working along a continuum and shifting dimensions along it, even if shifts are incremental. We all have some space to shift our pedagogical practices - even if one small step at a time. Champions and mentors are needed to guide others on such a journey. This change also needs sustained engagement, experimentation, reflection and continuous openness to new ideas and approaches to help teachers and learners engage with ideas, content, and each other.

Certification, Volunteerism, and Unpaid Labour
Certification recognizes people's work as valid accomplishments. But sometimes there are other forms of intrinsic or extrinsic motivation that drive learner commitment. People tend to participate in Twitter Scavenger Hunt activities because they found it "fun" and they like the brief connection with students. Sometimes, as with EqU, participants stay for the social/affective aspects of being part of a community of like-minded educators.

This may explain why EqU worked more for educators than students - the educators needed this support, which possibly was not available within their institutions. On the other hand, if we offer uncertified/unaccredited courses in competition with the multiple responsibilities that academics have to juggle, we might have to let go of the idea of 'completing' a course, and rather allow academics to dip in and dip out as they can and wish. Facilitators and participants were sometimes uncompensated and unrecognized in any formal way for work. There is intrinsic motivation, and learning and community are often their own reward without need for financial compensation. However, not everyone can afford to volunteer their time in these ways. Also free participation and unpaid labour are not a sustainable model for long-term PD.

Concluding remarks

In this paper we suggest a framework for design considerations for networked learning for PD drawing on our own practices. This framework is neither prescriptive nor judgemental: each design consideration is a dimension, and location on the spectrum is contextual: there is no "best practice", no size fits all, and each decision should be gauged according to its fit for purpose, including readiness and philosophy of those designing and facilitating the learning experiences, institutional constraints or lack thereof, and participants' characteristics and needs.

This model can support decision-making for course creation and revision, helping designers identify areas to tweak along the spectrum of one or more dimensions to meet certain goals. It can also be used to analyze courses, which may result in adjustments to the model. It can help envision the future of a course, and what we desire to achieve, such as creating pathways to open, creative, collaborative networked PD. We invite fellow educators, designers and developers to use the model to contrast and discuss these and additional design considerations and, in the process, engage with their own beliefs and assumptions. We invite feedback and further development of this model and approach.

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Online Learning from the Peers in Higher Education

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Abstract

The main reason for the research is to find out what factors affect the student's participation and engagement to peer learning in the university's online course. Today's higher education has a strong foothold in learning theories and pedagogical approaches that focus on collaborative learning, networking and working with peers. Now when digital technology and eLearning platforms have established their place in the infrastructure of educational institutions, we should have the keys to implementing modern education in practice. The hypothesis of the article suggests that we do not yet know how to exploit the capabilities of modern learning technology in a way that students can learn from their colleagues, peers.

The practical objective of this article is to create information for planning online courses and organizing weekly tasks. The research data for this paper was drawn up from two different online implementations of the single university course. Students conducted a Moodle-based survey in which they were asked about the pedagogical approach and tools of the course. One aspect of the research is to increase the understanding of the students' opinions of peer activities in an online course. The theoretical background of the research is based on theories of active learning and learning communities. The research data are also reflected in the scientific literature on peer learning and peer assessment.

According to the results, students' opinions on peer learning are quite positive. Students are able to appreciate the learning opportunities offered by assignments and activities, which are open and visible to everyone during the course. Most of the students were not interested in peer assessment, but preferred feedback and grade produced by the teacher. Most of the students opposed the small group assignments of the online course. According to the data, students feared that their contribution was considered weak in the eyes of others in the course

The results of this document underline the need for further research into peer learning in higher education. Many strategies that utilize collaborative learning may be useful, but there are still questions about the individual needs, fears and motivation of peer learning. In addition, it would be important to find a way to strengthen mutual trust through online courses.

Keywords

Online course, Peer learning, Higher education, Peer assessment

1. Introduction

At today's university, we are able to utilize versatile digital tools for learning. In fact, the lack of time and the lack of physical space drive universities to exploit the tools of distance learning. In addition, there are many expectations and hopes for advanced types of learning and the learning outcomes that learning technology brings with it. In today's educational areas, it would be incomprehensible to imagine learning and education that have nothing to do with technology, such as digital devices and the Internet.

We can always argue what is part of educational technology. Digital tools for collaboration or distance learning were game changers when technologies were introduced. The rapid growth of digital technologies has significantly changed the learning field, and online and mobile technologies have become key elements of education in recent years. Digital technology has many expectations that support teamwork and commitment to the learning process in the academic field. Teachers and students have their own ideas about how online courses support the building of knowledge. At the same time, the institution is likely to have administrative expectations about how a large group of students can be taught remotely at reasonable cost and optimal learning outcomes.

Despite widely used terms such as eLearning and Computer Supported Collaboration Learning (CSCL), we can ask whether there is any kind of learning that is not related to digital technology and modern web-based

communication. At least in higher education, it can be difficult to imagine a degree programme where the student avoids information and communication technology in a learning situation. In addition, the majority of students coming to the university are in their twenties and are likely to make better use of modern media and social media practices than older generations. Social media systems, which has launched over the past decade embody ideas of co-production and shared learning experience. However, these modern views are not so simple to implement in practice in the field of education. Mechanics of collaboration and sharing are more complex in the field of formal learning (see e.g. Veletsianos & Navarrete 2012).

This article examines students' views on the various features of online learning. The focus of the research is to find out how students of the university's online course experience the peer learning approach and its various cases, such as group assignments, peer assessment and learning from other students. The practical purpose of this document is to create a well-founded argument and knowledge in the design of online courses and, in particular, online activities for peer learning. The theoretical background of the study is based on learning communities and peer learning literature. Recent research on peer learning and peer assessment has been carried out, which not only deepen understanding of research but also shed light on the key concepts of the research process.

2. Technology behind the pedagogy

Learning Management Systems (LMS) are an established part of the IT infrastructure of educational institutions. The IT unit of the school manages educational technology such as video services, online learning platforms and student management system. Teachers are trained to use a variety of tools and students can log in to the system using their ID. Organisations such as universities expect a lot of learning outcomes that such tools could provide. These tools enable students to independently learn time and place, and teachers are able to disseminate course material into the network. A significant investment in the technical maintenance of the organization, training of personnel and course management will have to be paid off.

Using an eLearning platform such as LMS does not automatically guarantee learning. In the research literature, researchers highlighted the danger of a technology-driven approach in which the new tool is used only as a channel for traditional classroom education or the features of technology are used regardless of their pedagogically appropriate (Conole 2003; Unwin 2007; Wood 2010). While guides to harness ICT for educational purposes are available on discussion forums and blog sites, the teacher must be self-aware and seek information on how technology can be adapted to personal pedagogical views. Over the past ten years, technology has in many ways changed learning in higher education. Audiovisual spaces and media servers provide lecture recordings, and students may not consider it particularly necessary to participate in the lecture, but instead study via online video. However, the latest online learning facilities do not change pedagogy alone. We also need to understand how students and teachers are able and willing to use these new technologies (Wood 2010; Sihvonen 2018).

Large groups of students in one course puts increasing pressure to offer e-learning. LMS such as the university administered Moodle is suitable tool to manage the students' assignments and course materials even with the large group of students. Moodle is also equipped with the peer assessments features. However, it would be hard to change the pedagogical approach if the tool encourages copying previous course implementation with only minor alterations for instance. Thomas and Milligan (2004) present the danger of fixed pedagogy that does not correspond to individual learning styles and teaching situations when the material is designed to be permanent.

3. Network of active learners

In today's higher education, the learner is seen as an individual, with personal motivation factors and unique practices in knowledge construction and perceptions and critical thinking (Magno 2010). Students of the same course rarely have the same starting point in learning, and their prior knowledge differs from other students. The cognitive-constructivist learning approaches also underline the learners' ability to set learning goals and examine their own learning process (Jonassen et al. 1993; Kuhn 1999). Active and critical learner also understands the competences and the opportunities offered by the learning environment. In this paper, the definition of learning environment is not limited only to digital environments, such as e-learning platforms, but the extended academic learning context including physical facilities to human resources that academic context can offer (Lizzio et al. 2002). Therefore, all the members of academic community are important, but rather incalculable resource of learning. Scaffolding (Silliman & Wilkinson 1994) and the Zone of Proximal

development model (Vygotsky 1980) highlight the learning that occurs, while receiving help from a more experienced person or other kind of support.

The formation of the learning community can be approached through the concepts of Sense of a Community (SOC) and Sense of a Virtual Community (SOVC) (Blanchard & Markus 2002). Participation in online course may include a feeling of membership, however feeling of influence and emotional connection of SOVC model can be difficult to achieve. An online community cannot be built unless the members of the community already share something in common, such as history, values and perspectives (Sadera et al. 2009). In the connectivistic approach, the teacher's role is to facilitate the active participation of the networked activity of learners. This involves:1) aggregation, accessing the resources to read, watch, or play; 2) relating, after reading, watching, or listening to some content; 3) creation, learners might create something of their own; and 4) sharing. This participation in activities is seen to be vital to learning (Kop 2011). However, using this approach require the change of mindset from task-based and grade-oriented teaching and studying.

Compared to other educational stages, a greater degree of responsibility for learning is placed on the student in higher education. That include the ability to build relationships to the learning community. Prior research show evidence of positive development in higher education when learning community experience was positively associated with student gains in personal and practical competence, social development, greater effort and deeper engagement (Zao & Kuh 2004). Krause (2005) points out that student who engage with peers, academics and the institution also likely report higher levels of achievement than their less engaged peers and indicate clear plans to persist with their study at university.

4. From peer learning to peer assessment

Peer learning is not a new concept in the field of education. As far as there have been student groups, there has also been learning from peers. The development of modern learning technologies, especially online learning platforms, has brought new tools and practices for peer learning. For example, the result of peer learning is fairly easy to present in open discussion forums or other LMS web applications. However, we can assume that the long continuum of teacher-guided learning can influence the general attitudes of how the learner sees the meaning of peer learning in their studies. The approaches to cognitive-constructivist learning focus on the learner's previous knowledge and metacognitive skills. If the learner can independently assess the learning process and the goals of the learning from the point of view of metacognitive skills, it automatically brings us to set expectations for the success of peer assessment. Boud et al. (1999) present four skills that are essential for peer learning: (1) the development of learning outcomes related to collaboration, teamwork, and becoming a member of a learning community; (2) critical enquiry and reflection; (3) communication skills; and (4) learning to learn.

We can find several arguments justifying peer assessment as an important learning concept, especially in the context of online learning. First, the student automatically studies when evaluating other student tasks. In an optimal situation, students will be able to familiarize themselves with a large number of relevant course material, including comments and opinions, which have been filtered and reviewed by peers. After studying the peer student's answers to the same task, which the student has already returned himself; it gives the student the opportunity to look at the task from a different perspective. The ideal situation of self-built knowledge can be close to achieving. We can argue that assessment skills are crucial for a university student. In carefully planned peer assessment processes, the student learns how to determine the final grade and what kind of learning the course should include. Peer assessement is also seen as an organisational solution that relieves teachers' workload from course evaluation. Evaluating tasks and providing quality feedback can take a long time. The peer assessment can be used to ensure that each student receives feedback. This is one way to reduce teachers' workload, as the evaluation task can be partially outsourced to students.

**Table 1: Bay (2001) points out several arguments for and against
peer assessment from the pedagogical point of view**

Pros in peer assessment	Cons in peer assessment
- Learning efficiency and quality improves - Students get detailed information of their work - Students are required to think critically - Contributes metacognitive awareness of learners - Improves social and communicative skills	- Require time for organization, training and monitoring - Students may experience the peer assessment as waste of time - Feedback and scoring requires extra time devoted for training

According to Bay (2001), learners prefer teacher evaluation and constructive feedback. When the feedback affects the grade, the student's attitude can be even more reserved. Anderson and Speck (1997) pointed out that even teachers in staff training demanded a grade, although they had already received a considerable amount of feedback from the workshops. This brings us to the question of what kind of mindset grades in higher education relate to. If the learner focuses on getting credit points with a satisfactory grade, giving and receiving feedback may seem less important (see e.g. Cotten & Wilson 2006). However, feedback has a pedagogical importance. For example, Gibbs (1999) stated that the learner needs feedback to learn, and students pay more attention to feedback related to the social dimension.

5. Content and community in an online course

The data was collected from the implementation of intermedia studies in the Information Studies and Interactive Media programme in spring 2019. The first part of the data was collected from the course implementation, in which 62 degree students participated. Implementation of the course included the possibility to participate in classroom teaching, even though the students were able to complete the course completely online. The second part of the data was collected from the course implementation, in which 24 students from the open university participated. Both courses lasted 7 weeks and the main teaching method was a weekly 1.5 hour lecture available online. The course also required weekly course assignments and final essay. The first course was implemented by 36 degree students and 18 open university students.

Students conducted a Moodle-based survey in which they were asked about the pedagogical approach and tools of the course. The survey was conducted anonymously and voluntarily. 23 degree students and 8 students from the open university were responded to the survey. The course did not have a peer assessment task that would have affected the evaluation. That can be seen as a limitation in this paper. Another limitation in this study was a small number of respondents. If the number of respondents had been higher in the open university student group, it would have been possible to compare the opinions of the two student groups. However, some interesting trends can still be highlighted in the results between the two groups.

The questions covered peer learning on three different topics: 1) online and classroom learning, 2) course assignments and performance, 3) feedback and grades.

Open university students had more experience in online courses. Most of them had previously participated in more than five online courses, while most of the degree students previously had only 1-3 online courses. Online learning routines are probably more familiar to open university students, as many of their studies are offered online only. This was also the case when asked whether they would prefer class education if they had a choice. Degree students would participate more voluntarily than open university students. However, the reasons were practical and related to scheduling and the location of the students.

Some of the assignments were visible only to the teacher, while some of the weekly assignments were visible to everyone during the course. Students were not afraid that someone would plagiarize their work. Instead, they felt uncertain about how their own contribution could appear in the eyes of other students. This may be associated with a lack of mutual trust, which was also considered relatively difficult to achieve in the online course (Figure 1). All respondents (n = 31) are taken into account in the figures of this chapter.
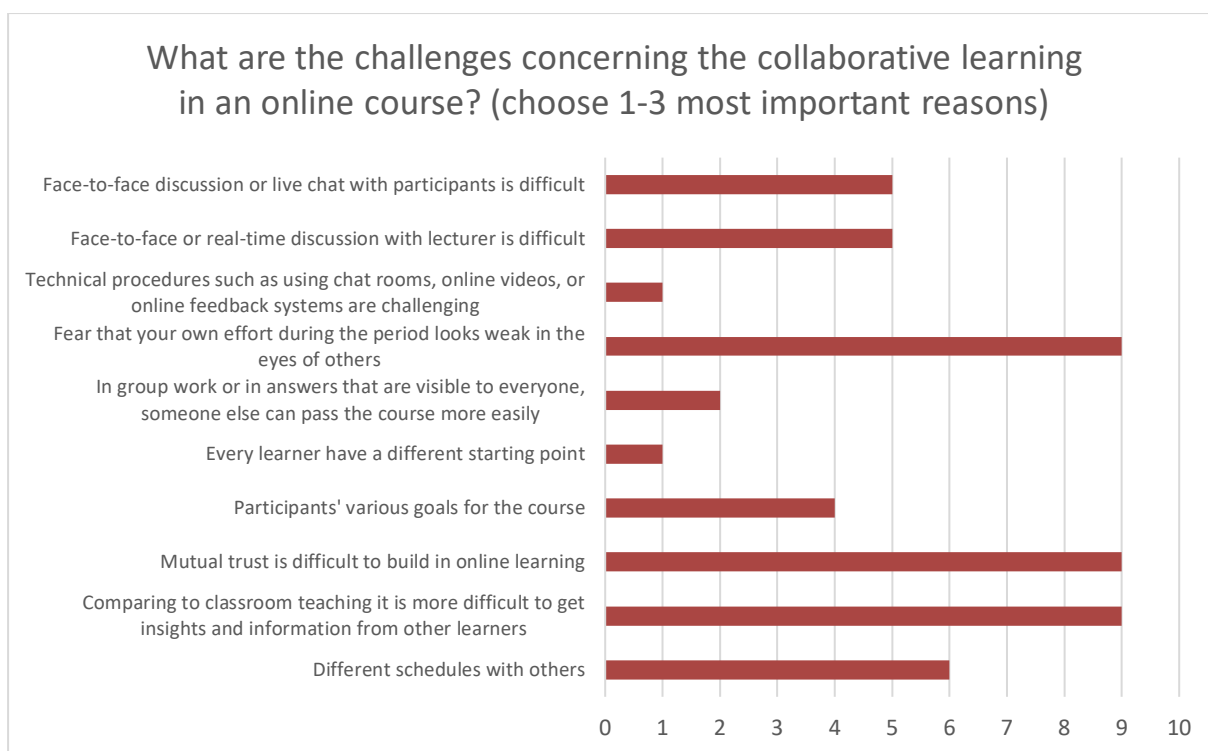
What are the challenges concerning the collaborative learning in an online course? (choose 1-3 most important reasons)

Figure 1: Main challenges concerning the online collaboration (all the respondents, n= 31)

Figure 2 shows which of the statements relating to course materials, such as lecture recordings, were most significant in the students' opinion. The course material, such as presentations, created by the student, was gaining some popularity. Students appreciate the fact that the online learning environment offered the opportunity to comment on the course topics and post links.

Course Material (Choose 1-3 statements you most agree with)
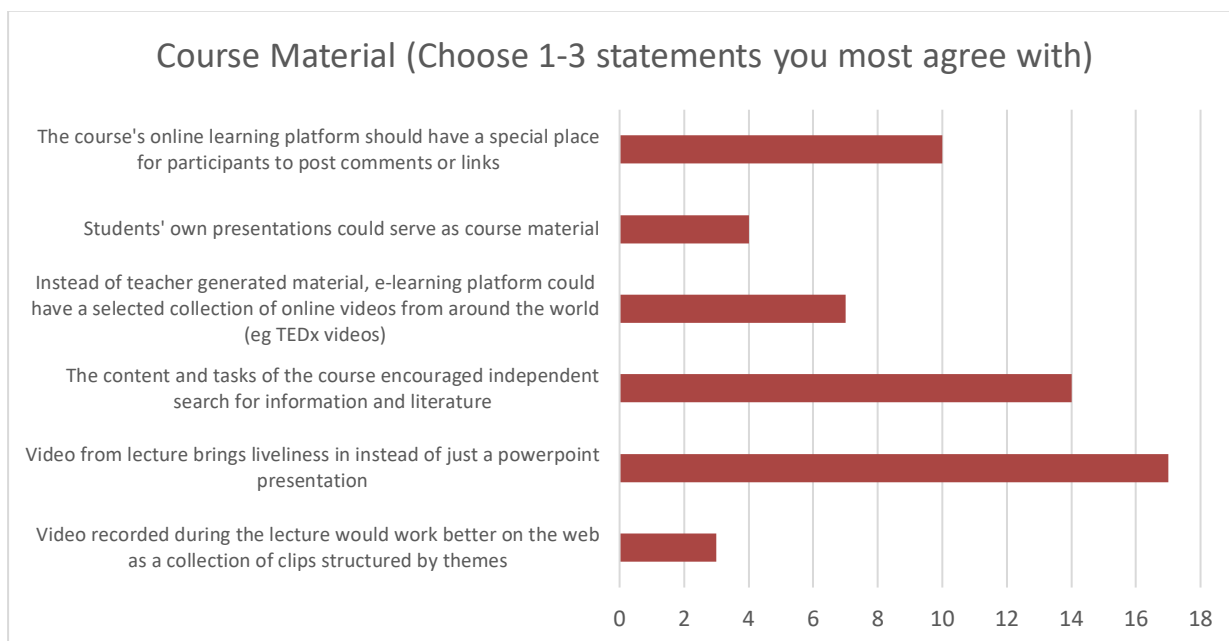
Figure 2: Relation to teacher generated and student generated course material

Course material and assignments were delivered through Moodle's e-learning environment, where students also completed the feedback survey for this study. Moodle is a popular and open source learning management system (LMS) and its features can influence the pedagogical approach and thinking when planning a course (see e.g. Remley 2003).

During the course, students were encouraged to discuss and comment on other students' contributions in Moodle's discussion forums. Of the seven weekly tasks, 4 were sent to discussion forums, which were available to everyone in the course. When peer students' stakes were visible, it was inspiring and opened up new perspectives (Fig. 3 & 4.).

Weekly assignments in an open forum inspires better performance

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
3	11	3	6	0
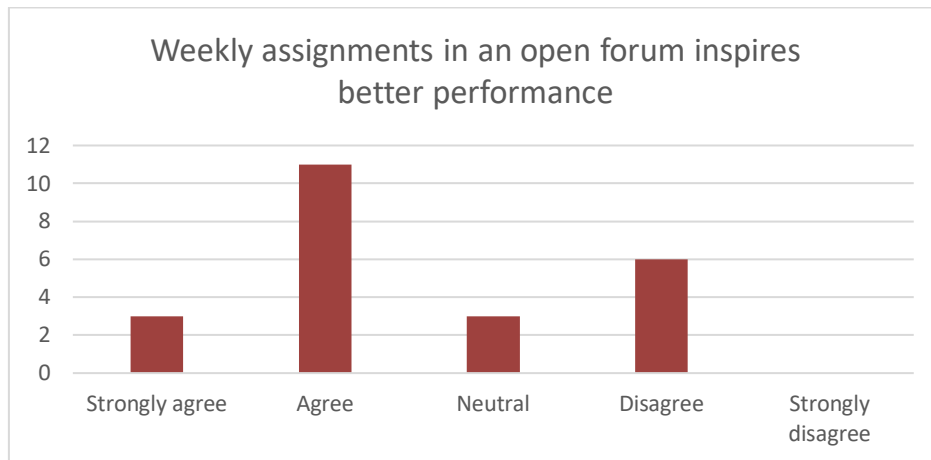
Figure 3: Relation to assignments in an open forum

Viewing the contributions of other participants in the open discussion forum opens up important perspectives on the topic

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
8	9	3	3	0
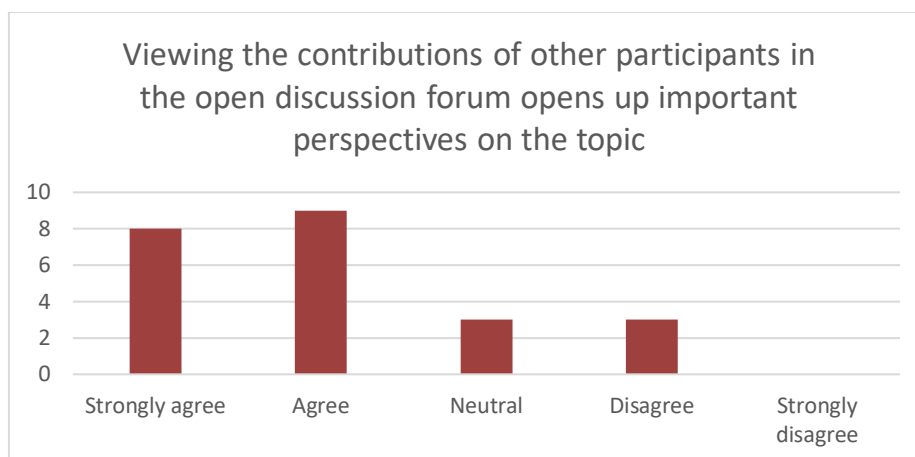
Figure 4: Relation to assignments in an open forum

Most students consider the feedback given by the teacher to be important for learning. Surprisingly, three out of eight open university students wanted more peer assessment (Fig. 5.), but none of the respondents wanted their grades to be based on peer assessment. However, open university students were more willing to carry out peer assessment as part of course work.

Some students also have negative experiences of peer grading.

> "I have been in classes where peer assessment has affected the course's grade, and it usually does not work. Even if the criteria are clearly outlined, some students still do it according to their own model, and teachers have not always checked this, especially when there are a lot of participants in the course."

All respondents agreed when they were asked whether the teacher's personal oral or written feedback was important, even if there were only a couple of sentences. All students supported the traditional teacher-based grade and did not prefer the idea that at least 50% of the final grade should be based on peer assessment.
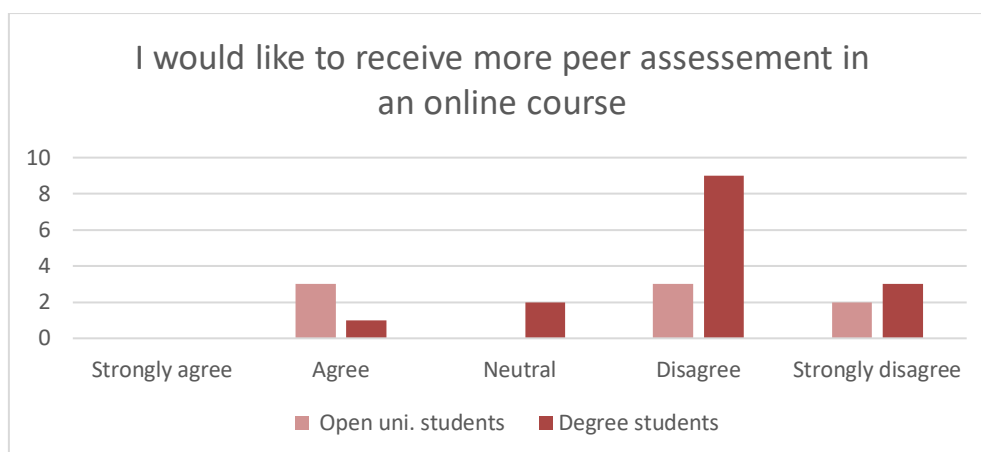
Figure 5: Students' relation to peer assessment

6. Towards student generated content and feedback

As the number of respondents was relatively small, the study cannot be considered representative. However, the data revealed interesting trends that should be taken into account when planning online peer learning. First of all, the teacher must ensure that students appreciate the importance of peer students' contributions and use this material as a learning resource. Secondly, there must be tools and support to make the students' own critical thinking visible. Thirdly, it would be important to find a way to strengthen mutual trust through online courses. It may be the only way to ensure that students are ready to give constructive feedback to their peers. Especially when students are beginners on online learning platforms. According to the survey, the respondents had a negative attitude towards their grade. Although there are administrative and pedagogical arguments for peer assessment, students consider teacher-based classification to be more important and objective (see e.g. Liu & Carless 2006). Monitoring the tasks and activities carried out in the course can be challenging for teachers. For example, the student's personal contribution can be difficult to recognize among several dozen messages.

7. Reflection

A critical relationship with information and knowledge can be seen as one of the main goals of higher education students. Conversation skills and argumentation are essential in academic discussions, where it is important to be able to assess the strengths and weaknesses of others and to formulate their own positions with appropriate criteria (Marttunen & Laurinen 1998). Some students may find it difficult to share their thoughts with the audience in the lecture hall. Commenting on other students' work in an online environment can be challenging, although shared writing and web-based discussion forums are established practices in today's education. For example, microblog applications such as Twitter work in such a way that comments remain permanently online, so the situation is different from face-to-face conversation. According to the students, the main challenge for tasks requiring comments is to find new perspectives, especially since other students have already commented on the original assignment. There may also be extra excitement to give critical feedback on the learning tasks of friends (Bay 2010; Topping 2009).

There were promising views on peer learning, despite the fact that the respondents were sceptical about some team exercises and peer assessment. Both groups, degree students and open university students felt that learning results will improve if weekly assignments are published for everyone to see and comment on the online course. There was no significant difference between the opinions of student groups in this matter. Open University students were more positive about peer assessment tasks than the degree student group. According to this study, students oppose peer assessment if their grade is entirely produced by their fellow student. In addition, feedback from teachers was considered important. The main reason for this result may be the long tradition of teacher-based grades and feedback. The teacher is seen as an expert on the subject and therefore the best person to evaluate the contribution of the students. It may also be feared that student work will be viewed in a biased manner in peer assessment. In addition, the responsibility for assessing the contribution of peer students seems to be a heavy burden. As far as learning communities are concerned, the online course rarely forms a solid network of learners. Even if the objectives and background are shared, it is challenging to build enough trust among learners to carry out diverse peer assessment processes. However, this can be achieved through other support methods, such as online support and encouragement for discussion.

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A design layer to support self and social regulation processes of learning in MOOC

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Abstract

Open, social and networked approaches to learning pose challenges for learners, who must assume the role of actively directing their own learning, in interaction and collaboration with others, in an increasingly complex environment. In this context, concepts such as self-direction and self-regulation of learning have attracted renewed interest as umbrella terms for a skill set and provisions that allow subjects to independently guide their own learning process and assume responsibility for it.

Moreover, many authors have pointed out various problems regarding MOOC design and quality from a pedagogical perspective. This raises the need for a greater and more holistic understanding of learning regulatory processes and for developing models and instruments to support learners in this regard.

This research aims to analyse how to support learning regulation processes as a whole in MOOC environments. This means paying attention to both social and individual dimensions of regulation, by studying how processes of self-regulation, co-regulation and socially shared regulation can be supported and promoted in this type of learning contexts.

To this end, we apply the methodology of design-based research in order to intervene directly in the pedagogical practice through an iterative cycle based on stages of design, intervention, reflection and redesign of a design layer to support learning regulation in a MOOC. In this paper we present the design of the regulation support layer proposed in the first research iteration. We begin by presenting its theoretical foundations and then describe the support layer that has been designed as well as the empirical case of an xMOOC were it has been implemented. Finally, some conclusions and recommendations for the design and practice of learning regulation in MOOC are drawn from the results obtained in the first research iteration.

Keywords

Learning design, learning regulation, self-regulation, co-regulation, socially shared regulation, MOOC

Introduction

Learning design challenges and opportunities in MOOC

In their initial conceptualization, MOOC materialized the principles of connectivism and open education, as networked environments in which people interact with each other and with knowledge objects, learning through these network connections (Powell and Yuan, 2013; Anderson and McGreal, 2012). This type of MOOC, inspired by the connectivist model was called cMOOC. Later the so called xMOOC arose, currently the most widespread, that emphasize individual learning through interactive materials instead of social learning, as would be the case with the cMOOC (Conole, 2015; Daniel, 2012; Guàrdia, Maina, and Sangrà, 2013). We agree with Conole (2015) that establishing a basic dichotomy between cMOOC and xMOOC is excessively reductionist and limited. In recent years multiple hybrid or varied proposals of these two original models have appeared. In fact, according to the pedagogical approach used we could identify many different MOOC models nowadays.

Numerous authors have pointed out various problematic issues with MOOC such as their debatable quality from a techno-pedagogical point of view, low completion and high dropout rates, certification and accreditation issues, among others (Conole, 2015; Littlejohn and Milligan, 2015). According to the analysis by Margaryan, Bianco and Littlejohn (2015), most MOOC are of low quality from the point of view of their instructional

design, for example, by not sufficiently contemplating support for interaction and feedback (Clarà and Barberá, 2013; Clarà and Barberá, 2014).

Conole (2015) proposes a list of twelve dimensions from which to categorize and evaluate the quality of MOOC based on their design: degree of openness, the scope of participation (or level of massification), the level of use of multimedia resources, the level of communication, the degree of collaboration that is proposed, the type of learning itinerary that is proposed to students (from focused on the learner to highly structured by the teacher), the expected quality assurance system, the degree to which student reflection is encouraged, the type of certification offered, the level of formality-informality, autonomy and diversity. It is therefore essential to influence both the design and the implementation of MOOC with the intention of guaranteeing their quality.

Self-directed learning and learning regulation in MOOC

Research has shown that agency and active participation are relevant aspects for actual learning to take place in open, informal and social learning environments. Learners must decide, for example, what tools and resources they use, what connections they are based on to make sense of the information they handle and ultimately how they build their learning itineraries (Maina and Garcia, 2016). Kop and Fournier (2010) analysed the agency and level of autonomy required by the trainees participating in a MOOC, using Bouchard's four-dimensional model of learner control (Bouchard, 2009). This study points to the management of time and information, the formulation of objectives, effective planning —all aspects directly related to the self-regulation of learning— as factors that directly influence participation and the type of activities that learners carry out in MOOC.

Another critical aspect that appears in different investigations is the volume of information circulating in a MOOC, which can easily be disorientating and overwhelming, especially for those students with instructional expectations similar to those of traditional higher education models. Achieving an effective organization of learning and resource management requires a great deal of autonomy and self-organization capacity (Tschofen and Mackness, 2012; McAuley et al., 2010). Additionally, in most MOOC, learning occurs mainly through student-content interaction and not so much through student-student or student-teacher interaction. Therefore, the high level of autonomy offered to learners in MOOC and the fact that learning takes place mostly through self-study, makes indispensable for students to apply learning self-regulation skills in order to be successful (Jansen, van Leeuwen, Janssen, Conijn and Kester, 2020).

The concept of self-regulation of learning (SRL) has been defined as "the set of thoughts, emotions and actions planned and adapted cyclically for the achievement of personal goals" (Zimmerman, 2000: 14). The SRL model proposed by Zimmerman consists of three phases —forethought, performance and self-reflection—, crossed by affective, behavioural, cognitive and metacognitive sub-processes (among them, the formulation of objectives or time management, motivation, self-reflection and self-evaluation, the perception of self-efficacy and self-satisfaction) (Zimmerman, 2000; Fontana, Milligan, Littlejohn and Margaryan, 2015). This approach emphasizes the perspective of individual differences, although the social context is recognized as a component of the SRL process (Schunk and Zimmerman, 1997).

One of the reference works on SRL in MOOC is that presented in Littlejohn, Hood, Milligan, Mustain (2016), Littlejohn and Milligan (2015) and Milligan and Littlejohn (2014). The authors analyse the SRL strategies that learners put into play in MOOC and how they vary depending on different factors related to motivational aspects, such as their perception of the purpose and interest of this type of course. Research on SRL in MOOC during the last decade has mainly made use of questionnaires to show positive correlations between self-reported SRL activity and course completion. Recently, the use of traced data and learning analytics to inform about learners' SRL behaviour as a predictor of learner success has become a new strand of research (Jansen et al., 2020).

However, most MOOC do not have a design that facilitates SRL (Littlejohn and Milligan, 2015). Lately, several studies have started to carry out different types of interventions in order to promote and support SRL processes. The results are still scarce and, in some cases, seemingly contradictory (Jansen et al., 2020). This raises the pressing need to achieve a greater understanding of the processes of learning regulation in order to develop models and support systems for learners in this regard (Bonk, Lee, Kou, Xu and Sheu, 2015). In the same way, it is necessary to examine in depth the pedagogical models on which to base the MOOC, paying special attention to the experiences and motivations of the learners, as well as to the value they attribute to their participation in an open and networked learning environment (McAuley et al., 2010).

The social dimension of learning regulation: self-regulation, co-regulation and socially shared regulation processes

Another line of research in the study of the regulation of learning from the sociocultural approach has focussed on its social dimension, giving rise to new constructs from which to analyse the regulation process, such as co-regulation and socially shared regulation (Hadwin, Järvelä and Miller, 2011).

The concept of co-regulation (CoRL) derives from the Vygotskian consideration of learning, according to which the higher cognitive processes are internalized through social interaction. From this perspective, the emerging social interaction with other subjects in a given context gives rise to the internalization of SRL processes (McCaslin and Good, 1996; McCaslin and Hickey, 2001). Hadwin, Järvelä and Miller (2011) define CoRL as a temporary coordination of the SRL of learning with others, understanding these "others" as equals or peers, the teacher, etc. In processes of social interaction, CoRL involves negotiation processes that reveal the experiences and difficulties of SRL of each participant, thus enhancing the achievement of higher levels of regulation by each individual. The study of CoRL processes is based on the analysis of the interactions or dynamics between the subjects, with respect to or at the service of the processes of learning regulation.

On the other hand, the socially shared regulation of learning (SSRL) takes place in contexts of collaboration and cooperation, in which a group of individuals share their processes of learning regulation (including beliefs, knowledge, strategies, etc.) in an orchestrated way at the service of a common or co-built objective or product (Hadwin, Järvelä and Miller, 2011; Panadero and Järvelä, 2015). Research on SSRL therefore focuses on these shared, co-dependent and co-constructed processes of regulation, in the form of shared planning, shared objectives, shared monitoring and evaluation, shared strategies, etc. which are given in interaction with individual SRL processes. This study has been especially concentrated in the field of CSCL (Computer Supported Collaborative Learning) environments, in the analysis of team regulation processes during collaborative work.

In an extensive review of the topic, Panadero and Järvelä (2015) list several lines of pending research to be addressed regarding SSRL, among which we highlight two: the implementation of interventions to promote or support this type of process, especially with the help of digital technologies, and the study of these processes in interaction with those of SRL and coregulation, since they can be considered as interdependent.

Learning is not generally only individual or collaborative, so we understand that its study must be approached from a more holistic perspective, which takes into account the social component of the three situations (SRL, CoRL and SSRL). This makes special sense in environments such as MOOC, in most of which: a) the SRL capacity of the participant in the course is presupposed, although not necessarily true; b) learning could be facilitated by the CoRL of what is shared, understood as mutual feedback, which is not always effective, and c) the spontaneous generation of learning communities that are collaboratively regulated through their own acquisition of shared knowledge is generally idealized.

Authors such as Hadwin, Järvelä and Miller (2011) or Volet, Summers and Thurman (2009), maintain that, with the right kind of tasks and social conditions, these three forms of learning regulation can manifest simultaneously and therefore be studied. However, there is hardly any research dealing with these three processes (SRL, CoRL and socially shared social regulation) as a whole and much less so in open learning contexts, in which collaboration is articulated in a distributed and emergent manner, without responding clearly to a given formal group organization structure. Precisely for this reason it seems essential to address this gap, with the purpose of identifying how these three processes manifest in contexts such as MOOC and how they can be supported or facilitated by influencing their design.

We are specifically interested in studying how social support can be provided in relation to the processes of regulation of learning within the framework of MOOC. This includes modelling and scaffolding processes (McCalsin and Hickey, 2001), or others that we can identify, whether provided by classmates, by the tutor or mediated by the environment itself, as part of the course design.

This work is guided by the following research questions:

RQ1. What aspects should be considered in the design of a layer to support the social regulation of learning in MOOC?

RQ2. How could a layer to support the social regulation of learning be better integrated into the design of an MOOC?

The design of a regulation support layer for MOOC

With the purpose of answering the posed questions, a literature review was carried out, first on the analysis of the three mentioned regulatory processes, and then on the use of scaffolding tools to support them in different settings. This review provided us with the conceptual framework and the design elements to be considered in the construction of the regulation support layer.

Next, we briefly present the conceptual basis that articulates our proposal. Then we describe the different elements that constitute the regulation support layer and the way they interact with each other. This part of the work intends to answer the first research question posed.

In order to be able to work on the second research question, we proposed an empirical case of intervention, based on an xMOOC, where we integrated and implemented the designed regulation support layer. The empirical case and the actual integration in the MOOC platform of the regulation support layer is described next, as well as the research design and data gathering instruments that were applied.

The use of prompts as scaffolding tools for learning regulation processes

The use of tools to scaffold learning regulation, and more specifically the use of prompts, has been studied during the last two decades (Bannert, 2009; Wirth, 2009; Bannert and Reimann, 2012). According to Bannert and Reimann (2012: 195) prompts focus learners' attention on understanding the learning activities they are engaged in. They can be useful to support the recall and execution of knowledge and skills while learning, such as activities, procedures, techniques, or even the use of cognitive and metacognitive strategies.

Instructional prompts take the form of short-term interventions, embedded in a given learning context, as explicit statements that students have to consider during learning. The aim is to focus the student's attention on specific aspects of the learning process. In the case of learning regulation, the use of prompts has consisted mainly in asking students to carry out specific SRL activities, requiring them to explicitly reflect on, monitor and revise their learning process. The assumption is that prompts would allow them to activate their repertoire of metacognitive knowledge and strategies during learning because they already possess them, although they might not recall or execute them spontaneously.

Regulation tools and scaffolds have also been used to promote SSRL in the context of Computer Supported Collaborative Learning. In this case, support has consisted in encouraging students to negotiate and share their goals, plans and strategies, as well as to reflect on the achievement of their goals, or evaluate their plans and strategies (Malmberg, Järvelä, Järvenoja, Panadero, 2015). Järvelä et al. (2016: 267) mention three design principles for supporting SSRL (Järvelä and Hadwin, 2013): (1) increasing learners' awareness of their own and others' learning process, (2) supporting the externalization of students' and others' learning process in a social plane and helping in sharing and interaction, and (3) prompting the acquisition and activation of regulatory processes. Regulation tools could be considered awareness tools, since they help to make the targets of the SRL visible for the group members and in this way increase the possibilities of developing SSRL strategies (Järvelä et al., 2015; Järvelä et al., 2016). Moreover, as Molenaar and Järvelä (2014) point out, another interesting aspect of these tools is that they allow to data to be collected about 'on-the-fly' processes of SSRL that would not be available through other means.

Description of the regulation support layer

Purpose
The purpose of the design layer of learning regulation, as it was presented to the MOOC participants and facilitators, is twofold: on the one hand, it intends to help participants to have a more satisfactory learning experience, prevent attrition and explore possibilities to improve the MOOC design by paying attention to both individual and social learning processes. On the other hand, its purpose is to advance the understanding of the way learning regulation processes (SRL, CoRL and SSRL) operate and how they could be better supported in an MOOC environment.

Types of prompts

The basic scaffolding elements that make up the regulation support layer are the following three types of prompts:

- Guiding prompts (GP): guidelines provided to participants where they are invited to perform some actions. Among these actions there are always some that have to do with putting into practice some strategy or procedure, others with sharing and discussing the previous ones with the rest of the coursemates in the forum and others with reflecting on one's own learning process.
- Reflection prompts (RP): reflective questions posed to participants, following the guiding prompts, where they are requested to give a written answer about their own learning experience regarding: the use of some strategy or procedure, the sharing and discussing with other coursemates and the reflective process itself.
- Feedback prompts (FP): at the individual level, forward of own responses to the Reflective prompts by the participants; at the group level, forward of the responses to the Reflective prompts on the shared activity, by the rest of the group members.

Guiding prompts and Feedback prompts intend to act mainly as scaffolds of the regulation process, while Reflection prompts, in addition, allow us to collect 'on-the-fly' qualitative data of the process, as it is being experienced by participants throughout the development of the MOOC.

Regulation phases

We took as a reference and adapted the Barnett and Reimann (2012) prompt proposal. In a similar way, our proposal follows Zimmerman's (2000) three cyclical learning phases —forethought or planning, performance and self-reflection— but we explicitly refer to the processes in each one of them more directly related with the structure and the development of the task. We also subdivide the forethought phase in two —a preliminary one devoted to the task understanding and a second one focussed on planning and goal setting.

In this way, the provision of the three types of prompts is distributed in the four next phases throughout the course.

- Phase 1: Understanding the MOOC learning challenge
- Phase 2: Learning goal setting and planning
- Phase 3: Activity enactment
- Phase 4: Performance evaluation and adaptation

For the specific formulation of the prompts in each phase we followed the Barnett and Reimann (2012) proposal, especially for prompting SRL processes, but we adapted it taking as reference other proposals to support CoRL (Volet, Summers and Thurman, 2009; Kaplan, de Montalembert, Laurent and Fenouillet, 2017) and SSRL (Morris et al., 2010; Järvelä et al., 2016).

Regulation targets

Our aim is to consider the different overlapping dimensions in the regulation of the learning process: cognitive, behavioural, motivational and socio-emotional. This means that the suggested prompts are intentionally meant to activate all four dimensions or regulation targets in participants. In addition, besides metacognitive activity, the purpose is that the prompts should induce every core regulation process in the four mentioned phases: orientation, planning, goal-specification, finding relevant information, monitoring and evaluation.

Nature of the task

Lastly, we also needed to take into account the nature of the task considered in this case. First, we distinguished between two main types of learning activities that participants had to fulfil in the MOOC:

- Individual activity: referring to the general activity in the MOOC that consists in working with the materials and completing the test at the end of each module, as well as optional peer review activities. It also involves non-structured social interaction and exchange with other participants in the forum space.
- Collaborative activity: referring to specific activities that participants have to carry out within a group involving negotiation and sharing. Specifically, for this case, an optional individual peer review activity was redesigned and offered as a collaborative task in order to involve knowledge sharing, goals and procedures negotiation, planning and review of the joint process, etc. so that could lead to SSRL processes.

Differentiating between individual and collaborative activity in the MOOC allowed us to design and provide the most appropriate prompts in each case, in order to stimulate the corresponding regulation processes: in the first

case, those related to SRL and CoRL and in the second case, these same two in addition to those related with SSRL.

In order to not overburden students, we tried to simplify the presentation of prompts as much as possible. Thus, in the case of the individual activity, to structure the presentation of the prompts we decided to consider the whole course as a single task and thus distributed the four regulation phases in which to provide the prompts throughout the 4 + 1 modules of the MOOC, that is, over the 4.5 weeks duration.

The collaborative activity was proposed in the third module, lasting one week, and was considered globally as a task. In this case, the regulation phases and provision of the prompts were simplified even more, considering three regulation stages throughout the week, so that it would not be so intense for the participants.

The empirical case

An xMOOC on Gamification

The course 'Introduction to gamification through practical cases' was used as the empirical case to design and to implement the regulation support layer. It is a course of the xMOOC type, structured into four modules, with the additional introductory one, and a duration of four and a half weeks. The first two modules are devoted to providing basic knowledge about games and gamification elements as well as design guidelines for gamified learning solutions, and the third and fourth modules focus on practical cases in the fields of health and education, respectively. The structure of each module is the usual one in an xMOOC: the contents are presented through text and videos; there is a multiple choice test at the end of the module as the main assessment tool of the participants' knowledge acquisition in the course; the test provides the participants with a mark and is the only requirement to pass the module and the course. The third and fourth modules also include optional assignments that involve some more written development. These activities are assessed by the participants themselves through a peer review procedure facilitated by the learning platform and must be completed in a specific time period to be taken into account, although they are not considered in the final MOOC grade. The MOOC also presents practical examples of success and proposes the use of a gamified task management tool called Habítica. Participants are invited to interact in the forum space but there is no mandatory activity that involves its use to discuss or collaborate. The MOOC is hosted on the MiriadaX learning platform, a Telefónica Educación Digital initiative that has been operating in Latin America since 2013.

The regulation support layer implementation in MiriadaX

The design layer in the MOOC was mainly integrated by taking advantage of the functionalities and tools provided by the MiriadaX platform. The primary intention was to avoid adding complexity to the learning environment. Only in the case of reflective prompts we used links to external basic Google forms.

A presentation of the regulation support layer was given in Module 0. Participants were invited to use the proposed system to help them direct and improve their learning experience. On a voluntary basis, they could subscribe to the individual activity, the collaborative activity or both, by completing a form. In this way, we maintained some control over who had initially enrolled and were able to monitor continuity. Then we created an itinerary for the individual activity and another one for the collaborative activity. In each case, we embedded the regulation support layer in the MOOC as follows:

- For the individual activity:
- A brief introduction of each regulation phase was given after the presentation of the corresponding module.
- Guiding prompts through the four regulation phases were provided in the platform blog.
- In each phase there were guiding prompts that suggested the participants share and discuss their strategies, reflections, opinions and sensations in the forum throughout the process. The forum was proposed as the main space for open social interaction and discussion. Participants could also comment on the blog posts.
- Reflective and Feedback prompts were provided through links to Google forms in the blog post.

- For the collaborative activity:
- A brief presentation of the collaborative activity was given in the description of the third module.
- A general overview of the collaborative activity was provided in the platform blog.
- Guiding prompts through a simplified proposal of three regulation phases were provided in the wiki space on the platform, where the activity also had to be carried out in groups. Each group had a wiki page to work

through the activity. On the wiki page each group was provided with a template that facilitated the structure of the work and the development of the collaborative activity.

- The forum space was additionally proposed as the place for discussion, negotiation and group decision making.
- Reflective and Feedback prompts were provided through links to Google forms in the wiki.

Since the regulation support system was distributed in different spaces on the platform, we sought to link these spaces to each other as clearly as possible, and to make the structure and internal logic of the regulation support system explicit and understandable.

Research design and instrumentation

The design-based research model is applied with the aim of generating and analysing changes in the learning regulation practices in MOOC through the development of a design intervention and in parallel to advance the theory on the support of learning regulation processes. With this twofold purpose, research and development form a continuous cycle of intervention design, analysis, evaluation, reflection and re-design. For the collection, analysis and interpretation of the data, a mixed approach is used, although with preeminence of the qualitative approach. Quantitative data are collected from the participation statistics generated by the MiriadaX platform, but most sources of information are of a qualitative type: semi-structured interviews with MOOC participants, responses obtained through the reflective prompts in the different phases of the regulation support layer and, finally, records of the interaction between the participants in the platform (forum, wiki and blog). The data of the survey of general satisfaction of the participants with the MOOC is also available. Data collection is carried out in each of the modules through the aforementioned instruments, except in the case of interviews and the survey carried out at the end of the MOOC.

Conclusions

After an initial exploratory implementation of the design layer to support learning regulation, we can offer some first reflections on the two research questions posed:

Regarding the first question: What aspects should be considered in the design of a layer to support the social regulation of learning in MOOC?

The use of prompts seems appropriate to induce and support regulation processes in a sustained way. However, the low follow-up of the system by the participants, as well as the interviews carried out, lead us to think that the presentation of the Guiding prompts as well as that of the Reflection prompts should be improved and simplified in order to become more "transparent" to participants throughout the MOOC. In the case of Reflective prompts, the "questionnaire effect" seems to have had a discouraging impact. In this sense, a possibility would be to raise this type of prompts more along the lines of a functionality to take notes as a reflective journal, similar to that of the NoteMyProgress tool (Pérez-Álvarez et al., 2017). Another possibility would be to keep the Reflective prompts but to make public the answers for all participants, anonymously, so that everyone could benefit from the responses of others. This could reduce the feeling of responding to a machine and the perception of lack of utility of these responses reported by some participants. It would work, in fact, as a different type of Feedback prompts. Testing the use of targeted prompts that provide learners with expert models of reflective thinking that can work as behavioural references, could be a different approach interesting to explore (Ifenthaler, 2012).

One aspect that clearly determines the use of the system is the way in which the participants position themselves and orient their learning on the MOOC since the beginning. In many cases it tends to be superficial, intermittent and intensive. It is difficult for regulatory processes, especially those of the metacognitive type, to be activated within such a fragmented approach. In this regard, the regulatory support system should help sustain a more continuous, progressive and meaningful journey within the MOOC.

On the other hand, the collaborative activity must be presented and encouraged from the beginning and perhaps not presented to the participants as an itinerary other than the individual, but as another element of the same itinerary, which as the rest can optionally be carried out. In order to make its implementation feasible and at the same time make it possible to monitor the phases of support regulation, a longer period of time must be considered. The fact that it is an optional activity in the third module greatly reduces participation, which is already scarce in individual P2P activities. Something similar occurs with any form of social interaction in the

forum, as a prerequisite for CoRL and SSRL processes to occur. Therefore, it is necessary to deepen the reasons for low participation and generate mechanisms in the first modules to make social interaction and collaboration in the MOOC more attractive, productive and rewarding.

Regarding the second question: How could a layer to support the social regulation of learning be better integrated in the design of a MOOC?

The way in which this layer of regulation support is integrated into the MOOC design seems to be an essential factor in order to achieve its optimum use by the participants. In this case, the characteristics and the way the platform operates do not facilitate an organic and at the same time attractive integration. Iit is an unfeasible platform and with few tools and functionalities designed to facilitate social interaction and collaboration.

Although efforts were made to trace the itinerary of the support system in the MOOC environment, the disintegration of the different components caused the participants to get lost frequently and not fully understand the proposal. In the interviews the participants found it difficult to place clearly the aspects related to the regulation support layer. In this sense, although we believe that this layer of support should be more transparent for the participants, at the same time it should draw a path that is recognizable and understandable. It should help to become aware of the process of learning regulation within the MOOC and of the sense and utility of making an appropriate and continued use of prompts (Bannert and Reimann, 2012). This implies looking for strategies to better embed the system into the contents and the learning activity of the MOOC (considering the goals of the module, contents, activities and tools) (Jansen et al., 2020). Specifically, prompts, instead of being presented as a block, could be administered more gradually into the contents of the MOOC. In this case, perhaps even trying to give them a gamified treatment by taking advantage of the course contents would help.

Just as Bannert and Reimann (2012) state, offering prompts to improve learning regulation may not be sufficient. In further research we will attempt to analyse why students did not use prompts more frequently and in the intended manner. In this sense, it may be interesting to analyze to what extent these students have the SRL skills tha we are trying to activate or encourage. Another possibility is that certain additional guidelines are necessary to "train" proper use of the system.

The conclusions drawn in the first iteration of the research offer some guidelines on how to propose mechanisms to support regulatory processes in a broad sense, within a general approach to learning design in MOOC.

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http://dx.doi.org/10.1016/B978-012109890-2/50031-7

Phenomenology and Networked Learning: mobilage glimpsed from the inside through an online focus group

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Abstract

This paper arises from doctoral studies which adopted a multi-methods design which aimed to disclose being healthcare students using a mobile phone for academic work: the student and mobile phone, i.e. mobilage, was the unit of analysis. This paper picks up on a long-term but sparse conversation about the use of phenomenology to investigate networked learning. Reasons for the paucity of work in this area are explored, including the nature of questions that phenomenology seeks to engage: to unveil and convey pre-reflective human consciousness. I seek to supplement this gap, as I see it, in the literature by contrasting two arms of my thesis project: one relied on ten in-person encounters with informants and another an online focus group designed to gather information from within the informant's lifeworld. These two methods frame a discussion of the merits, weaknesses and fidelity of my approach to gathering data pursuant to hermeneutic phenomenology, i.e. considering the difference between methods where the researcher is or is not in the informant's immediate co-presence.

Gadamer's horizon fusion metaphor is arguably easier to conceive of with informant and researcher co-located, where the setting and conversation is informal, perhaps typical of everyday mobile phone use. Ten such encounters were undertaken and analysed through repeated listening to audio recordings and phenomenological writing. In contrast, the online focus group lasted for three months with seven informants who never met physically. Informed by experience sampling methods, weekly trigger messages were posted for the group to respond to, ideally in situ.

Acknowledging that all data is mediated in need of interpretation, the paper reflects on the possible effects of data gathering at varying levels of temporal and interpretive proximity, or 'hermeneutic shades', between the researcher and the phenomena carried within data gathered, helping to condition what weight to afford information from different media. Van Manen's analytical method and goal of writing vocative anecdotes to convey aspects of the essence of a lived experience is considered against examples of direct accounts from the online focus group, one of which, it is argued, fulfils his criteria for phenomenological anecdotes. It is proposed that this demonstrates the potential worth of an online medium to not only supply data for phenomenological writing but arguably even represent phenomena without passing through the hermeneutic/analytical writing process.

Keywords

Introduction

Oberg and Bell (2012) outlined three types of phenomenology, empirical, existential and hermeneutic, and offer a reflection upon them in use within their own doctoral research. I will defer to their overview of phenomenology. Oberg and Bell aimed to stimulate and engage the networked learning community in a discussion. Phenomenology features sporadically in the wider online learning literature. But, as Chris Jones (2016) has noted, very few have taken phenomenology up within the distinctive context of networked learning, especially at the conference. There are other valid meaning and theory-making approaches, but this paper is concerned with phenomenology because it offers a philosophical pedigree, values, aims and outputs which offer something different to the preponderant research approaches in learning technology.

In September 2019, a search of the ERIC educational research database combining 'networked learning' AND phenomenology revealed 4 hits. None of these drew upon networked learning theory or really embraced phenomenology as explicated by protagonists such as van Manen or Moustakas. The same search terms run through Google Scholar returned 1330 items, many of which only make passing reference to both concepts (for example, Goodyear et al., 2014). Others (such as, Dukes, 2018; Paskevicius & Irvine, 2019) claim to enact a

phenomenological approach, but fall short of this in important ways: neglecting any kind of phenomenological reduction, or, in analysis, they aim to merely identify emergent themes, with little or no attempt to fulminate or present findings through phenomenological writing. Van Manen (2017) and Giorgi (Giorgi, 1999, 2011) have defended phenomenology from a kind of miss-selling which threatens to erode its distinctive contribution. This is not to say that methodological innovation is ruled out. However, according to the basic principles of scholarship it may develop by sensitively accounting for previous work of significant pedigree. I strove to achieve this during my doctoral studies but freely admit that I have much more to learn. In some way, this paper is a vehicle for that ongoing exploration.

There are many reasonable causes for networked learning researchers to eschew phenomenology, concerned as it generally is with unveiling that which appears to consciousness in 'order to clarify its logic or structure.' (Giorgi, 1999, p. 69). These are not the most obvious matters of concern for learning technologists. As with many fields, broadly speaking, questions of learner experiences or intervention effectiveness serve a more obviously practical outlook. Or phenomenology may be off-putting because writers need, as Oberg and Bell assert, to engage properly with phenomenology before deploying it. Arguably, any methodology should be explored before attempting to adopt it, but even a cursory glance reveals a dense, branching, contested family of ideas. Many research approaches are complex, but the situation with phenomenology is complicated by leading names, such as Husserl, Heidegger and Gadamer, leaving their followers to work out how to apply their work in the conduct of phenomenological studies (Giorgi, 1999). Horrigan-Kelly et al. (2016) state that Heideggerian phenomenology is challenging to access and apply in research.

Phenomenography (Marton, 1981) and empirical phenomenology (Giorgi, 1999) have claimed success in investigating learning in 'order to clarify its logic or structure.' (Giorgi, 1999, p. 69). While Oberg and Bell state, 'Our everyday living takes place without us having to think about it or translate it into disciplinary discourses' (2012, p. 204), academic work requires exactly that, and more, including monitoring and evaluating personal effectiveness, as in metacognition. Thus, exploring elements of academic work phenomenologically sets up a paradox - how to investigate and represent pre-reflective reflection? Fields of work with similar names, such as phenomenography and interpretive phenomenological analysis, circumvent this difficulty by taking aim at a second-order perspective, or 'the lived experience.' Experiences of networked learning, or any other experiences for that matter, may be interesting and useful objects of study, but Heidegger's project is ontological, rather than ontic. He sought to reveal primordial structures of human being, whereas an ontical focus examines *ways of being in given settings*. The distinction is logically clear, but existence and experience may be harder to isolate in practice. The attempt requires at least gaining 'enough' of a grasp of phenomenology's development, nuanced core concepts and proffered methods, not just a matter of following the correct steps, learning a technique, or even deep scholarship: Adams and van Manen (2017, p. 781) require extended immersion towards an 'attitudinal disposition… internalising sensitivity to life meaning'.

With trepidation then, for my doctoral thesis I came to phenomenology after realising ethnography was incompatible with my research questions. I felt affinity with ethnography from a general commitment to participant observation in order to fairly portray life-world complexity through narrative. However, my research question was less concerned with tracing cultural patterns and more about experiences, of being a healthcare student using and learning to use a smartphone for academic work. I admired Gourlay and Oliver's work that highlighted a practice focus on digital literacy (2013, 2018). Like them, I was influenced by Assemblage and Actor Network Theory (ANT) with its claims to avoid dualism in regard to informants and determinism with respect to their technology - thus I conceived of the unit of analysis as *mobilage* (Johnson, 2017). Mobilage was sensitising theory (Trowler, 2012) which helped me to frame the learner and their mobile phone in a synergistic epistemic relationship on the move. As such, mobilage was a moving target and challenging to encounter considering how sporadically academic work may be undertaken with or even just in the presence of a mobile phone.

Direct Observation

I wanted to gather optimal data for the study, which led to a commitment to first person direct observation stemming from Atkinson's values for ethnography (2015), but I found this also chimed with Gadamer's notion of the fusion of horizons (1992). Both encourage the researcher to get as close as possible to the phenomena of concern rather than hold interviews about it. Inspired by Gadamer's horizon fusion metaphor, I cast interviews as 'encounters', aiming to level off hegemonies, adopting a conversational style around the topic within naturalistic settings, sharing and learning from each other, phones to hand. Atkinson (2015) argues that analysis does necessarily occur at a defined stage in a research project, but begins with the project's initial conception, reflecting his emphasis on the researcher being the 'research instrument par excellence' (Hammersley &

Atkinson, 2007, p. 17). Similarly, for van Manen, a phenomenological attitude is implicit in 'every turn of the inquiry process' (2014, p. 228). Such views challenge novice researchers to develop their own reflexivity rather than rely on a given procedure. I considered transcribing past events would amount to a reification; transcribed text is different to the encounter past. I found that the audio recording was more suitable for *representing* (van Loon, 2007), retaining actual voices and contextualising background noise as I undertook deliberative analysis, eventually through writing and re-writing phenomenological vignettes (after van Manen, 2014).

Listing phenomenology alongside other interpretive methodologies becomes more difficult when it is understood that assembling and presenting empirical findings about lived experiences, especially for wider generalisation, is not the goal of existential or hermeneutic phenomenology. Rather the aim is to gather 'examples of possible human experiences in order to reflect on the meanings that may inhere in them' (van Manen, 2014, p. 313). This makes van Manen seem ambivalent about direct observation of someone else undergoing a particular experience. Indeed, the obligation to directly observe phenomena does not come from a need to personally witness something, as if it were possible to read another's mind or impossible to trust an informant's account of the experience recalled from the past. It is more to do with assumptions about the immense subtlety of human experience and the difficulty of apprehending it without the researcher and informant being co-present. Enriquez-Gibson (2011) argues that the question of 'place' in research has become blurred from a mobilities perspective. However, the contrast between the experience of physical and virtual co-located activity was well illustrated by Jacobs' (2019) account of the first date after connecting online, and serves as a caution for anyone willing to blur or diminish this difference.

In order to capitalise on physical co-location, I recruited ten students for mobilage 'encounters' within naturalistic settings of our mutual choice (e.g. a commute, a café, etc.). However, knowing my own academic practice, it was safe to assume that knowledge work with a smartphone may be attempted sporadically at any moment and setting. Gourlay and Oliver (2013) and Jones and Healing (2010), interpretive rather than phenomenological studies, enlisted students to gather data for them, which led to accounts drawn from quite intimate moments of students' life-worlds (e.g. bathing while reading academic texts on a tablet PC enclosed in a plastic bag). Some Experience Sampling Method (ESM) advocates claim that enlisting participants in data collection boosts the immanence and integrity of the data since it is unmediated and memory recall distortion is reduced (Riddle & Arnold, 2007). From a phenomenological perspective, data is always mediated and interpreted. Indeed, Giorgi (2006) holds that involving informants in this kind of role is 'wholly indefensible theoretically' (p311), since experiences will tend to be described from the natural attitude, rather than phenomenological *wonder* (van Manen, 2014). This reveals something of an epistemological difference between ESM and Van Manen's method: the latter is less concerned to report data 'as is', rather data is raw material for phenomenological anecdotes that a writer is relatively free to reflexively fabricate. In the case of phenomenological writing, rigid faithfulness to the data, as in the literal words used by informants, is less important than faithfulness to the phenomenon, its analysis and conveyance. This does not make it superfluous to aim for maximal rigor in the attempt to gather data that may unveil what appears to pre-reflective consciousness, and ESM offered a 'least worst' solution for gathering accounts of moments in informants' life-worlds which were impossible to personally observe or share in co-location.

The online focus group

I adapted Jones and Healing's version of experience sampling into an 'online focus group' (OFG) with 7 recruits over 3 months. Microsoft's enterprise social network platform Yammer™ hosted the OFG, allowing a geographically disparate group of informants to respond to each other as well as to the triggers I posted weekly. Elements of studying are unavoidably solitary and yet, for many, social networking is an ordinary everyday facet of mobilage (Madge et al., 2009).

The design of trigger posts varied apart from a standard set of questions which asked for responses in the present tense, such as, 'Where are you?'. In data gathering, Van Manen commends obtaining *direct accounts* of the situation and experience, rather than inviting reflections upon the experience (2014, p. 299). Students were asked to respond from their phones, either from the mobile app or by email. In this way I felt I had a method for hearing 'from the inside' of mobilage.

As I reviewed student messages, it was apparent that some were recalling past events, while others were written 'in the moment' as the trigger questions invited them to. I considered that recalled events may be less authentic, with less fidelity to the original experience as time passed. I decided to code the data accordingly to distinguish statements of differing apparent temporal proximity between experiences and reporting them. Such coding was used to navigate or aggregate the data for hermeneutic analysis rather than with the aim of identifying themes or

categories. This distinction in the immediacy of informant reporting their experiences opened up a variation in the degree to which I seemed to have personal access to the phenomena of interest for the purposes of unveiling it and so I extended this idea to condition the way I thought about each of the various methods used to assemble a data corpus as offering different 'hermeneutic shades', with 'auto' data at one end of the spectrum and survey responses at the other (see Table 1).

Table 1: Degrees of interpretive proximity across different data gathering methods

	Medium	Media created	Where was 'data' made?	Duration for informant	Physical proximity	Psychic proximity	Interpretive proximity	Coordinates of experience?
Survey	Internet enabled device, screen and keyboard	Text, Ratings	Unknown – anywhere with a Web browser	Reading blurb, responses averaged 10 minutes	Distant	Response to prose by a known person (email and survey)	Remote	External - nil Internal - some
Online Focus Group	As above but affords multimedia and 'likes'	Images, video, text	Range of spaces: family trips, library, café, home	Maximum 30 minutes per week for 3 months	Distant	Distant, yet multi-method informants were better known. Virtual presence (see Kehrwald, 2010) varied.	Removed Current events less removed than recall of past events	External - some Internal – some
Encounters	Nil, but mobilage present	Images, field notes, audio	With me: cafés library, canteen, hospital concourse, train, family home,	1 hour	Immediate	Shared space/time – but recollections are more distant	Interactive	External - shared Internal - sympathetic
Auto data	Experience	Images, video, text	My settings	Ongoing	Personal	Personal	Reflexive	External - exact Internal - reflexive

I did not assume that my own reified reflections of my own digital practice provided the research with undiluted direct access to the phenomena. This acknowledgement lays bare the reliance placed on reflexive conditioning of my own exposure and attitude to the phenomenon through the various media and channels in conducting the research.

Aside from my phenomenological aims for the OFG, I also performed a thematic analysis on the data, with synthesis informed by group consensus, according to the purpose of focus group methods (Davis, 2017). For example, there was agreement amongst the group that, 'work on the move is tricky'. Most of the data related to this theme arose in response to a trigger (see Figure 1) that included an advert featuring four cyclists riding along a wide desert road. The strapline claims that, 'With Google Sheets, you can create, edit and collaborate wherever you are. For free.'
A quote within this theme by Chris is copied here:

> I was in the kitchen, trying to access my emails, my research, work out blackboard on the mobile (next to impossible) glue gunning sequins to a tin and painting a fairy post box whilst cooking duck. I was Whatsap'ing a fellow student with her literature review and trying not to fall over either of my cats. The duck was dry but that was the only casualty! (Chris 8/1/2017 11.57pm)

This quote illustrates the hectic and stressful life of a single parent, juggling multiple roles. Although it is usual to think of mobile learners, from a mobilities perspective, as traversing physical distance (for example, Holton & Finn, 2018), Chris was more than 'mobile', she was a blur *in situ*. Her account chimes with Enriquez's (2011) notion of being in a 'tug-o-where', seeking to operate in physical and online dimensions simultaneously. Academic work seems likely to be compromised in the face of such a tumult of competing interests. Nevertheless, as with Webber's (2017) informants, Chris's account challenges restrictive, i.e. purely academic, notions of 'success' in higher education to appreciate their broader life-wide achievements and contribution.

Given the nature of her experience, it is not surprising that Chris was unable reply to the OFG on top of all the other tasks she was undertaking and thus resorted to providing recollections instead. However, another informant responded while… 'cilycling [sic] on a stationary bike' in the Students Union, where he was taking part in an endurance fundraising event for charity (Benjamin 17/3/2017 4.01pm). Benjamin's account was apparently written in closer temporal proximity between the experience and the reporting of it. Benjamin's cycling, while strenuous, did not preclude the concerted use of eyes and hands to compose a trigger response *in the moment*. Nevertheless, the spelling error and brevity of the message could imply that communication was hampered within that activity. Clearly there were some aspects and moments of mobilage which could not be relayed into the OFG simultaneously. I had thought that temporal proximity was important in data gathering by

informants reporting experiences as soon as they occurred, and the technology appeared to afford this. Yet this now seems naive when comparing the two contributions above, with Chris' reply seeming to supply better phenomenological data than Benjamin's. Indeed, Chris's reply seemed to so capture the experience that I felt no amount of my own phenomenological analysis through writing could better it as vocative prose.
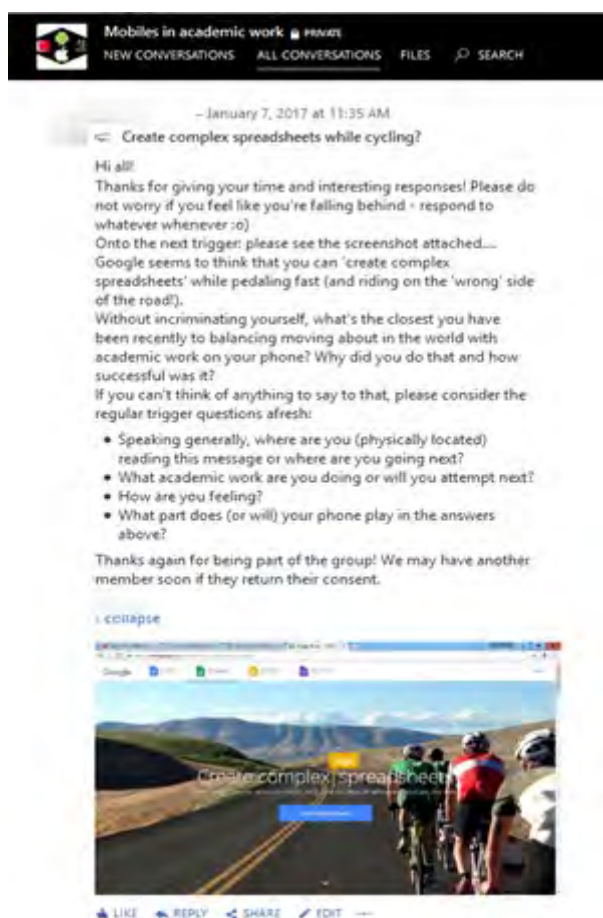

Figure 1: Online Focus Group Trigger 7th January 2017 - create complex spreadsheets while cycling?

Returning to presence

When qualitative research methods rely on interviews for collecting data, some kind of transcription of audio recordings may be presumed (Creswell, 2014). It may be thought that the act of transcribing brings the researcher closer to the data (Evers, 2011). The close attention required when typing up audio or handwritten words encourages a heightened level of concentration that engenders familiarity with and reflection on the data. This opportunity seems to be somewhat foregone when informants supply their responses directly as digital text, as in an online focus group. In a sense, the hermeneutic effort of framing discourse to create and convey meaning shifts to the informant, possibly invoking reflection by them on the topic and act of communication. This arguably further distances the informants' words from fulminating data of use to researchers seeking to unveil and convey something pre-reflective of a phenomenon. However, and in spite of Giorgi's reservations about informant involvement in data gathering and validation, Chris's contribution (above) meets van Manen's criteria for data gathering in terms of being a 'direct account'. Although brief, Chris's words also compare well with van Manen's 'criteria for evaluative appraisal of phenomenological studies' (2014, pp. 355–356), such as 'descriptive richness', and 'strong and addressive meaning', almost rendering the step of phenomenological analysis towards anecdote writing redundant. Conversely, it is conceivable that even the most conducive interview may not be as productive, with informants prone to lapse in and out of awareness of where they are and what they are expressing. The move towards representation is less tightly coupled with the data corpus than might be expected of other forms of qualitative research which borrow claims to rigor through mimicing empiricist aims of fidelity with the precise words and meanings supplied by informants. Instead, in phenomenological analysis through writing the researcher seeks to conjure the phenomenon into consciousness in order to create text which evokes an approximation to the phenomenon each time it is read. Almost regardless

of data and the means of obtaining it, it behoves the phenomenological researcher to work with the information they gather in order to write vocative anecdotes. The aim is different than 'speaking for', rather, the researcher is seeking a 'return to presence', re-presencing (van Loon, 2007, p. 279) their reader. But if informants speak vocatively for themselves, perhaps through an online focus group, it may save the researcher transcribing time but it presents a methodological challenge to van Manen's phenomenological analysis, i.e. through writing scholarly and reflective texts. Or does a phenomenological anecdote only qualify as such if it has passed through the researcher's soul?

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Disciplinary digital capabilities of professionals: networked learning in engineering and management

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Abstract

This paper is concerned with the digital practices of professionals, and the ways in which educators can support higher education (HE) students with successfully transitioning into professional life by developing relevant digital capabilities according to their disciplines. Digital capabilities have received significant attention in recent years, with various attempts made to develop digital frameworks to support curriculum design in HE. However, few studies have articulated these generic capabilities in terms of specific disciplines. This paper addresses the gap of disciplinary conceptualisations of digital capabilities by exploring how they are planned in HE curricula in two professional disciplines, engineering and management. Originality of the study is achieved in part through a conceptual framework that weaves together Shulman's notion of signature pedagogies with JISC's Digital Capability Framework (DigiCap). The study employed a multiple-case study methodology with each discipline as a case, and four undergraduate/postgraduate modules as the units of analysis, drawing on documentary sources, and academic, professional and student perspectives via interviews and focus groups. The research design section presents a practical manifestation of this conceptual framework in the form interview questions, which is one main outcome of this study. The study offers insight into the digital capabilities in engineering and management education, as well as the digital practices of engineers and managers. Findings report on which digital capability elements are prioritised, and how, in the two professions, followed by a discussion of their most distinct, 'signature digital capabilities'. These indicate that the development of digital capabilities is aligned with the respective discipline's signature pedagogies. In engineering, digital problem-solving and collaboration/communication, followed by data and information literacy, appear to be most prominent. In management, data and information literacy overlap with problem-solving, and, together with digital content communication, form its prominent digital capabilities. The study also identifies management's overarching signature digital capability. The paper argues that simply just using a descriptive, typological framework (e.g. DigiCap) is not sufficient to identify signature digital capabilities of a subject without tending to their disciplinary aspects. It is the combination of a typological digital capability framework through the lens of signature pedagogies, which can be effective in identifying disciplinary digital capabilities.

Keywords

Digital capabilities, digital literacies, disciplines, signature pedagogies, curriculum design, professionals, engineering, management, networked learning.

Introduction

This paper is concerned with the digital practices of professionals, and the ways in which educators can support higher education students with successfully transitioning into professional life by developing relevant digital capabilities according to their disciplines. For the purpose of this paper, this transitioning process of learning is viewed as joining a particular, disciplinary, networked learning community. Current views of networked learning (Dohn et al., 2018) emphasise the different nature of connections that facilitate learning, whether it is between learners-learners, learners-tutors, or 'learners between situations and from their re-situated use of knowledge across contexts' (Dohn, 2014). All these connections are permeated with digital actions and interactions (Littlejohn et al., 2012).

Therefore, if universities have a role in advancing disciplinary knowledge and educating tomorrow's professionals, the above mentioned digital nature of professional networked learning necessitates that they pay attention to developing digital capabilities of their graduates. In turn, professionals' digital capabilities are linked to disciplinary innovation, economic competitiveness (Orlik, 2018), and to social inclusion, citizenship and lifelong learning (Carretero et al., 2018; Mihailidis, 2018). Digital skills are required for jobs (Becker, Pasquini, & Zentner, 2017) and for graduates to make a positive contribution to society.

The focus of this paper is exploring the nature of disciplinary digital capabilities which enable graduates to transition from education to networked learning communities of their profession. Digital capabilities are defined as those 'which fit someone for living, learning and working in a digital society' (JISC, 2017c). A plethora of digital capability frameworks and definitions exist (Beetham, McGill, & Littlejohn, 2009; Ferrari, 2012), including UK/European policies (EC, 2016). These focus on generic digital skills for employment and living. However, inherent in generic frameworks is a lack of specificity as to digital capabilities in a given discipline.

Few studies have applied or mapped such generic skills in particular subject settings. And when the evidence points to the effectiveness of discipline-based, embedded approaches as opposed to generic digital skills development (Beetham, McGill, & Littlejohn, 2009), having limited examples of disciplinary digital capabilities is not conducive to curriculum design and review. If universities have a central role in developing professionals' digital capabilities (Payton, 2012; Sinclair, 2013), then higher education (HE) curriculum teams need to articulate what digital capabilities mean in their disciplinary contexts (Belshaw, 2012; Warren, 2011) to be able to design them into their course. This gap leads to the overarching research question of this paper: "How are digital capabilities conceptualised in different disciplines?" In particular, it focuses on digital capabilities which foreground connections between human and digitally mediated interactions.

For this investigation, two disciplines, engineering and management, were selected. Prior to this study, few mappings of digital capabilities existed, including English as a second language (John, 2014), religious studies (Sinclair, 2013) and sustainability education (Brown, 2014). Apart from a study (Jupp and Awad, 2013) on construction management, no mapping existed for engineering or management, and none offered triangulation of perceptions between academics, students and professionals. In addition to these aims, this paper concentrates on finding a suitable framework and process for capturing the digital capabilities to benefit educators, educational developers, learning technologists and professional bodies in any disciplinary context.

This proposed conceptual framework comprises JISC's Digital Capability Framework (2017b, abbreviated as DigiCap hereafter) combined with the notion of Shulman's signature pedagogies (2005a,b,c). As one main outcome of this study, the research design section presents this framework in the form interview questions. The study maps the digital capabilities in engineering and management education, as well as the digital practices of engineers and managers, foregrounding especially those elements of the framework, which are related to networked learning (i.e. digital problem-solving, communication/collaboration, learning and development). Findings report on and discuss which digital capability elements are prioritised, and how, in the two professions. The paper highlights that networked learning in disciplinary contexts displays different characteristics, and so, 'signature digital capabilities'. It also argues that the identification of these signature digital capabilities would not have been possible without tending to their disciplinary character through the lens of signature pedagogies.

Literature review

In policy-level initiatives there is a tendency to view digital skills as technical skills (Hinrichsen & Coombs, 2013), whereas in education they are seen as situated, social, cultural and disciplinary practices associated with higher forms of knowledge creation, creativity and innovation (Goodfellow, 2011; McDougall et al., 2018). However, this latter perception leads to a tension between striving to identify a generic set of capabilities and specific examples in local contexts (Orlik, 2018). This poses a problem for studies of digital capabilities.

The scarcity of disciplinary studies of digital capabilities are due to this tension between narrow and broad conceptualisations. Authors over the last decade have established, used, evaluated and adapted generic frameworks of digital competences/capabilities (Coldwell-Neilson, 2017; Handley, 2018). As part of, or in addition to these, a number of studies have also produced a review of frameworks (Beetham et al., 2009; Ferrari, 2012; Janssen et al., 2013; Sharpe, 2014). The most commonly-used frameworks are JISC's Digital Capability Framework (DigiCap) (2017b) and DigComp, EU's Digital Competence Framework for Citizens (Ferrari, 2012).

This study draws on DigiCap, a framework used most extensively in UK HE (Handley, 2018). DigiCap is a typological framework, which groups the kinds of digital practices of professionals into six overlapping elements: 1) ICT proficiency; 2) information, media and data literacies; 3) digital problem-solving (creation, innovation and scholarship); 4) digital learning and development; 5) digital communication, collaboration and participation; and 6) digital identity and wellbeing (JISC, 2017b). All these elements relate to networked learning in emphasising connections, whether between human or non-human 'actants' (such as digital resources or technologies) (Dohn et al., 2018). For instance, digital collaboration (5) refers to professionals/students collaborating with each other in digitally mediated ways, or digital problem-solving (6) refers to connections

between contexts and 're-situated use of knowledge across contexts' (Dohn, 2014) , e.g. professionals using digital technologies to problem-solve. Similarly, professionals exercising their information/data/media literacy (2) are making connections between digital resources and their own understanding to support their decision-making. Whilst other professionals undertake digital learning and development activities (5) are drawing on their network of other people and other (de Laat & Dohn, 2019).

Returning back to DigiCap as a framework, it has always been intended to be generic, invite local interpretation, with this co-creation process being seen as important as the resulting definition or the framework itself (Baume, 2012; Belshaw, 2012; Ilomäki et al., 2016). Disciplinary articulations of digital capabilities have been produced at institutional (Oxford Brookes University, 2013; Anagnostopoulou, 2013) and at professional levels, e.g. adapting DigiCap for health & social care professionals (NHS Health England, 2017). Studies argue that subject-specific disciplinary tasks using relevant technologies in the curriculum are an effective way to develop digital capabilities (Coldwell-Neilson, 2017; Littlejohn et al., 2012). Despite this recommendation for embedded design, the 2017 UCISA survey indicated that only a fifth of responding universities recognised student achievement in digital capabilities in credit-bearing modules (Fielding et al., 2017). Moreover, two-fifth of HE students reported that they felt unprepared for a digital workplace (Newman, Beetham, & Knight, 2018).

All this points to the need for more work in HE in embedding digital capabilities into subject contexts. That said, few examples explore disciplinary digital capabilities apart from construction management (Jupp & Awad, 2013) and religious studies (Sinclair, 2013). These studies are pertinent because they account for the impact of changing knowledge-practices of their respective fields as a result of technological innovations, and what this means for curriculum design. This paucity of studies inspired this paper to develop a conceptual framework to support curriculum designers in being able to review their curricula from a digital capability perspective.

Conceptual framework

This study is concerned with preparing HE students to transition to professional practice, making comparisons between the digital practices of professionals with those being developed within the curricula of students of the same discipline. The proposed conceptual framework is a combination of JISC's Digital Capabilities Framework (DigiCap) and Shulman's (2005b) signature pedagogies. The former helps with exploring digital capabilities (and so networked learning), whilst Shulman's notion assists with the disciplinary angle. Both offer a different perspective on curriculum design in applied disciplines. This framework is novel in that no prior studies had explored digital capabilities through the lens of signature pedagogies.

My study looks for articulations of digital capabilities adopting DigiCap as one lens, in modules' learning outcomes (James & Casidy, 2018). DigiCap's six elements are: (1) ICT proficiency, concerned with basic digital skills; (2) Data and Information Literacy, the capacity to find, evaluate, manage and share digital information and data; Media Literacy, the capacity to read critically in a range of digital media; (3) Digital Problem-Solving, or creating, innovating, problem-solving with technologies or developing digital artefacts/materials/ practices; (4) Digital Communication and Collaboration, the capacity to communicate and collaborate effectively in a variety of digital media for different purposes and audiences; (5) Digital Learning/Development, the capacity to identify/participate in digital learning opportunities; and (6) Digital Identity and Wellbeing, the capacity to maintain a positive digital identity across platforms; and look after one's work-life balance (JISC, 2017b).

The other lens offers a disciplinary perspective (Becher & Trowler, 2001) through the notion of Shulman's signature pedagogies, "the types of teaching that organize the fundamental ways in which future practitioners are educated for their new professions" (2005, p.52). Shulman's concern with professional education has emerged from the observed gap between the HE curriculum and professional practice (Dotger, Harris, & Hansel, 2008). This connection is a key rationale for this paper. Shulman is interested in defining what is distinctive in legal education that develops students' capacity to think like a lawyer. Such "pervasive, routine, and habitual" (Shulman, 2005a, p.22) examples, e.g. engineering's design studio are what he coins 'signature pedagogies'. He distinguishes three dimensions (Shulman, 2005a). Surface structures are the concrete learning and teaching activities; deep structures reflect the set of assumptions on how best knowledge, know-how and skills are imparted; while implicit structures reflect the values and beliefs underpinning the profession.

A wide range of studies have applied Shulman's notion of signature pedagogies to subjects including nursing, social work, political science (Chick et al., 2012); law (Hyland & Kilcommins, 2009); mathematics (Passey, 2012); history (Beck & Eno, 2012). The most pertinent work on engineering signature pedagogies detects six elements of "engineering habits of the mind", including systems-thinking, adapting, problem-finding, creative problem-solving, visualising and improving (Lucas and Hanson, 2006). Management's signature pedagogies are

under-explored: one journal editorial invites readers to consider signature 'habits' (hearts, minds and hands) of management education, noting that integrity (heart) is missing from their curricula (Schmidt-Wilk, 2010).

Further, Shulman himself pointed out that signature pedagogies would require constant reviewing due to technological changes (2005a). And indeed, since introducing signature pedagogies, the digital landscape has significantly altered. Technologies non-existent or in their infancy in 2005, such as social media, mobile and cloud computing are now widespread. Despite this, only a limited number of articles concern themselves with the intersecting domains of technology use and signature pedagogies, and none seems to deal specifically with students' digital capabilities. The only study, which links digital literacy and signature pedagogies, is by Bruce and Casey (2012) who identify enquiry-based learning as a "pedagogical sweet-spot" for developing digital capabilities. Thus, beyond the findings of engineering and management's capabilities, this paper argues that the emerging research process based on the conceptual framework is appropriate to be used with other disciplines.

Research design

Epistemologically, this study draws on pragmatist principles (Dewey, 1938), concerned with what provides the best understanding of the inquiry (Creswell, 2003). This paper focuses on a sub-set of research questions:

1. How are digital capabilities conceptualised in modules of two disciplines (engineering and management)?
   1.1 What digital capabilities are planned by academic staff in intended learning outcomes, teaching and learning activities, and assessment tasks?
   1.2 What are the digital practices of engineers and managers?
2. Can signature digital capabilities of engineering and management be identified? And if yes, what are they?

These research questions lent themselves to a qualitative case study methodology, investigating "a contemporary phenomenon in depth and within its real-life context" (Yin, 2009, p.18), bounding a discipline as the case, and a module (semester-long unit of UK HE curricula) as the unit of analysis. Two cases were chosen to allow for disciplinary comparisons. Four modules were chosen to enable similarities and differences to be observed within each case. Six modules were from UniA for pragmatic reasons, and two from UniB, as it requires programmes to map digital literacy as a graduate attribute. The criteria for choosing these modules were that they should include some digital activity and also preferably some employer engagement, although this latter one was not possible in each case. Lancaster University granted ethical approval for the study in April 2017.

Each unit of analysis drew on various data collection methods, including documentary analysis, interviews with module leaders (engineering/ENG=4, management/MAN=5) and professionals (ENGprof=5, MANprof=6), student focus groups & interviews (ENGstd: 7 student focus groups; MANstd: 5 student interviews +1 focus group). Documentary sources included module and programme documents, subject benchmarks (QAA, 2015b, 2015a); and professional competency frameworks. Analysis comprised identifying DigiCap elements in learning outcomes, teaching activities, assessment tasks, subject benchmarks and professional frameworks.

The case study's proposition was that disciplines differently prioritise, or even conceptualise, their digital capability elements in their curricula. Mapping digital capabilities in engineering and management was based on interview questions derived from the combined conceptual framework (DigiCap and signature pedagogies):

1. Elicit the signature pedagogies of the discipline: 'What are the characteristics of a good X (= discipline) student?' 'What do you think are distinct teaching methods in X?'
2. Explore the way digital technologies have transformed or disrupted the discipline, e.g. 'Can you recall any significant digital development that has transformed or disrupted the field of X in recent years?'
3. Elicit features of digitally capable professionals: 'Can you describe a digitally capable professional in X?'
4. Analyse module outcomes, skills, assessments/criteria and learning/teaching tasks using DigiCap with the associated programme outcomes and subject benchmarks, e.g. 'What tasks or activities have digital aspects in this module/programme?'; 'Do the module's/programme's (formative, summative) assessments contain any digital aspects?'; 'Any digital artefacts produced?'; 'Do the module's/programme's learning outcomes contain or relate to any digital aspects, explicitly/implicitly?'….[see Varga-Atkins, 2018 for the full set of questions]
5. Identify emerging/existing signature digital capabilities, e.g. 'As a result of significant digital developments that have transformed or disrupted your field of X in recent years, what emerging/new digital capabilities do you think your students need to develop?', 'And why/how might these be important in your field?'

Data were thematically analysed via inductive and deductive coding. Findings were presented of the three perspectives (academics/students/professionals) within each of the six DigiCap elements. Framework analysis (Ritchie, 2011) was used to identify which digital capability element(s) were foregrounded, e.g. expressed in assessment criteria or weighting. Lacking space to present the full findings (see Varga-Atkins, 2018), the next section offers a window onto networked learning in two disciplinary contexts, in work and in education.

Findings

This section presents findings that relate to the overall research question, i.e. how digital capabilities are conceptualised in curricula and practised by engineers and managers, mapped to the six DigiCap elements.

Case 1: Engineering

The four units of analysis (modules) were: ENGm1, a third-year module on materials design: student teams 'reverse engineer' a manufactured artefact, e.g. a hedge trimmer, and record their findings in a wiki. ENGm2 is a second-year module on product design: teams write a product specification for a smoothie maker, develop its 3D-CAD design and a design report. ENGm3 is a master's-level engineering management module: students develop a business plan in groups and present their ideas for peer feedback. ENGm4 is a second-year module on product visualisation and simulation techniques: students create/animate a 3D-model of a teaching room.

1. ICT proficiency for engineering students includes basic ICT skills, such as using Microsoft (MS) Office as well as digital applications for project and risk management. Students generally seem to lack know-how in presenting and managing data. Engineers use general ICT skills, IT development, and project and risk management tools. They use MS Office tools and Adobe suite, OneDrive and SharePoint alongside cloud computing facilities and MS Project for resource allocation. An engineering consultant uses data collection devices and software, e.g. thermal imaging cameras, vibration sensors, drones, oscilloscopes, etc.

2. Data literacy - As engineers need to generate, manage and interpret large amounts of data, developing data literacy as a key capability to develop at university. This involves tasks with generating, managing and representing data in experiments and simulations. "I am always surprised about how little [students] have actually used the packages, like [MS] Excel, to present data" (ENG1-Thomas). Both risk analysis and quality improvements are areas where engineers draw on large amounts of data and/or use digital tools.

Info literacy - In engineering education, information literacy comes into focus when engineers need to be aware of the legal and safety requirements as well as the relevant ethical, social, commercial and environmental factors relating to the problem they are solving. Students "have to look at legislation …can you fly a drone anywhere you like? (ENG2-Mike)". Whilst information (and data) literacy appears to be a significant capability in the curriculum, the engineers interviewed discussed it less frequently.

Media literacy - Engineers constantly work with 2D/3D images, animations and simulations when problem-solving or collaborating, which is probably why visual literacy is not explicitly articulated in the curriculum or by engineers. Students display a range of media capabilities. Whilst in some cases students might have no "idea how to lay a poster out to convey the information and what a good poster should look like" (ENG1-Thomas), other assessment tasks or collaborative design projects result in creative digital multimedia outputs.

3. Digital problem-solving - Sub-disciplines use different kinds of software for problem-solving (Becker et al., 2017). A structural engineer, uses REVIT and AutoCAD, an infrastructure engineer uses WaterCAD, StormCAD, Hevacomp (for simulation and energy analysis) and BIM 5D (for modelling). Engineers also use product lifecycle management tools, e.g. SiemensNX. The approach is to give students a sense of the breadth of industry-standard software to prepare them for professional practice. This means that instead of in-depth training in a specific tool, e.g. a 3D-CAD package, students are to acquire the scientific principles underpinning the software, future-proofing them against continuous software updates and institutional/company differences.

4. Digital communication and collaboration - Engineering routinely collaborate in teams, produce and share digital product specifications, presentations, reports, designs and visual artefacts. Digital collaboration capabilities are facilitated by staff, e.g. setting up institutional tools, whilst allowing collaboration to emerge organically according to the teams' preferences. Students use "high street-tech, communication software, and it is just so second nature, we don't even deal with it" (ENG2-Mike). Staff feel that what students need guidance on is group working, intercultural skills and professional communication/ collaboration practices. Engineers consider various factors when choosing communication methods between teams and customers (face-to-face, telephone or digital). These include the size and location of the given company and its sites, the perceived

formality of the conversation, client and team preferences, and intercultural norms. For such synchronous collaborations, Skype, Lync and other platforms, e.g. See-and-Share, a remote image-sharing software is used.

5. Digital learning/development - Students use digital resources (e.g. online resources in the virtual learning environment, YouTube videos, lecture capture, in-class polls, online submission, peer evaluation and note-taking tools). Engineers also use VLEs and online resources for continuing professional development.

6. Digital identity - Engineering students may arrive as 'savvy' social media users, but when it comes to professional use, they need academic guidance (Jones et al., 2010). Most engineers' approach to social media is cautious and critical. LinkedIn was seen as the only acceptable platform: "if you said you want to meet on Facebook, a senior strategist will probably… no longer take you seriously as they did before" (ENG6prof-Paul).

These findings offer a glimpse into engineers' networked learning practices, mirrored in formal HE settings.

Case 2: Management

The four units of analysis (modules) were: MANm1 is a third-year module: students develop an e-business strategy for a real client. MANm2 is a masters-level risk management module: students complete an online simulation game, arranging a relief effort for a hurricane-hit village applying risk theories learnt.MANm3 is a first-year module: groups produce and present a market research report to their real client. MANm4 is a final year module: students evaluate the communications of a public/non-profit-making organisation.

1. ICT proficiency for management students involves mainly MS Office packages. Students are influenced by academics (Beetham, McGill, & Littlejohn, 2009; Jones et al., 2010) in their technology adoption: one student on placement used Slack to keep in touch, as prompted by their lecturer. Managers use chiefly MS Office tools, with some variation of using additional tools. Office365 for collaborative working was not yet widespread at the time of interviews. Organisational practices are the main influencers of managers' technology choice.

2. Data Literacy involves collecting and critically analysing data for problem-solving, and interpretation. Whether it is analysing market research data, organisational budgets or calculating risk probability, students need to draw on qualitative and quantitative data methods. Managers work with data similarly, e.g. with business intelligence tools or data mining software to identify customer behaviour trends. One manager's company generates their own market research, which is faster than buying off-the-shelf market intelligence: "If we're looking at a medical product, we will go and talk to the clinicians who are leaders in their field".

Information Literacy in management involves the resourceful collection of primary or secondary data from a wide range of sources (academic, case-based or online). It includes critical analysis and interpretation for the purpose of decision-making to relevant stakeholders. This features in a number of UniA' graduate attributes for management students under the labels of "self-guided research", critical "analytical skills", "commercial awareness" and "international awareness". Academics and librarians play a large part in educating students: "If the university hadn't told us 'Oh, go use Mintel', I probably would have just gone on Google" (MANstd-Lidia).

Management students' media literacy tends to be limited to creating presentations or documents with diagrams and charts. This is confirmed by a similar finding that 63% of students have minimal/no training in multimedia production (Becker et al., 2017). The critical aspect of media literacy seems well covered in disciplinary tasks.

3. Digital Problem-Solving in management tends to involve working with information and data in digital form, e.g. whether students are given a real-life challenge to find out about a particular market or invent business solutions for an organisation. Their problem-solving skills equate with their ability to source requisite, reliable information. As for managers' digital problem-solving practices: (1) the higher they are on the managerial ladder, the less likely they are to use subject-specific software; (2) their disciplinary background and their company's practices appear to be the two main factors of technology choice; and (3) the degree of digitisation changes from company to company, and, in turn, this impacts managers' digital practices, too.

4. Digital collaboration/communication is less prominent in management than engineering. Even in group tasks, marks tend to be moderated to reflect individual achievement, although "working productively as part of a team" are clearly important. Some academics recommend institutional communication tools. Most module leaders let students make their own choices, with groups opting for WhatsApp, DropBox, Google Docs, etc. Students consider speed, visibility, reaction time, platform dependency, and access, when it comes to choosing communication tools. Managers typically use email, web-conferencing systems (e.g. Skype, WebEx), or other

tools (e.g. Lync or Yammer) to connect with clients and colleagues. Employees in larger companies collaborate via institutional tools, e.g. SharePoint and OneDrive. Rebecca, a self-employed co-owner of a marketing company, communicates with clients via social media: Facebook, Instagram, Twitter and LinkedIn. When choosing collaborative tools, managers are influenced by client preferences and skills, company size, software availability/price, and intercultural considerations. University education, therefore, needs to prepare students, so they can carefully consider their technology choices in different contexts (Remneland-Wikhamn, 2017).

5. Digital learning of management students is similar: they use digital resources (VLE, captured lectures) and digital tools for reading, annotating and note-taking. UniB's smartphone SkillsApp is aimed at strengthening the relationship between their digital capability, confidence and self-efficacy via reflection (Becker et al., 2017). Managers similarly partake in online tutorials and courses run by their organisation.

6. Digital identity is addressed by academics and career advisors educating management students that being able to positively manage their online identity can "make you more employable" (MANstd-Reem). Broadly speaking, management students are present on digital platforms, e.g. Facebook, Instagram and Snapchat, though they tend to keep to private social media spaces for learning (Beetham, McGill, & Littlejohn, 2009). Managers make careful decisions regarding the digital platforms they use, depending on their company type and discipline. LinkedIn is the most significant professional platform both for management students and managers.

Findings show that in engineering, digital problem-solving and collaboration, followed by data/information literacy, seem to be the most key capabilities. In management, data/information literacy, overlapping with problem-solving, and, together with digital content communication, form this discipline's most characteristic capabilities. These emphases are not accidental, but strongly align with the discipline's signature pedagogies.

Discussion: signature digital capabilities

This study set out to explore the nature of disciplinary digital capabilities which enable engineering and management students to transition from education to networked learning communities of their profession, with the expectation that certain capabilities might be more prominent than others. Detected patterns and associations (Ritchie 2011) suggest that disciplinary digital practices align with their signature pedagogies, referred to as 'signature digital capabilities'. These also signal that networked learning varies in different subject contexts.

Engineers' values and attributes are summarised as collaborative problem-solvers who are resilient, creative, and act with integrity. Engineers apply science and mathematics to real-world, open-ended problems in teams, whether economic, social, environmental, or local/global. Dym et al. (2005) identify design thinking and project-based learning as two signature pedagogies in engineering. Another signature pedagogy gets students "thrown into teamwork from day 1" (ENG1-Thomas). The combination of long-term, team-based, open-ended projects is a "mode of teaching …that I don't think you see anywhere else in the university" (ENG2-Mike). Engineering's overarching signature pedagogy is Conceive-Design-Implement-Operate (CDIO); a worldwide educational framework which sets engineering fundamentals in the context of real-world systems and products (Crawley et al., 2014). Accordingly, collaboration, problem-solving and information/data literacy are engineering's most typical digital capability elements.

In contrast, managers analyse/interpret information/data for communication and decision-making. The implicit values and attributes of a good manager are adaptability, resilience, dynamism, cultural/commercial awareness and good networking; with the focus being on individual achievement. The deep structure of management seems to be a combination of a) developing students' understanding of the link between management theory and application, b) their commercial and strategic awareness, and c) a mix of subject-specific and transferable skills. Despite the fact that management is an umbrella term for distinct sub-disciplines, CAIC (Collect-Analyse-Interpret-Communicate) emerged as one of its overarching signature pedagogy (discussed below). Aligned with these disciplinary traits, digitally-capable managers concentrate on information/data literacy, digital problem-solving and communication.

Below, four of these distinct digital practices, or 'signature digital capabilities', are discussed. Simulation and modelling (1); and open-ended collaborative design projects (2) in engineering; and in management, digitally-mediated CAIC (3) and using technologies to connect theory to practice (4).

1) Simulation and modelling have emerged as signature pedagogies in engineering, demonstrating the transformative impact of technology on disciplinary practices (Warren, 2011). Participants emphasised the shifting skill-set from hand-sketching and physical manufacturing to 3D-CAD modelling, simulation as

transformational. Engineers used to build physical prototypes in laboratories to test them under real conditions. Today's engineering students are not "in a workshop using machinery" (ENG1-Thomas), but sitting at computers using highly specialised industry-standard simulation software, applying forces to things to "predict what's going to happen in the real world when you get components" (ENG8prof-Jack). Students learn how to model and test in 3D, use virtual reality, visualisation and simulation tools e.g. Photoshop, CorelDraw Fluent, Pro/Mechanica, Dyna3D, Cobra, Moldflow and 3DS Max. At the same time, they also acquire the underpinning scientific principles, materials and operations. Epistemologically, the virtual 3D-model becomes the "master-model" from which all the analyses derive: "If you looked at the 3D-model of our car, you probably would be quite stunned at the level of detail on it. They have wires, nuts, bolts, everything" (ENG4-Dylan).

2) Open-ended collaborative design projects from day 1 are signature to engineering, e.g. from designing slot cars to humanitarian drones. Relating this to digital capability, HE needs to prepare students to be self-reliant and confident when using unfamiliar technologies. 'Collaborative' refers to the fact that many of these complex, open challenges are the result of a team effort. Findings above have shown the many ways digital collaboration is intrinsic to engineering practice. Academics facilitate the development of such collaborative skills in a digital context either by providing institutional technologies for collaboration, modelling ways of collaboration or letting student groups choose collaboration tools according to their preferences. A typical 'signature' picture would show a team of engineering students huddled around a screen discussing their design components.

3) Digitally-mediated CAIC (Collect-Analyse-Interpret-Communicate) emerged as management's overarching signature digital capability, by MAN1-Sam. It is "us[ing] IT tools and digital media effectively, efficiently and flexibly for the purposes of information gathering, collation and analysis, with appropriate adaptation for the nature of the problem-solving task under consideration" (programme outcome). Digital skills are required in all its stages of this module task: (Collect) students work on searching academic and other literature relating to companies' e-business strategies (using numeric/textual data, information, diagrams, etc.); (Analyse), students critically analyse their data, developing their information, data and media literacy; (Interpret) students identify solutions relating to an e-business strategy through critical analysis; (Communicate), students report their business strategy, integrating diagrams and charts. Identifying this is one contribution of this study.

4) Connecting theory to practice has been identified as another signature pedagogy in management. With respect to signature digital capabilities, technologies, e.g. simulation game or schema-building in spreadsheets, can help students acquire managers' "habits of the mind" (Shulman, 2005a). In MANm2's assessed online simulation game, each student manages a relief effort for a village hit by a hurricane within a limited budget and a finite amount of time by working with the village chief and other stakeholders. While Remneland-Wikhamn critiques university management education in relation to the limited opportunities it offers students to enact management practice (2017), virtual simulation appears to be a perfect vehicle for addressing this critique.

Conclusion

This study's overarching research question was "How are digital capabilities conceptualised in two different disciplines, in engineering and management?" Findings through detailed mapping and analysis of interviews, documentary sources and focus groups highlighted the distinct ways in which the six digital capability elements manifest in engineering and management, in alignment with the professions' signature pedagogies. Digital signature capabilities of engineering and management were also identified.

Implications for teaching practice involves suggesting potentially effective ways of supporting students' transition into professional life in a networked learning context. These include: 1) preparing graduates for being able to problem-solve in different digital contexts, employing their resourcefulness and self-efficacy; 2) immersing students in authentic digital settings and resources; 3) developing students' critical stance on technology use and technology choice; 4) giving students a sense of the breadth of industry-standard software, instead of in-depth training in specific tools, future-proofing them against continuous software updates and institutional/company differences; and, 5) focusing on academic guidance for students' technology use with respect to teamwork, intercultural and professional collaborative practices and preferences.

The theoretical implication of this study is its conceptual framework, which combines DigiCap with the notion of signature pedagogies (Shulman, 2005b). This combined conceptual framework proved insightful and effective for disciplinary mapping of digital capabilities and networked learning in a professional context, as demonstrated by the interview process. The study shows limitations with respect to the range of sub-disciplines, sectors explored, since digital resources and infrastructure vary, even from one organisation to another. Finally,

given that many innovations are interdisciplinary arising from collaborations between different fields (Tsatsou, 2017), further research could explore signature digital capabilities in such interdisciplinary contexts.

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Development of a Pedagogical Design Matrix for ICT-based Boundary Crossing in Dual VET

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Abstract

Research on networked learning is concerned with finding new and productive ways of connecting people and their practice across boundaries in different contexts. Particularly in *dual* Vocational Education and Training (VET), there is a need to focus continuously on learning in and between boundaries of domains, practices and the school-workplace contexts. Information and Communications Technologies (ICTs) have been proposed as artefacts that enable mediation and bridge the gap between different boundaries.

In this paper, we present findings from a research project aimed at understanding Danish VET teachers' use of ICT as boundary objects in relation to boundary crossing activities. In the first phase of the research project, interviewed VET teachers pointed to the need for new materials directed at the planning stage in their work with design for boundary crossing. As part of the research project a pedagogical design framework, including design principles and a design matrix that focuses on boundary crossing mediated by ICT-based boundary objects, was developed and tested. While the research project has been designed as a multiple case study, the development and testing of the design matrix has been inspired by Educational Design Research (McKenny & Reeves, 2013). Theoretically, the research project is founded on a sociocultural perspective with research on boundary work, boundary crossing and boundary objects (Akkerman & Bakker, 2012, 2011a, 2011b) and research on mediating artifacts (Henningsen & Mogensen, 2013) as the backdrop. By way of combining four dialogical boundary crossing activities (identification, coordination, reflection and transformation) with four main affordances (documentation, simulation, construction and interaction) of the ICT-based boundary objects, the pedagogical design matrix was developed and tested in three iterations.

Selected findings show that the participating Danish VET teachers do not fully realize the potentials of using ICT-based boundary objects in their boundary work. Our data show that the VET teachers designed ICT-mediated activities aimed at boundary crossing through identification, coordination and reflection, whereas data point to no activities directed towards transformation. In terms of ICT-based boundary objects, the VET teachers were mainly focused on ICTs that afford documentation with sparse focus on construction and interaction, and no explicit focus on simulation as boundary activity. In the final discussion we point to possible explanations as to why the VET teachers' use of ICT in boundary work is relatively limited and we suggest further research.

Keywords

VET, boundary crossing, boundary objects, ICT, Educational Design Research

Introduction

According to Dohn (2014) *networked learning* is:

> (…) learning in which information and communications technology (ICT) is used to promote connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources; between the diverse contexts in which the learners participate (ibid, p. 30).

This makes networked learning relevant in the Danish Vocational Education and Training (VET) system, given that it is based on a *dual* principle, which means that students alternate between school and workplace periods throughout their education. Making sense and use of learning in and from different contexts and experiencing continuity between school and work has long been considered a major pedagogical challenge in Danish VET research resulting in a continuous focus on the transfer phenomenon. Nonetheless, transfer is a contested concept both in research (Engle, 2012; Hager & Hodkinson, 2009; Lobato, 2006) and among practitioners. In this paper, the concepts of boundaries, boundary crossing and boundary objects are adopted as a way of challenging the traditional notion of transfer understood mainly as a one-time and one-directional transition between a context of acquisition and that of application. Boundaries in education and learning processes are intuitively apprehended as something that needs to be avoided or diminished, but according to research on boundaries and boundary crossing (Bakker & Akkerman, 2017; Tuomi-Gröhn, Engeström & Young, 2003; Wenger, 1998), this may not be the best approach. In fact, Wenger-Trayner & Wenger-Trayner claim that:

> Rather than hindering boundaries under an illusion of seamless applicability across contexts, it is better to focus on boundaries as learning assets (Wenger-Trayner & Wenger-Trayner, 2015, p. 18).

As stated by several authors (Motta, Cattaneo & Gurtner, 2014; Nortvig & Eriksen, 2013; Wals, Lans, & Kupper, 2012), ICT can be used to bring about some of the learning potentials in and between domains, practices, and contexts in dual education. However, in Danish VET research knowledge of pedagogical use of ICT is highly limited (Ørngreen, Henningsen & Louw, 2016). To remedy this lack of knowledge, a research project investigating Danish VET teachers' understanding and use of ICT-based boundary objects in boundary crossing activities was conducted between 2015-2018.

In this paper, we present selected findings from the research project. In the first phase of the research project, interviewed VET teachers pointed to the need for new materials directed at the planning stage in their work with design for boundary crossing (Riis et. al., 2016). As part of the project a design framework, including design principles and a design matrix that focuses on boundary crossing mediated by ICT-based boundary objects, was developed and tested. Here, we focus on the development of the pedagogical design matrix, convey main findings regarding the development and usefulness of the matrix, and point to further research.

Research design, methods and main questions

The research project has been designed as a multiple case study (Yin, 2009) with the involvement of nine VET schools and two workplaces. In different phases of the project, we conducted 20 interviews (35 VET teachers, students, trainers) and 30 hours of classroom observations as primary methods to generate and collect data. Furthermore, the study was inspired by Educational Design Research (McKenny & Reeves, 2013) in so far as the design framework and the design matrix was developed, tested and refined in three iterative cycles. However, even though the goal of the study was focused on the development of theory and a design framework, the research project did not provide the opportunity to conduct experiments in the participating VET schools or workplaces. Instead the design matrix was tested in workshops and in teaching sessions, predominantly involving in-service VET teachers, and we are still in the process of finalizing the design principles and additional materials. While students, trainers, pedagogical leaders and consultants have participated in different phases of the project, the VET teachers are the main target group of the project. Table 1 below shows the connection between the two main research questions, methods and the expected outcome.

Research question	Methods	Expected outcome
RQ1: In what ways and why do VET teachers use ICT-based artefacts as boundary objects to design for boundary crossing and	Interviews and classroom observations	New knowledge of how VET teachers understand and use ICT in relation to boundary work and design for boundary crossing.

continuity in and across different contexts?		
RQ2: What pedagogical recommendations and materials can support VET teachers' future work with establishing enhanced school-workplace interaction through the use of ICT?	Design iterations tested among in-service VET teachers in workshops and teaching sessions.	A design framework consisting of design principles, a design model/matrix and additional scaffolding materials.

Table 1. Connection between research questions, methods and expected outcome.

Boundary crossing and boundary objects as theoretical backdrop

The research project is based on a sociocultural understanding of knowledge, skills and practice requiring a sensitivity towards participation in boundary contexts. Based on a review of 187 educational studies, Akkerman & Bakker (2011a) contend:

> All learning involves boundaries. Whether we speak of learning as the change from novice to expert in a particular domain or as the development from legitimate peripheral participation to being a full member of a particular community (Lave & Wenger, 1991), the boundary of the domain or community is constitutive of what counts as expertise or as central participation (ibid, p. 132).

Akkerman & Bakker define a boundary as 'a sociocultural difference leading to discontinuity in action or interaction' (ibid., p. 133) with discontinuity indicating actions or interactions that do not result in the intended or desired progress or when they require substantial effort. One typical boundary in dual VET, is the difference in epistemic cultures, and thus practices and possibilities for participation, in and between the school and the workplace. Although Akkerman & Bakker (2012) assert that boundaries can function as learning resources, the authors also emphasize that intersecting sociocultural practices do not per se lead to boundary crossing but rather necessitates deliberate pedagogical design in order to reach the full potentials of dual education.

Inspired by Star & Griesemer (1989), Akkerman & Bakker suggest the use of boundary objects as a means to facilitate boundary crossing. Boundary objects are 'artefacts doing the crossing by fulfilling a bridging function' (Akkerman & Bakker, 2011a, p.133). While Akkerman & Bakker are not particularly focused on the use of ICTs as boundary objects, Heilesen, Mogensen and Gleerup (2012) found that ICT can extend formal learning into the workplace during apprenticeship periods. According to the authors, this will lead to empowerment of apprentices and give the learners a more active and responsible role in their learning. Correspondingly, Nortvig & Eriksen (2013) state that new and easily accessible technologies provide opportunities for construction of a third, intermediary space of learning and integration of theory and practice, thus pointing to a boundary crossing potential.

Akkerman & Bakker (2011b) have identified four learning mechanisms or processes that potentially occur in and between the boundaries of sociocultural systems, namely:

1. **Identification**: Boundary crossing can lead to the identification of the intersecting practices, whereby the nature of practices is (re)defined in light of one another.
2. **Coordination**: Boundary crossing can also lead to processes of coordination of both practices in the sense that minimal routinized exchanges between practices are established, to make transitions smoother.
3. **Reflection**: Reflection is a more profound effect of boundary crossing. It is about learning to look differently at one practice by taking on the perspective of the other practice.

4. **Transformation**: In the case of transformation boundary crossing leads to changes in practices or even the creation of a new in-between practice, for example a boundary practice. (Akkerman & Bakker, 2011b, s. 3)

Central to these learning processes is a dialogical demand, which necessitates scaffolding from either the VET teacher in the school periods or the VET trainer in the workplace periods, preferably both in collaboration. Given that research shows that Danish VET students more often than not are expected to cross the boundaries in and between school and work on their own, potentially leading to confusion, lack of meaning and coherence and general dissatisfaction, this dialogical and collaborative demand is important.

Akkerman & Bakker primarily focus on the processes of boundary crossing. With regard to boundary objects we have been inspired by Henningsen & Mogensen (2013) who, based on research in dual education, propose the use of different types of mediating artifacts in boundary work. Such mediating artifacts have the capability of mediating the development and transformation of knowledge and skills, and Henningsen & Mortensen identify four main types of artifacts aimed at interaction, reflection, construction and simulation (ibid. p. 109). We understand these four action possibilities as inherent properties/affordances of different artifacts, e.g. ICTs.

Selected findings related to the design process

As previously mentioned, in the initial phase of the research project, VET teachers pointed to the need for new materials to guide them in the *planning* of their pedagogical designs for boundary crossing. In line with foundations in sociocultural theories, such as boundary crossing theory, the VET teachers called for a focus directed at *activities* undertaken by the learners. By way of combining ideas from Akkerman & Bakker and Henningsen & Mogensen, we created a model focusing on boundary crossing mediated by ICT-based boundary objects, which has been refined through three iterations so far. In all three iterations, the model has been tested by different practitioners (mainly VET teachers). It is beyond the scope of this paper to present the full design process, but the following account provides the reader with an impression of the type of reflections the iterations resulted in and how we tried to accommodate suggestions from the practitioners who were involved in the process.

From the conception, the design model was intended as a pedagogical tool for the VET teachers *to use in their planning and subsequently evaluation* of designs for boundary crossing. The first iteration of the model (figure 1), depicted the four boundary crossing processes combined with four main affordances related to the boundary objects. Based on initial research and testing of ideas in teaching sessions, we decided to revise and reduce Henningsen & Mogensen's (2013) original suggestions and ended up with highlighting the following dominant affordances of the ICT-based boundary objects:

- **Documentation** – incl. potential processes of collecting, classification and archiving
- **Simulation** – incl. potential processes of imitating, testing and experimenting
- **Construction** – incl. potential processes of imagining, generating and creating
- **Interaction** – incl. potential processes of mutual affecting, dialogue and co-creating
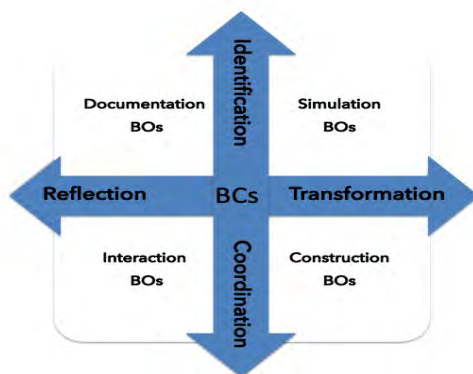
Figure 1. The first iteration of the design model.

This iteration of the model was tested in two workshops; 1) a workshop with 16 in-service VET teachers enrolled in a further education program, where two of the authors were teaching, and 2) a workshop with approx. 40 participants from the VET sector (mainly pedagogical leaders and pedagogical consultants from VET schools). During the workshops, the participants were, among other things, asked to discuss and decide where in the model different ICTs (of their own choosing) could be placed and why, and this resulted in the suggestions shown in figure 2 below.
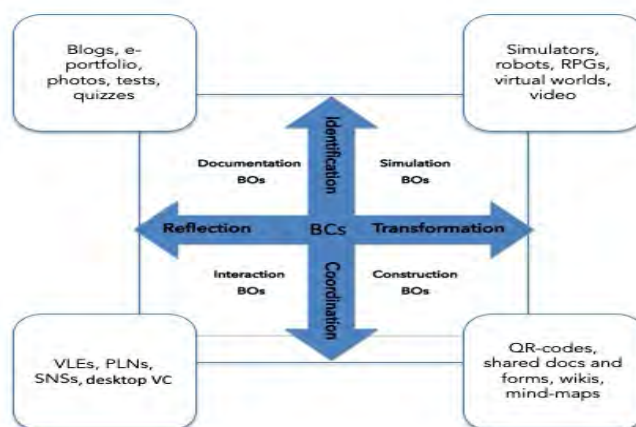
Figure 2. The first iteration of the design model with examples of ICTs.

As seen in figure 2, the workshop participants pointed to many different types of ICTs. Nonetheless, even though the participants found the model useful as a 'planning tool', which could trigger reflections on different ICTs and their relation to boundary crossing processes, the model was conceived as misleading. This first iteration seemed to indicate that the ICT-based boundary objects only were related to two of the four processes. Further, many of the mentioned ICTs are complex technologies with more than one affordance, and while the participants decided the position of the ICTs based on perceived *main* affordance, this was unsatisfactory. As the participants stated, often they would choose a specific ICT precisely because of its *various* affordances. Thus, the participants called for a different type of model, which could encompass such considerations.

Based on these experiences, we developed a second iteration of the model, which as it turned out still did not meet the expectations or needs of the VET teachers. The testing of the second iteration pointed to a fundamental challenge in using the model, which led us to conclude that a narrow focus on boundary processes and affordances was insufficient in the teachers' planning processes. Testing in this phase, showed that the VET teachers often neglected to consider other crucial elements in design for boundary crossing such as the purpose of the activity, the learners' (and teachers') prerequisites, the curricular content etc. In other words, there was a need to complement the model with additional pedagogical design questions for the VET teachers to consider,

when using the model. In the third iteration, the model was changed to a matrix, which illustrates the many ways it is possible to combine the boundary crossing processes with different affordances of the boundary objects.

In the final data collection phase of the project we decided to interview 14 VET teachers focusing on their use of ICT, and in our analyses, *we* used the pedagogical design matrix to map our findings. In figure 3 the pedagogical design matrix is depicted with examples of the different ICTs as they were discussed in the interviews. With regard to the elements in the design matrix, our data show that the VET teachers designed ICT-mediated activities aimed at boundary crossing through identification, coordination and reflection, whereas data point to no activities directed towards transformation. In terms of ICT-based boundary objects, the VET teachers were mainly focused on ICTs that afford documentation with only little focus on construction and interaction. Among the interviewed VET teachers, the rare mentions of simulation were in connection to the use of physical simulation dolls and the use of a flight simulator, which was used as a training object, and not as an intentional boundary object.

	ICT-based Boundary Objects - Based on dominant affordances			
ICT-based Boundary Crossings *–Based on dialogical learning mechanisms*	**Documentation** (collecting, classification, archiving)	**Simulation** (imitating, testing, experimenting)	**Construction** (imagining, generating, creating)	**Interaction** (mutual affecting, dialogue, co-creating)
Identification - Othering - Legitimating coexistence	Video OneNote		Video Thinglink	Facebook Google+
Coordination - Communicative connection - Efforts of translation - Routinization	Facebook Google+ Elevplan ItsLearning OneNote		Video Thinglink OneNote	Facebook Google+ OneNote
Reflection - Perspective making - Perspective taking	Facebook Google+ Elevplan ItsLearning OneNote		Video Thinglink OneNote	Facebook Google+ OneNote
Transformation - Hybridization - Crystallization - Continous joint boundary work				

Figure 3. Third iteration: the pedagogical design matrix.

Overall our data show that the interviewed VET teachers did not recognize the full potentials of ICT in relation to boundary crossing activities. In general, our study shows that VET teachers employ different pedagogical strategies for integrating ICT in their teaching practices, e.g. enhancing student activity or accommodating students' prerequisites through multimodal approaches, but that the use of ICT in relation to boundary crossing activities is limited.

Discussion

For us as researchers, the pedagogical design matrix was useful in terms of mapping existing use of ICT-based boundary objects related to specific boundary crossing processes. However, in order to better understand *why and how* VET teachers use ICT in boundary work, the matrix was insufficient pointing to a need for a more elaborate framework, if such questions were to be uncovered solely through design analyses.

For the VET teachers, the use of the matrix as pedagogical design tool also pointed to the need for at more elaborate framework and thus further iterations. Looking back at the many different types of ICTs, and combinations with boundary crossing processes, the participants pointed to in the two initial workshops, the findings in the final interviews seemed relatively sparse with regards to diversity and use of ICTs in practice. The data show that the VET teachers used a variety of ICTs, often these were, however, not used as *intentional* boundary objects.

For all the interviewed VET teachers, the theory of boundary crossing and boundary objects was new, and even if they were thinking in lines of designing for connections and transformation of knowledge and skills, they were

accustomed to think about traditional transfer, mainly focusing on creating similarities and reducing differences. Considering boundaries as 'learning assets' (cf. Wenger-Trayner & Wenger-Trayner, 2015), was quite new to most of the teachers. Among the four boundary crossing processes, reflection was the most recognized and used.

In relation to the boundary objects, perhaps the VET teachers did not acknowledge the affordances of the ICTs and thus found it difficult to envision the use of the ICTs in relation to the four boundary crossing processes. Some affordances are complex and need to be learned, in particular when combined with the boundary crossing processes. Throughout the project, most of the VET teachers expressed the need to know more about ICT and more precisely how different types of ICT can afford different types of action possibilities and how they can be combined with the four boundary crossing processes. This points to a general need of enhancing in-service VET teachers' *pedagogical imagination,* which would require additional research.

Finally, in this project focus has been on what we would term 'pedagogical' ICT. Our data also reveal that VET teachers use a variety of subject matter related ICT and not least ICT directly related to the vocations of the different VET educations. In summary, a fair account of VET teachers' understanding and use of ICT-based boundary objects in boundary processes, should also include such types of ICT, which also would demand further research.

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Global learning through the lens of criminal justice

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Abstract

My research involves piloting a networked learning pedagogy, Collaborative Online International Learning (COIL), in an introductory criminal justice course at an urban U.S. community college. COIL involves the collaboration of professors from universities in different countries in creating assignments and projects, which their students collaboratively undertake. The networked learning values that are manifest in COIL are collaboration, group work, discussion, student ownership of learning, and navigating difference. I am partnering with a professor teaching an international criminal justice course at a university in The Hague. Through three assignments, we aim to develop student global learning competencies and increase student awareness of the existence of different criminal justice systems in the world. We are exploring certain aspects of global learning, including global self-awareness, perspective-taking and understanding cultural diversity. The students use "WhatsApp" and Skype technology to collaborate and the technology used to showcase the student work is Padlet, an online virtual bulletin board designed for students and teachers to collaborate and reflect and share videos, photographs, and written material. I will conduct assessment of my students' development of global knowledge and cognizance of diverse criminal justice systems using a qualitative methodology, administering pre and post-COIL reflective surveys. Data collected in the pre-COIL survey will be compared with the post-COIL survey and analysed using the American Association of Colleges and Universities' Value Rubric for Global Learning. The pre-COIL questions are designed to explore student expectations of the COIL assignments and collaboration with peers in a university class outside of the United States; and student awareness of differences in how criminal matters are handled and judges in other countries. Student responses will establish the foundation upon which to assess growth and transformation over the course of the semester for the students themselves and the professor. The post-COIL questions are designed to facilitate reflection of discoveries that students make about themselves and about the students abroad and the influence of cultural background on their interaction. Additional questions aim to explore differences and similarities in how students in the U.S. and abroad define justice and how it is applied in different jurisdictions.

Keywords

Introduction

I teach at an urban community college in the South Bronx. The students at the college, part of the City University of New York system, are largely members of the Latino and African American communities who live in some of the most economically deprived neighbourhoods in New York City. They possess a multitude of barriers to success in college and employment in mainstream professions. Facilitation of my students' global learning has become imperative as the internationalization of society accelerates and the communities where my students live remain insular (Allen & Turner, 2012; Mejia & Goshue, 2017).

Previous Related Studies

Previous studies that I conducted of students who participated in service learning in immigration and family law paralegal courses revealed that reflection of the service provided students with increased intercultural competencies. Students in those studies provided assistance at a naturalization assistance event where the clients served were mostly Latino. At the family courts, which serve clients who are unrepresented and in the lowest socioeconomic strata of New York City, students handled abuse/neglect and paternity petitions for mostly African Americans community members. Although the Latino and African American communities in the U.S.

share historical resentment generated by social and economic factors, through their respective service experience, students developed the ability to challenge prejudices and develop empathy for each other's community (Ramson, 2013; Ramson, 2014). I am currently researching another strategy, which exposes students to multicultural peers in another country in an effort to expand students' intercultural competencies to global competencies.

Aims and Objectives

This article discusses my current research, which involves piloting a networked learning method, Collaborative Online International Learning (COIL), in an introductory criminal justice course of 28 students. COIL is a recent, innovative pedagogy, which involves the collaboration of professors from universities in different countries in creating assignments and projects, which students from both universities collaboratively undertake (American Council on Education, 2016). The networked learning values that are manifest in COIL are collaboration, group work, discussion, student ownership of learning and navigating difference (Hodgson, McConnell, & Dirckinck-Holmfeld, 2012, p. 295). I am partnering with a professor (I.D.) who is teaching an international criminal justice course at a university in The Hague. Through three assignments, we aim to develop the student's global learning competencies and increase their awareness of the existence of different criminal justice systems in the world. Professor I.D. and I will link our courses and move from the pilot stage in the Fall 2020 semester.

Design

Professor I.D. and I began communicating in January 2019 in preparation for our COIL initiative. We emailed and Skyped numerous times in order to collaboratively formulate three preliminary assignments. Both faculty and students engage in collaboration throughout the initiative. Collaboration produces results, which are more profound than those of teamwork because of the intertwining of ideas, which occur as a consequence of exchanging viewpoints and compromising rather than merely the sharing of ideas (Ingram and Hathorn, 2004). We continued our communication regularly throughout the Fall 2019 semester in order to hone and adapt our assignments to our current students and unforeseen circumstances (Labi, 2011). This exercise forced us to reflect on and articulate our respective teaching styles and how we were going to "flip the classroom" where we were no longer the expert but rather the facilitator of student knowledge and skills (Hodgson, McConnell, & Dirckinck-Holmfeld, 2012, p. 296). We had to agree on ministerial matters such as deadlines and how to address problems as well as substantive ones such as student learning outcomes and course assessment. We had to prepare the students to work collaboratively and to engage in cross-cultural communication. Moreover, we had to infuse the students with the confidence to take the risk of doing something new and uncharted (Wiske, Franz, & Breit, 2005). In order for the online environment to be truly collaborative, we designed the assignments so that students had the ability to question, discuss and debate with other. Since the COIL collaboration for students was layered, the students developed collaboration skills with their class team members first, via text and e-mail, in creating unified answers to the assignment questions before collaborating with students in another country. I prepared the Hostos students for cross-cultural communication in this same fashion. In class group and Blackboard group discussion board fora, students discussed the definition of culture, their self-identified cultural identities and the negative impact of generalizations. I set up a cross-cultural simulation exercise in three parts involving the student members of the Latino and African-American community groups, who comprise the student population. Students learned about the norms, traditions, and language of the community that was not their own; observed a role play of a normal familial situation; and actively engaged in the role play of the other culture (Kratzke, C., & Bertolo, M. 2013). The next layer of collaboration between the Hostos and The Hague teams occurred using the "WhatsApp" messaging app because of its ubiquity, its familiarity to students, and its free cost. The technology used to showcase student work was "Padlet", an online virtual "bulletin board" designed for students and teachers to collaborate and reflect and share, videos, photographs, and written material. The professors divided the board into 6 spaces, each with a descriptive heading. In the first space entitled, "Welcome to this COIL course", the professors posted videos and photographs of our respective college and class, which serve as context for students to understand the academic environment of students in the partner college. In the second space entitled "Course Information", we posted a written blueprint of the initiative and the three assignments, including instructions and grading policy. Under "Assignment 1: Icebreaker", each student will post a video describing him/herself, why he/she chose to study criminal justice; and identifying a behaviour in his/her respective neighbourhood that should be a crime. Viewing and hearing each other on video, enables students to familiarize themselves not only with the students abroad, but also with their own classmates, which will start to build social connections. The behaviour that the student identifies as criminal can provide a window into the student's values and into the subtle characteristics of the student's living environment. It could

highlight cultural differences or similarities, for example if a behaviour is antisocial in one country and not in another or is unacceptable in both. For the second and third assignments, students will be placed in small groups of two or three students from each class to collaborate on more substantive assignments. This vehicle will deepen the connections between students since most college age students are comfortable establishing and maintaining intimacy through virtual relationships (Guizzardi, 2013). Focusing on a task at hand should obviate any potential awkwardness that the students may experience. The second assignment is a comparative analysis of the proceedings that students will view on trips to the courts, i.e., the Bronx Criminal court for students in the U.S. and the International Criminal Court for students in the Hague. The third assignment asks students to critique the roles that the prosecutor and defence attorneys play in case studies of trial proceedings in a New York State Court and the International Criminal Court and a discussion about justice in each criminal justice system. The students will record the discussion among the group members in assignment 3 and will discuss whether justice was achieved in either trial.

Methodology

The professors will assess their respective students. I will assess my students' level of global knowledge and cognizance of diverse criminal justice systems using a qualitative methodology, through pre-COIL and post-COIL reflective surveys (Cooper & Niu, 2010). Data collected in the pre-COIL survey will be compared with the post-COIL survey and analysed using the Association of American Colleges and Universities (AAC&U) value rubric for global learning (Association of American Colleges and Universities, 2014). The pre-COIL questions are designed to explore the students' expectations of the COIL assignments and collaboration with peers in a university class outside of the United States; cultural awareness of themselves at the commencement of the project; and awareness of differences in how criminal matters are handled and judged in other countries. Student responses will establish the foundation upon which to assess discovery and transformation over the course of the semester for the students themselves and the professor. The post-COIL questions are designed to facilitate reflection of discoveries about attitudes that students have about themselves and about the students abroad and the influence of cultural background on their interaction. Additional questions aim to explore differences and similarities in how students in the US and abroad define justice and how it is applied in other jurisdictions. According to Hatcher and Bringle (1997), reflection will assist students in relating what was learned through their discussions to the larger issues of justice in the world outside. The global learning categories examined will be global self-awareness, perspective taking, and cultural diversity, and understanding global systems which are measured by four levels, benchmark, two milestone levels and capstone (Johansen & Ornelas, 2012.).

Areas for improvement and future assessment

Even though we have not completed the pilot COIL initiative, I have noted areas in which I can make improvements. I will provide more background information to the Hostos students about the culture of the students in the Netherlands and spend more time explaining the assignments at the beginning of the semester. During the Fall 2020 semester, I will teach two sections of Introduction to Criminal Justice and I will participate in a COIL partnership in one of the sections. I will conduct quantitative assessment to determine if retention, a chronic problem for community colleges, can be increased if students engage in COIL activities (Oberhelman & Dunn, 2019).

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Biography

Amy Ramson is a Professor at Hostos Community College (CUNY) in the Bronx, New York where she has taught in the Public Policy and Law Unit since 1990. She is an attorney licensed to practice in New York State and Georgia since 1983 and 1987, respectively and practices part-time in the areas of immigration and international law. She has practiced at large and boutique law firms in New York City and at an international law firm in Geneva. Her areas of academic research are sexual harassment education, instructional technology, service learning and cybersecurity. Most recently, she is a founding member of the Hostos service-learning committee and has written an editor's choice article on sexual harassment. Her peer-reviewed manuscripts and numerous domestic and international conference presentations have focused on the benefits and assessment of service learning, e-portfolios, and online teaching. She serves as chair of her campus subcommittee on collaborative online international learning (COIL) and as the campus representative to the CUNY-wide COIL working group. She piloted COIL in Fall 2019.

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Educational materials as collaborative design space?

Teachers' remix practices through designing, sharing, redesigning and resharing materials in CourseBuilder

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Abstract

The study presented constitutes the first step in a research project aiming at gaining more insight into the processes of creating educational materials through a collaborative design space. Additionally, it focuses on the possibilities of and challenges involved in creating valuable and meaningful educational materials drawing on teachers' remix practices. The purpose of the study is to investigate how teachers' collaborative interaction with educational tools may influence ongoing improvement of the courses and materials included in design of contextualized learning paths.

By taking our point of departure in existing theories and knowledge, we designed a triangulated methodology using a combination of questionnaires, interviews and user behaviour data focusing on the use of the CourseBuilder as a collaborative space. The article focuses on the possibilities and barriers of developing a collaborative design space that enables a (re)design of digital educational materials which looks at teachers' interest in: 1) designing their own teaching materials, 2) working professionally with the redesign and remixing of materials from many different sources, and 3) adapting them to the many contexts in which materials of this type are included.

This article should be seen as a step towards a deeper understanding of opportunities and challenges within teachers' cooperation on designing, sharing, redesigning and resharing teaching materials. It shows that there is a high degree of acceptance of digital teaching materials among teachers of upper secondary schools in Denmark. Furthermore, there seems to be a collaborative culture, where the majority of teachers indicate that they already collaborate professionally regarding course planning and they see advantages connected with these practises.

In prior research, factors promoting the adaptation of virtual collaboration are mentioned. These include teachers' digital skills, professional development through courses, allocated time and integration of tools that allow teachers to enter into re-design networks with colleagues. All the institutions participating in our study show a supportive environment regarding the use of CourseBuilder. However, several factors were identified indicating that CourseBuilder is not the ideal version of a design collaborator. Although the necessary factors for a successful collaborative environment are present, somehow there seems to be a missing link in the fulfilment of CourseBuilder as collaborative design space. Put differently, there are collaborative supportive environments at the specific institutions - but the *productive remix practices* are not facilitated by CourseBuilder, despite the design intentions and layout.

Keywords (3-5 keywords)

collaborative design, teacher collaboration, cocreated materials, remix practices, design collaboratorium

Introduction

Research within professional teacher development shows that teacher collaboration concerning the development of educational materials in groups or networks - through processes of designing, sharing, redesigning and resharing - shares many of the same potentials and benefits as collaborative learning processes (Voogt et al., 2011). One way to create opportunities and frameworks for teachers in order to increase the benefits of collaborative and network learning is in the form of collaborative (re)design of educational materials (Dohn et

al, 2020; Voogt et al, 2011; Handelzalts 2009; Simmie 2007). Through what we call *teachers' remix practices*, teachers design, share, redesign and/or reshare educational materials.

Within collaborative design spaces this is primarily done in face to face collaboration or based on internal sharing of local materials within a teacher collective - sometimes supported by experts such as educational designers, technologists or researchers. By (re)designing educational materials in collaborative design spaces teachers are provided with opportunities 1) to shape their own teaching practices through designing and redesigning educational materials, 2) for professional development and reflection through engagement in collaboration and remix practices, and 3) the production of reflective, meaningful and valid educational materials through designing and redesigning them to fit different educational contexts in the form of iterative collaborative design processes (Voogt et al, 2011; Penuel et al, 2007; Borko, 2004; Parke & Coble, 1997; Clandinin & Connelly 1992). However, according to Conole & Fill:

> Research to date shows that it is difficult to encourage authentic virtual learning or collaboration; discussion board use, for example, often shows a pattern of peak use directly related to teacher intervention or responses to particular 'hot' topics. Collaborative group work needs to bare carefully set up and orchestrated to achieve desired results [...] Integrated learning environments are still predominantly used as shells for displaying web pages and rarely get beyond basic information, dissemination and administration (Conole & Fill, 2005, unpaged).

A primary reason for this is the lack of necessary e-learning skills (Conole & Dyke, 2004), inadequate support and training (Oliver et al., 2002), no easy-to use tool-kits, guidelines and frameworks, and the absence of methods for understanding, unpacking and repurposing existing technology-enhanced educational materials (Conole & Fill, 2005). The availability of the above-mentioned factors also provide teacher with the opportunity to integrate learning activities that effectively utilise technology-enhanced learning materials that are shared, adopted and adapted. Ten years later, however, Kali, McKenny & Sagy (2015) still call for more knowledge on and experience with how teachers can be supported in sharing, designing, and collaborating around educational materials in ways that make these materials better through teacher involvement:

> While the benefits of teacher involvement in designing technology enhanced learning are acknowledged in the literature, far less is known about shaping that involvement to yield those benefits. Research is needed to understand how teachers learn through design; how teacher design activities may be supported; and how teacher involvement in design in various ways impact the quality of the artefacts created, their implementation, and ultimately, student learning. (Kali, McKenny & Sagy, 2015, p. 173).

To pursue these ambitions, we investigate *how teachers' collaborative interaction with educational tools may form a part of the ongoing improvement of courses and materials included in their design of contextualised learning paths.*

For this purpose, teachers' use of the Systime CourseBuilder was selected as a single case study. The CourseBuilder – is a novel digital tool and framework for designing, sharing, redesigning and resharing educational materials (see presentation of CourseBuilder below). If collaborative interaction is in fact not taking place, what might be potential reasons for this that could serve as the outset for new design moves and research activities?

Users' interaction with CourseBuilder has been analysed based on the following research questions:
1) How is collaboration in learning networks included in the functionality?
2) To what extent do teachers use CourseBuilder as a collaborative design space?

In the context of Design Based Research, educational product development serves as a case of that which is being both researched and developed. Research and design knowledge may contribute to both product improvement and knowledge production simultaneously. McKenney & Reeves (2019, p.83) have developed a model for design research in education that explicitly integrates research activities and design moves by connecting research and design practice.
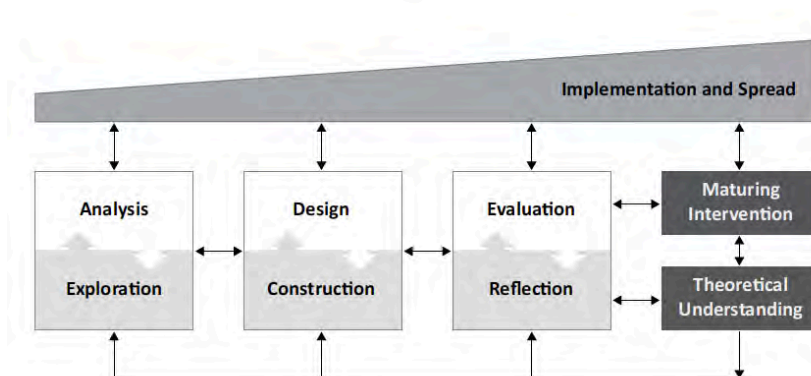
Figure 1: McKenney & Reeves' (2019) model for design research in education

The squares in the model represent the three phases of research and development activities, whereas the rectangles represent the two main outputs of the design based research process. Finally, the triangle represents the interaction with practice that increases over time through research activities and design moves. The present article engages the above challenge through *analysis* and *exploration*, as it is located in the first phase of a three-year project focusing on educational materials as collaborative design spaces.

Kali, McKenny & Sagy (2015) summarise knowledge in this area by emphasising three main areas which show potential for achieving this goal. The first area provides teachers with the tools and resources to become re-designers or co-designers of technology enhanced educational materials. The second area opens up technology enhanced educational materials to re-design and co-design and to increase teacher ownership, practicality and commitment of implementation. Finally, the third area provides teachers with support in the form of courses, competencies and professional development in teams so they can gain the knowledge to structure re-design and co-design processes with the tools provided to them (Kali, McKenny & Sagy, 2015, p. 174). The support mechanisms include collaborative work and work planning, facilitating team meetings or courses, and/or structuring tasks through templates or pre-selected source materials (Huizinga et al., 2014). Given that these areas are provided, will the goal now five years on be achieved?

Collaborative design of educational materials amongst teachers

According to Goodyear (2015), teachers' design practice is part of what he calls *pre-active teaching*; a distinctive planning mode of thought, tools and methods put into action to create designable things or design components e.g. educational materials. The most beneficial outcome often concerns the selection of existing materials and their configuration into new assemblages (Goodyear, 2015, p. 32). Thus, teachers' design of educational materials can be seen as a 'self-directed journeying through a pre-existing landscape' (Goodyear, 2015, p. 34):

> In recent times, this process of consumers or end-users [or teachers] taking over, reconfiguring, adapting, personalising and embellishing designed products [or educational materials] has been given a wider recognition in the design community - there is now a strong sense of co-production or co-configuration , with a concomitant sense of design as being fundamentally s communicative process (Goodyear, 2015, p. 36).

This process is precisely the central premise of one of the core Scandinavian design traditions: participatory design – to get people involved in design processes which concern them as well as give them the ability to impact and shape the future uses of what is designed (Jalowski et. al., 2019; Knutsen & Ramberg, 2018; Bannon & Ehn, 2013; Muller, 2003). The teacher as a designer of educational materials in participatory design focuses on collaborative technological development (co-operative design practices). The focus of the educational design is on democratisation, discussions of values in design and the co-development of organisations, resources and work places (Gregory, 2003). It is important to note that teachers should not *become* professional designers, but, rather, develop designer-like competencies which allow them to collaborate on, co-construct and take control of the educational materials they use in their teaching. The functioning of teachers' collaborative design space may be explained through the concept of *design collaboratorium* (Buur & Bødker, 2000). According to Buur & Bødker design collaboratoriums:

are supporting collaboration between a variety of persons, groups and competencies in the design process. The voices of the users [teachers] are represented in this, either through actual participation of users or through previous work in the users' sites. It is important for the design collaboratorium that it supports joint action through access to prototypes and other tangible means of "doing" [educational materials] (Buur & Bødker, 2000, p. 302)

Building on the work of Buur & Bødker (2000) and Bødker & Buur (2002), CourseBuilder may be characterised as an online design collaboratorium supporting teachers' collaboration on and remix of educational materials. Buur and Bødker see the design space as a semi-permanent room which exists throughout a project's lifespan. However, the design space can be re-configured and moved to new projects/sites over time (Buur & Bødker, 2000, p. 302). Simultaneously, the design space accumulates teachers' design knowledge over time as they design, share, redesign and reshare educational materials. Thus, the design collaboratorium reflects the history of the projects and materials. In this context, the collaboratorium functions as a room where teachers can find each other and themselves 'at home' together in the design process of developing educational materials. However, such spaces are not enough in themselves. Teachers also need to organise and carry out a series of design activities or *productive remix practices* that move the educational material through a series of 'design moves' of design, sharing, redesign, resharing.

In Knutsen & Ramberg (2018), teachers themselves point towards 4 central obstacles that prevent the collaborative design space from happening: 1) The need for courses, training and knowledge sharing, 2) The need to dedicate time, resources and personnel 3) The need to develop frameworks, constraints and processes for the use of technology, and finally, 4) The need to take care of and support practical and technical issues related to the use of technology (Knutsen & Ramberg, 2018, unpaged). Among the four obstacles, number 2 is considered to be the most important. These circumstances are also highlighted in Tremblay (2018) and her studies on teachers' networked learning and collaboration in communities of practice.

In relation to the above, Voogt et al.'s review of research on teacher design teams and collaborative curriculum design prompts them to make the following four recommendations: 1) Collaborative teacher design teams should not solely focus on creating materials together (design), but also on testing them and integrating the results in the educational materials (redesign), 2) Participation in collaborative design spaces is important for teachers to develop reflective educational materials and professional development, 3) This, preferably, requires external facilitation and professional resources and tools, and 4) Clarity within the teacher design teams and in the collaborative design space regarding the goals and design tasks is crucial. Here existing materials (sharing) can serve as concrete artefacts for understanding the tasks at hand (designing) (Voogt et al, 2011, p. 1243).

Goodyear (2015), however, argues that the greatest obstacle may actually be the teachers themselves as they have been 'notoriously reluctant to use other teachers' educational products' (Goodyear, 2015, p. 43). In Judy et al.'s (2018) study of teachers' participation in online knowledge construction in networked learning communities it was evident that the majority of online knowledge constructions were at the level of sharing and comparing information. There was extensive sharing of resources and artefacts and some affirmation of forum posts. However, there was limited interaction that built on the sharing of resources or that led to higher levels of knowledge construction (Judy et al., 2018, p. 376). Thus, Goodyear's and Judy et al.'s research show that another central challenge for creating a collaborative design space is to move teachers' participation beyond the first level of sharing and comparing educational materials and towards higher levels of joint knowledge construction, collaborative inquiry and a culture of designing, sharing redesigning and resharing (Judy et al., 2018, p. 377-78). For this particular purpose, many researchers highlight and emphasise the importance of having a shared set of resources, tools or methods, or what Tremblay (2018) calls *common baggage* that facilitates and support the exchange and adaptation of educational materials (Tremblay, 2018, p. 281).

Methodology, data collection and case

In order to investigate the research question presented in the introduction, the following data collection, methodology and case have been used. The quantitative documentation is based on surveys sent to 49 K12-schools with access to CourseBuilder (213 teachers responded to the survey) and platform data on teachers' use of educational material. Furthermore, qualitative documentation was used in the form of interviews with the developer and the project manager of the system and paid content providers, who have been involved in 50 teacher workshops since 2017. The study does not provide a statistically generalisable insight into teachers' cooperation with course design and teaching material development. But as shown in Table 1, a triangulation of case study data sources have been ensured a as well as employing method and analysis integration as described by Frederiksen (2013, pp. 21–24).

Method	Type 1	Type 2	Purpose
Survey	Quantitative	Qualitative	To obtain different but complementary data
Interview	Internal	External	Qualitative data are collected to explain the quantitative findings
Platform data	Number of shares	-	Quantitative data to control the findings in the survey

Figure 2: Methodology - The study triangulates findings from survey, platform data and interviews

As mentioned in the beginning, the aim of the case study is to gain insight into the teachers' collaboration in digitally based course planning and their background for selecting and deselecting specific online collaboratoriums or platforms as collaborative design space. This article focuses on the quantitative sources of data whereas the qualitative aspects are used as steppingstones for future research in the concluding remarks.

Case: The CourseBuilder

All K-12 teachers in Denmark, Greenland and on the Faroe Islands have free access to the teaching resources distributed by the educational publisher Systime. As part of the publicly listed Gyldendal Group, Systime is the leading supplier of educational materials to this specific target group.

If teachers chose to become members of Systime's 'My Account' they are given unlimited access to materials in Systime's *iLibrary* and they can create and share courses in the CourseBuilder. The iLibrary has more than 500 online publications covering all subjects taught in the Danish K-12-system. 16,600 teachers (e.g. almost all K12-teachers) have chosen to use this opportunity, and therefore they also have the possibility to participate in remixing courses in CourseBuilder. The development of the iLibrary and the CourseBuilder should be seen in connection with the national program on digital literacy (The Danish Government 2016a+b) but at the same time it can also be interpreted as an attempt to promote the iLibrary as a new concept. Since CourseBuilder was launched in 2017, Systime has arranged more than 50 workshops focusing on the use of iLibrary and CourseBuilder.

Systime's CourseBuilder is a tool, which enables the teacher to become an educational designer or learning architect. In other words, teachers can tailor courses and learning paths for his/her pupils. By using the CourseBuilder the teacher can combine elements from various internetBooks or other types of digital material, so they constitute an entire course, which can be shared with classes, groups of pupils and colleagues. (Systime.dk). The intention of the CourseBuilder is to diffuse the knowledge of the iLibrary amongst teachers and make them use the online publications from the commercial publishing company in their teaching. Access is only a no costs if you are a teacher. The schools must pay if they want the students to use the Teaching Resources and learning paths that their teachers have designed in the CourseBuilder. But all the 50 schools in our survey have chosen to buy a flat rate access to iLibrary and CourseBuilder so in these cases there would be no additional cost for the school if the teachers choose to use the CourseBuilder.
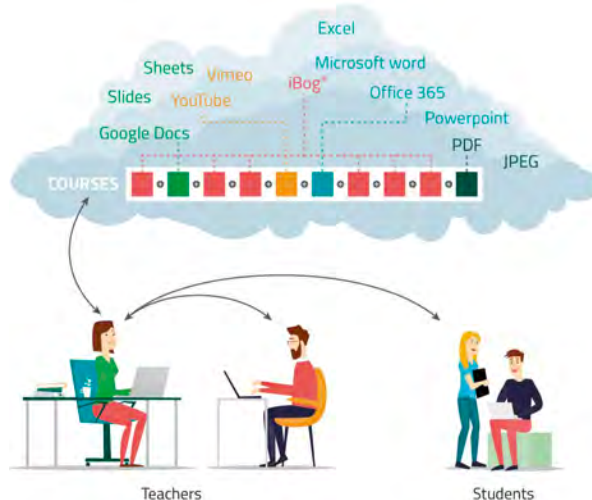

Figure 3: The logic of the CourseBuilder enables teachers to integrate content from the iLibrary (text, video, questionaries' etc.) with contend from other sources. When designed, the course description can be distributed using the school LMS.

The teacher must create a (verified) teacher's account with Systime to use CourseBuilder, Subsequently, the teacher identifies specific digital materials to be included in the intended course. On the individual page, the teacher presses "Share page", and now "Add to CourseBuilder " can be activated. When the desired pages have been selected and added, the rest of the course construction takes place within CourseBuilder. After naming the course, relevant elements must be selected and placed in a systematic order. Under the item "Content from internetBooks", the teacher must then select the specific page in the internetBook. If the teacher wants to add elements from other Internet sources, self-produced materials or assignments, these types of elements can be added by selecting "Type" and then inserting, for example, a link to a video, an external website, an assignment or other types of content.

Figure 4: My Courses - An overview
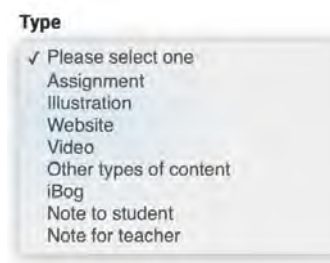
Figure 5: Types of content

After having created a course, the teacher can then share the course with the students via a unique link. The students' view differ from the teacher's view and gives the students an overview of the course. The teacher may also choose to share the course - either globally (the entire institution) or with specific colleagues. Sharing a course involves clicking the "Share course" icon at the lower part of the page.
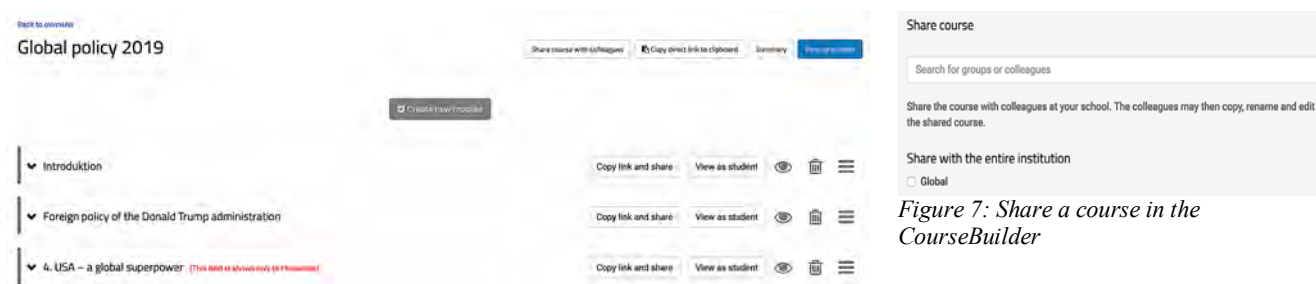

Figure 6: Overview of the course

Figure 7: Share a course in the CourseBuilder

Teachers can also reuse and redesign courses using courses already made by the publisher or courses shared by colleagues. The shared course plans can be reviewed, cloned and redesigned with the teacher's own course design elements and then shared with students and colleagues.
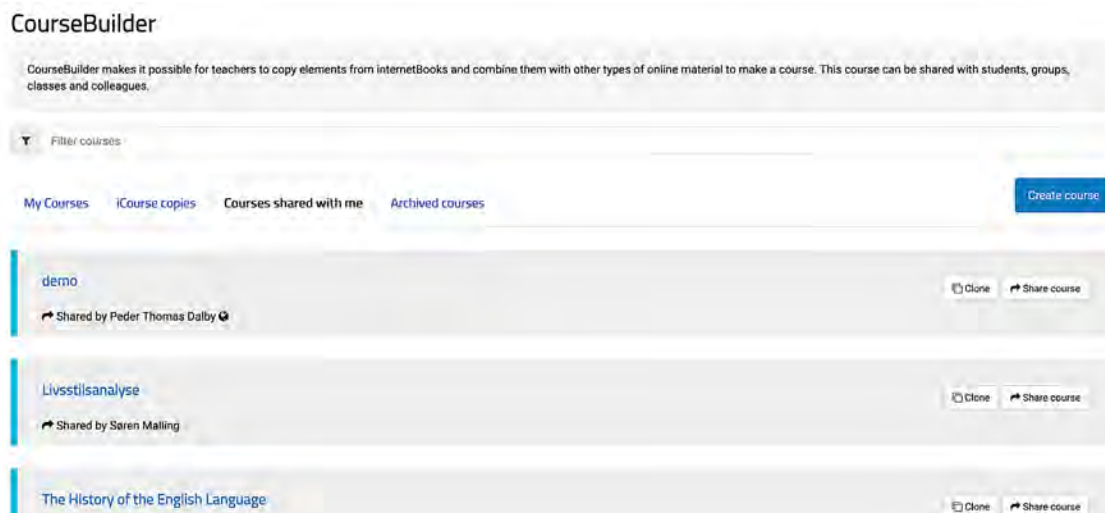
Figure 8: Sharing and cloning

In summary, the functionality of CourseBuilder: 1) Enables teachers to collaborate in course design through the iterative process of sharing, cloning and redesigning, 2) Invites teachers to form professional learning networks to make course design easier and to share inspiration, and 3) Serves as a systematic collection of existing educational materials that can be reused in various contexts subsequently.

A collaborative space for teachers' remix?

The workshops with professional instructors were held (partially) to introduce teachers to the use of the CourseBuilder as a tool for designing, sharing, redesigning and resharing educational materials. Thus, part of the workshops' intention has been real-life-testing the potential benefits from an asynchronous collaborative design space supporting, framing and inspiring remix practice.

In September 2019, online questionnaires were distributed to participants of the workshops regarding their use of CourseBuilder. The survey showed that 95% had used some kind of digital learning materials in their teaching in a period of two weeks prior to the survey. 90 % of the teachers replied that they generally use digital teaching materials in more than half of their teaching. The survey also showed that almost 70% had used courses developed by other teachers when planning their own teaching. As several comments indicated, using materials from colleagues was *not seen as copying or uncritically taking over colleagues' course plans. The colleagues' work was a source of inspiration.* Out of the 213 respondents, only *one* person replied that he/she had reused courses from CourseBuilder when planning his/her own teaching.
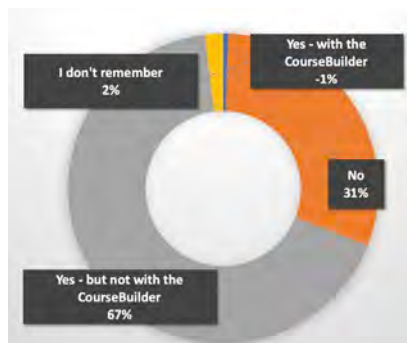

Figure 9: Answers to the question: Have you ever reused colleagues course plans in planning your own teaching? >0,5 % (one person) replied 'Yes – with the CourseBuilder'.

These results gave rise to the question whether the low proportion of educators using CourseBuilder may be due to a lack of knowledge of the platform? Apparently, this is not the case. A majority (60%) replied that they had knowledge of CourseBuilder. When focusing on the cohort of 17 respondents (8%) who had replied that they themselves had designed a course in CourseBuilder, only six of these (<3%) indicated that they subsequently shared a course with colleges or with the entire institution. The low proportion of teachers who created and

shared their own course designs - or Systime's prefabricated courses – might indicate a low interest in collaborating on designing and remixing courses. However, this conclusion was put to the test in the survey as 177 respondents (83%) replied that they share teaching materials on a regular basis.

Regarding the use of prefabricated course designs from publishing companies, 78% indicated that they had never used prefabricated course plans, and 6% answered that they had used one or more of the 80 prefabricated thematic course plans in CourseBuilder environment.

Most of the respondents wrote in-depth comments and described the benefits of collaborating with colleagues in course planning. Several teachers mentioned the opportunities for inspiration and efficiency. However, they also mentioned that it has become a mandatory part of the preparation of the teaching. One teacher stated that sharing courses is to be seen as 'Economies of scale' and that 'the school appeals strongly to this'. Another teacher wrote that increased teacher cooperation had positive implications: 'The courses become better and the work is easier'. Most teachers (64%) replied that in the future they would probably use a service such as CourseBuilder.

In other words, there was no general negative attitude towards collaborative course planning, but some responses showed a more critical view. As one teacher wrote, when asked for arguments for collaborative planning: 'Because we have to'. Another teacher formulated a similar point of view by writing: 'It is pure distress. With the constant reductions in preparation time, using course plans from colleagues is a last resort. […] The courses planned by others are rarely useful. A lot of them need to be worked on before they fit one's needs. The only situation where sharing courses can be an advantage is in the mandatory interdisciplinarity courses - and where it is time saving that a small group designs courses for all teachers - but the quality of shared courses is generally very poor' (our translation).

CourseBuilder - a collaborative space?

Thus, we can conclude that CourseBuilder has not been adopted by the potential users in any significant degree. This indicates that there is a possible mismatch between teachers' needs and the functionality of the platform. After almost three years and much effort used on development and communication about the possibilities, the offer of a collaborative design space has still not been adopted. Data shows that 80 prefabricated courses have been shared 517 times in total. Sharing was done by 256 unique users. These numbers may seem high, but they should be related to the number of workshops conducted in which sharing of courses has been included—and the fact that at least 16,600 teachers are members of the 'My Account' have free access to both *iLibrary* and CourseBuilder.

However, the fact that CourseBuilder is not being used as a collaborative space does not exclude that the platform has collaborative qualities. According to Henri & Lundgren (2001), one of the main prerequisites for collaborative practices is the commitment of participants to the task or community, as well as the engagement and motivation of teachers to work together as a group in a collaborative design space. To see CourseBuilder as a *joint enterprise* so to speak. However, as Tremblay (2018) points out few researchers have determined how exactly to nurture, scaffold and promote such commitment (Tremblay, 2018, p. 281). Based on her extensive research into informal and formal collaboration in communities of practice, Tremblay found that the most central sources for satisfactory participation in practices such as collaborative design spaces were the exchange and sharing of information and materials. But her research also highlights the importance of commitment, personal involvement and interest in learning from and collaborating with others.

Though literature on the subject often points towards organisational support to participants as a success factor, Tremblay's research results indicate that most of the participants may not want more resources or training. Thus, findings suggest that training and support resources are not a key factor in the success of CoPs [Communities of Practice] as indicated in the literature (Tremblay, 2018, p. 285-86). Finally, Tremblay points towards the fact that even though there has been much research concerning informal communities of practice – often of a normative nature - less research has been done on formal communities of practice created by organisations for a specific goal (such as collaborating in CourseBuilder) as well as research of a more data-driven nature (Tremblay, 2018, p. 286).

Finally, Judy et al.'s research revealed six factors influencing members' participation in knowledge construction and networked learning communities: a structured approach, organisational support, conducive environment, shared ownership, culture of sharing, and the platform and tools as enabler (Judy et al., 2018, p. 377). Future research within the three-year project might provide insight into these factors when it comes to formal

organisational collaborative design spaces such as CourseBuilder. If shared ownership is an important factor in getting more teachers engaged in designing, sharing, redesigning and resharing educational materials, than how might CourseBuilder itself scaffold and facilitate such shared ownership and culture of sharing? Especially, if these factors might be more important than easy-to-use frameworks or organisational support in order for teachers' deliberate and collaborative construction of educational materials to take place.

Concluding remarks

The CourseBuilder case study has highlighted that availability was very high regarding factors that could be expected to constitute the basis for changed behavioural patterns in relation to teachers' collaborative course planning. Fulfilment of listed factors in research (Judy et al. 2018; Knudsen & Ramberg, 2018; Goodyear 2015; Voogt 2005) can therefore in itself not be seen as sufficient conditions for teachers' remix practices and the creation of a collaborative design space. Something else is lacking in the design framework of CourseBuilder to support, facilitate and promote teachers' collaborative design. Furthermore, these findings also call for a better conceptual understanding of how and why teachers collaborate concerning designing, sharing, redesigning and resharing educational materials in general.

The analysis of CourseBuilder shows that there is a demand for frameworks that support sharing and collaborating on course design at a deeper level than just offering tools and opportunities and giving resources and recognition. In addition, the institutional support for teachers' collaborative practice is already in place and is even becoming mandatory practice. All upper secondary schools included in the survey had allocated time and resources for group collaboration and workshops. In conclusion, we recommend that future studies[1+2] – as illustrated in figure 10 below – should aim for 1) a deeper second order understanding of access, knowledge, demand and support and how this can be used in design to promote collaboration at a deeper level, 2) investigations into barriers in teachers' remix practices and how such an understanding might help create sustainable, worthwhile and meaningful collaborative design spaces.

In the analysis of the qualitative interviews, it was also found that teachers often explained their lack of using CourseBuilder as a collaborative design space as related to the complexity of the platform and its lack of combability with the LMSs already in use at the institution. Finally, several respondents mentioned that there is still a high degree of cultural resistance, when it comes to collaborating on teaching materials and that some teachers are very sceptical when it comes to designing, sharing, redesigning and resharing each other's materials.

In CourseBuilder, teachers are invited to become involved as designers and co-designers of educational materials. According to Clarke & Hollingsworth (2002), this can be viewed as an area of teacher and teaching experimentation – a design collaboratorium – and thus can be said to belong within the domain of teachers' remix practices. Accordingly, CourseBuilder and its framework, tools and methods should perhaps be viewed as essential in facilitating commitment and shared ownership as well as supporting the enactment of such remix practices. Perhaps teachers should even, as suggested by Voogt et al (2005), be more actively involved in the design of CourseBuilder itself for it to achieve its goal. More critically – and with a focus on the dialectics between management strategies and demands for change at the institutional level – next step is also to investigate the cultural aspects underpinning teachers' absent collaboration, bearing in mind the critical remarks from a recent study by Tuhkala who concludes that 'the issue is that teachers are often seen as implementors but are denied the opportunity of influencing what is being implemented. Thus, teachers may perceive that they are being forced to adopt technology without proper cause' (Tuhkala, 2019, p. 1). According to Maarten de Laat and Rob Martens:

> we need to have teachers and researchers (and other identified stakeholders) working closely together in an atmosphere of mutual respect from the beginning of a project and start a research journey together to create new knowledge through a constructive dialogue (Maarten de Laat and Rob Martens in Dohn et al. 2020, p. 149)

In conclusion, based on insights from the *theoretical exploration* and *design analysis* that together constitute the first run-through of the first phase of the design-based research project, the project will actually move backwards in order to move forwards. That is, the project will carry out a second run-through to establish a theoretical exploration and design analysis of the second order. This is done to ensure a deeper understanding of both the conceptual and the design framework that align with the future studies[1+2] outlined in the model below.
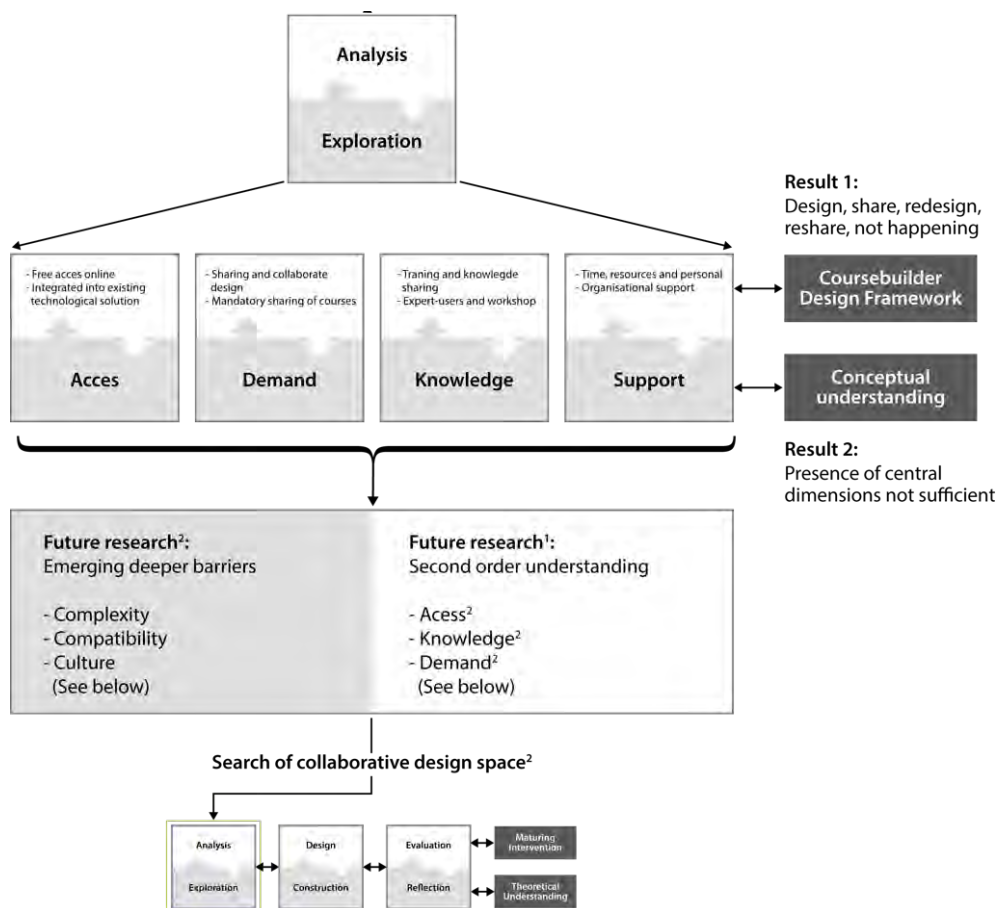
Figure 10: Results and outline for future research (inspired by McKenney & Reeves 2019)

Overall, there is a need to build both design theory and theory-informed designs, rather than just apply designs to practical problems or empirical studies (Bennett & Oliver, 2011). Future research carried out within the project seeks to theoretically and designedly explore teachers' remix practices and how they can facilitate the *learning of learning materials* as well as develop understanding and practice of collaboration platforms that not only support and promote teachers' design practice but also act as co-collaborators themselves. This aligns with Voogt et al.'s (2011) analysis of the literature on teacher design teams, which shows that research on (online) collaborative processes in teacher design teams is still very limited, and all have an exclusively qualitative research design. Additionally, research knowledge is lacking on the importance of designed spaces supporting and promoting teachers' professional communities, remix practices, and co-design teams (Voogt et al., 2011; Borko, 2004; Putnam & Borko, 2000). Something the project will also take into account when moving forward in the design process of CourseBuilder as a collaborative design space.

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Supporting knowledge transformation with Teams-mediated networked learning

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Abstract

Transfer between school and education - and more generally between persons' life practices - is a recurring issue within educational research. On the one hand, very generally speaking, the possibility of transfer is a prime rationale of the educational system - students are supposed to learn within education "something" which they can then use later in other contexts. On the other hand, theoretical and empirical research combine to question transfer both as a concept and as an empirically occurring phenomenon. This short paper reports on an ongoing Design-Based Research project with educators at The Business School. The outset for the project is the combination of a practice problem, experienced at The Business School, and the present authors' research interest in developing theoretically sound, operationalizable design principles to support students in learning to perform transfer and knowledge transformation. The practice problem at The Business School concerned the limited degree to which students (in their educators' experience) make use of their learning at school in their internship practice. The Design-Based Research project concerns the development and evaluation of design principles focusing on networked learning in mediator activities to facilitate students in performing transfer between school and internship. Microsoft Teams has been chosen by The Business School as the ICT platform to support the networked learning activities. We are inspired by a moderate situated learning approach to transfer which emphasizes the role of framing, the sense-making of the individual, the significance of anchorage of activities in primary contexts and of developed patterns of participation, as well as the thesis that context-dependency is itself context-dependent. Informed by this approach in combination with insights from networked learning research, we have formulated three design principles together with the educators at The Business School. The design principles address the practice problem identified by The Business School educators and take into account the aims of the educators as well as results from a pilot study. Through the Design-Based Research study the following research question and sub-questions are investigated: How can Teams-mediated networked learning support students at The Business School in transfer and transforming knowledge between school and internship? What are design principles for Teams-mediated networked learning to support knowledge transformation? What knowledge transfers and how does it transform in Teams-mediated networked learning for The Business School students traversing between school and internship?

Keywords

Transfer, knowledge transformation, Microsoft Teams, design principles, networked learning

Introduction

Transfer between school and education - and more generally between persons' life practices - is a recurring issue within educational research. On the one hand, very generally speaking, the possibility of transfer is a prime rationale of the educational system - students are supposed to learn within education "something" which they can then use later in other contexts. On the other hand, theoretical and empirical research combine to question transfer both as a concept and as an empirically occurring phenomenon (Lave, 1988; Packer, 2001; Tuomi-Gröhn & Engeström, 2003). The "problem of transfer" is accentuated in contemporary society where people, to an even higher degree than previously, traverse different contexts, both in a life-wide and a life-long perspective (Jarvis, 2007). Theoretically, this calls for a development of the concept of transfer which enables an understanding of what goes on in the situations where people succeed in putting knowledge to use across different contexts. Design-theoretically, it raises the question of how to design for students' learning of transfer - e.g. can relevant design principles be articulated to which learning designs should, all things equal, conform? Practically, the issue of how educators can support students in performing transfer between educational and professional contexts becomes pressing.

This short paper reports on an ongoing Design-Based Research project with teachers and educational developers (henceforth both termed educators) at The Business School (anonymized name). The outset for the project is the combination of a practice problem, experienced at The Business School, and the present authors' research interest in developing theoretically sound, operationalizable design principles to support students in learning to perform transfer and knowledge transformation. The practice problem at The Business School concerned the limited degree to which students (in their educators' experience) make use of their learning at school in their internship practice. Previous research indicates that networked learning focusing on utilizing ICT in mediator activities between primary contexts is a way to support students in establishing connections between contexts, and, in particular, in resituating insights across them (Dohn, 2014; Smith, 2012). Accordingly, the Design-Based Research project concerns the development and evaluation of design principles focusing on networked learning in mediator activities to support students in performing transfer between school and internship.

We understand Networked Learning along the lines of the first author's extension of the often-cited definition from Goodyear, Banks, Hodgson, and McConnell (2004). This extension stresses the connections between contexts, in addition to the original focus on connections between learners, tutors, and resources. This makes the definition particularly relevant for our study which focuses on the network of learners' and their individual and collaborative context couplings between school and their different internships. The definition reads:

> Networked learning is learning in which information and communications technology (ICT) is used to promote connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources; between the diverse contexts in which the learners participate. (Dohn, 2014)

The ICT platform chosen by The Business School was Microsoft Teams. This choice was motivated by the combination of the following three aspects: the academic and professional, yet relatively informal, user interface of Teams; the easy accessibility of Teams on mobile phones (which students always carry with them); and the possibility of seamlessly integrating Teams with student documents and assignments, produced in other Microsoft Office 365 apps.

Theoretical background

Transfer is a contested concept. Over the past hundred years, several different understandings have been proposed. They range from the view that transfer theoretically is a straightforward matter of knowledge retention and reactivation in new situations (Gagné, Wager, Golas, & Keller, 2005) to the position of radical situated learning which denies the meaningfulness of the concept because it presupposes a clear but unviable distinction between activity, cognition, and context (Lave, 1988; Packer, 2001). The view we take here is a more moderate one than either of these extremes. Thus, we acknowledge the context-dependency of knowledge, i.e. that knowledge takes on form and content from the situation; but propose that context-dependency is itself context-dependent. This means that it will depend on domain, activity and setting how much form and content knowledge takes on from the situation and, conversely, to which degree some aspects may stay the same across contexts (Dohn, 2017; Dohn & Hansen, 2020; Hansen, 2020). We follow the moderate situated learning theorists who emphasize the significance of activities in transfer, acknowledging that what transfers often will be patterns of participation and that these patterns have a decisive influence on the degree to which aspects of knowledge are transferred between situations as well as the degree to which the aspects are transformed in the process (Greeno, 1997). Hence, we focus on knowledge transformation as a way of performing transfer.

The point is that the character of the context-dependency is an empirical question that needs answering in any given situation of people traversing between contexts. In presenting this view, we draw on the work of Lobato who has argued for an actor-oriented approach to transfer which focuses on the sense-making of the individual, rather than on the transfer which teachers and educational institutions expect to happen (Lobato, 2012). On this approach, the question is less whether transfer takes place and more what transfers, how, why and with what transformations: Learners will often generalize their learning experiences to new situations, but their generalizations may be highly idiosyncratic and therefore go unnoticed by their educators or, alternatively, will be dismissed as wrong. In both cases, educators will construe the situation as one of non-transfer.

Combining Lobato's actor-oriented view with a pedagogical design perspective leads to the question how we can support students in generalizing the aspects we as educators wish them to generalize, rather than leave it up to the individual. To answer this question, it is helpful to look to the research of Engle who has investigated how to support transfer through expansive framing (Engle, 2006; Engle, Lam, Meyer, & Nix, 2012; Engle, Nguyen,

& Mendelson, 2011). Framing here refers to the way a given situation is characterized as relevant by the teacher. Expansive framing links current activities to future contexts of use. Bonded framing, in contrast, anchors the relevance of activities (only) in the current situation. Engle's studies indicate that expansive framing helps students to link learning activities across situations and to perform transfer of knowledge from the situation in which expansive framing took place to future situations. With expansive framing explicating specific details of e.g. content relevance in future situations, educators can support students in performing desired, rather than idiosyncratic, transfer (or none at all) and transformation of knowledge. In Lobato's terms, the expansive framing serves as "focusing phenomena", helping students "notice" the possibility of generalizing beyond the current situation.

However, both Lobato and Engle have focused their research at a micro-level and looked at transfer between, respectively, specific mathematics problems (Lobato) and lessons in a course spanning a few weeks (Engle). Their studies are valuable as they indicate elements which potentially are supportive of transfer beyond the microlevel (expansive framing and focusing phenomena). Nonetheless, their studies need to be supplemented to address the broader question of how to design for transfer and transformation across different life settings such as school and professional practice. Elsewhere, the first author has argued for the importance of anchoring learning activities in the primary contexts of the learners, i.e. in the contexts which matter to them as persons, because learners draw on the tacit knowledge perspectives, which they have from such contexts, in making sense of other situations: The tacit knowledge provides meaning and grounding to words and actions in the new situations. Here, networked learning is most adequately used as mediator activities between primary contexts, rather than as designated online communities intended to be primary contexts of their own. In the case of The Business School students, the internship work practices of the students can reasonably be expected to be primary contexts for (most of) them, as they constitute the type of authentic work practices that they are aiming to become participants in. This consideration concurs with the experience of The Business School educators. Coupling this consideration with Lobato's and Engle's insights, it is significant to frame learning activities at school as relevant for the internship work practices to help students make significant-rich sense of their learning at school (i.e. help them 'fill out' the theories and ideas presented at school with the experiential knowledge of their internship). This, on the other hand, will, all things equal, also support them in transforming knowledge from school back into the internship, as connections of meaningfulness and relevance have already been established.

These ideas have been further developed in Dohn, Hansen, and Goodyear (2020). Here, a set of basic design principles are developed for learning designs which aim to support students in performing knowledge transformation. Following Beach (2003), a distinction is made between four different transition forms, and design principles are discussed for each of the forms. In The Business School case, the students are performing collateral transitions, i.e. they traverse between the contexts in question (school and internship) several times over the course of their education. For this type of transition, there is a need for anchoring school learning in actual tasks in work practice; for both school and work practice to frame the learning in the other setting as relevant for learning in the present setting; and for assessment to prioritize the work practice perspective, ideally by being performed by workplace and school in collaboration.

A final point of inspiration comes from the networked learning literature, in particular the focus on how a learning community, and the collaboration and negotiation with peers, can support learners in developing nuanced perspectives on the subject matter (Dohn, Cranmer, Sime, Ryberg, & De Laat, 2018; Goodyear et al., 2004; McConnell, Hodgson, & Dirckinck-Holmfeld, 2012). As the traversing between contexts may be stressful for individual students, both theoretically and personally, the support of a learning community is highly significant, both as a trusted base for exploration and as a network with which to investigate different ways of transforming knowledge in context coupling and boundary crossing.

Rationale and setup of the design-based research study

Design-based Research is a methodology which combines development of educational practice with the investigation of research questions (Amiel & Reeves, 2008; Van den Akker, 1999). Typically, the outset is a practice problem, i.e. a problem identified in practice by teachers or educational developers. In collaboration with researchers, the teachers or educational developers will develop a learning design which aims to address the problem. When the design is then subsequently realized in practice, it both allows testing the viability of the design and opens the possibility for investigating a related research question. The research question can e.g. concern design principles for this type of design; theoretical aspects of learning and cognition; or system

features of classroom interaction made visible by student reactions to the design (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; Kali, Levin-Peled, & Dori, 2009).

The practice problem identified by The Business School

This design-based research study takes its outset in the practice problem experienced at The Business School. As indicated, the practice problem concerned the limited degree to which students make use of their learning at school in their internship practice. At The Business School, a typical educational programme is structured in the following way: the students spend two weeks on theoretical education at school, followed by a two-to-three months period of working in their internships. This means that the students spend most of their time working and doing practical training. In The Business School educators' experience, many of the students do not see the point in spending time at school and do not find the theoretical education relevant as compared to the practical experience they get from working in their internships.

In 2018, The Business School decided on a three-year digitalisation strategy which included a requirement that the school must be in contact with each student before, during and after their school attendance. To meet this requirement and as an attempt to support transfer through ICT-mediated learning, The Business School chose the ICT platform Microsoft Teams. Teams is a part of the Microsoft Office 365 suite, which the school already uses. It is the fastest growing application in Microsoft's history with more than 329.000 organisations worldwide today using Teams as a platform for teamwork, where people can exchange and generate ideas in an online community (Markezich, 2018). Teams has replaced the Office 365 Education, and offers services aimed at education, including assignments and quiz distribution. Originally conceived as a competitor to Slack and offering comparable functionality, Teams integrates with a range of Microsoft platforms. The growing adoption of adds to the relevance of Teams as a communicative platform for The Business School, as the students may be expected to enter companies utilizing it after they graduate.

Teams was introduced at The Business School in early 2019, but without an articulated strategy for use and students and educators got no thorough guidelines on how to use it. In mid-2019, a more detailed introduction was provided, and the students were told no longer to use Facebook or e-mail to communicate with educators or other students, with regards to academic or educational matters.

Pilot study

For The Business School educators, the aim of using Teams is to have a platform, where students and educators easily can stay in contact with each other and students can learn from one another. Also, students - especially during internship periods - can be asked to carry out academic and theoretical assignments to support them in thinking in theoretical and academic ways while being away from school. The idea is that this will facilitate their drawing of educationally relevant connections between school practice and internship practice. To help realize this idea, The Business School educators initiated the collaboration with the present authors (as researchers) to create a learning design aimed at supporting connection-drawing with Teams, since neither educators, nor students had managed to use Teams as a way to support transfer. Through several workshops and interviews with The Business School educators, we learned that Teams had not been used to the extent that they wanted, and that they had found it challenging to use Teams, since it was an unknown platform to them. We also learned that they did not know how to motivate the students to use Teams, but that they had high hopes for the future use of Teams and that they thought the platform had great potential.

To find out why the students didn't use Teams as much as the educators had wished for, we first conducted a pilot study in a class where the educator had taken an inductive, exploratory approach to Teams, trying out different prompts (e.g. "I have seen that there isn't much dialogue in here, why is that?") and tasks (related to schoolwork and internship) to engage students on the platform, without following specific design principles or guidelines. Five students were selected for interview on information-based criteria to maximize variation (Flyvbjerg, 2006). More specifically, they were selected based on their degree of participation in class (at school) and on Teams (during internship). All four participation possibilities were represented, with two students representing the possibility of high degree of participation in both settings. All five students received a list of questions through e-mail, concerning their use of Teams. Four out of five students replied, with short but informative statements. The statements allowed thematizing some general observations:
- The primary users of Teams were the educators
- The use of Teams was widely considered to be a less attractive alternative to dominant social media platforms, and consequently displaced by those
- The students were unsure of how to use Teams

- The students were hardly motivated to use it
- The format of the communication taking place on Teams had been very much characterized as one-on-one communication, mainly between educator and individual students.

The e-mail interviews also indicated that the students actually do think that they can use what they learn in school, during internship. This contrasts with the beliefs of the educators (cf. above).

Preliminary design principles and research question

Following the results of the pilot study, a set of design principles has been developed in collaboration with The Business School educators. The design principles are informed by transfer theory; studies of design for transfer and knowledge transformation; and research in networked learning (cf. section above). They centre on the educators' wish to increase student perception of relevance for their internship practice of the theoretical and academic perspectives learned at school, i.e. of establishing connections between school and internship. And they draw on the results of the pilot study which show the need for explicit guidelines and support in how to use Teams, as relevant use does not happen 'of itself', neither from educator side nor from students'. These considerations led to the following design principles:

- Anchor Teams communication in the internship organisation's actual tasks, so that the communication on Teams seems relevant for students and the organisation as well (a concretization of a design principle in Dohn et al. (2020) (cf. above), based on the educators' wish to increase perception of relevance)
- At the school, initiate the formation of habits of the kinds of communication that you want students to use during internship (an implication of the thesis from moderate situated learning theory that what transfers between contexts are often patterns of participation, coupled with the pilot study result that students need explicit support in how to use Teams)
- Exploit the Teams functionalities that allow for a number of distinct networking possibilities: In addition to private one-to-one communications between educator and student and student-to-student, a more group-oriented communication on Teams (many-to-many) should be facilitated (an implication of the networked learning thesis is that a learning community is supportive theoretically and personally, when investigating different ways of transforming knowledge in context coupling and boundary crossing, coupled with the educator wish for students to learn from one another).

In sum, the learning design developed to address the practice problem identified at The Business School focuses on supporting students in connecting between school and internship through engaging with each other and the educator on the Teams platform. This allows us to investigate the following overall research question

- How can Teams-mediated networked learning support students at The Business School in transfer and transforming knowledge between school and internship?

As part of investigating the overall research question, we have formulated the following sub-questions:

- What are design principles for Teams-mediated networked learning to support knowledge transformation?
- What knowledge transfers and how does it transform in Teams-mediated networked learning for The Business School students traversing between school and internship?

The three preliminary design principles developed together with The Business School are a first hypothesis for an answer to the first sub-question, to be tested in the design experiment.

Setting for the design experiment

The design principles are the outset for our ongoing design experiment, which at the time of writing is performed with one class from The Business School. Future classes will also be involved in the design experiment. The current class has been introduced to Teams and are required to use Teams actively during their school period and internship period. The class holds 16 female students, all in the age between 19 and 29, and all of them working their internship at The Women's Bodywear Retail (anonymized name). We shall observe and analyse their use of Teams, as concerns both content and communicative practices between students and between students and educator. In addition, and based on this, we shall select students to participate in a focus group interview, where they will be asked about their use of Teams. We shall conduct the same data collection with future classes to be involved in the design experiment. The aim of the design experiment is to assess whether or not the design principles work in the sense that they can be used to create connections between school practice and internship practice and thus to support transfer with Teams-mediated networked learning.

Concluding remarks

In this short paper, we have presented the theoretical background and research design for a Design-based Research study on Teams-mediated networked learning to support transfer and knowledge transformation in

students' collateral transitions between school practice and internship practice. The study is performed in collaboration with educators at The Business School who initiated the collaboration, due to their identification of a practice problem as regards students' limited use of their learning at school in their internship.

Our preliminary findings, based on theoretical considerations, previous research, and a pilot study at The Business School, have led us to hypothesize three design principles for Teams-mediated networked learning. It is our aim in our ongoing design experiment to assess the viability of these design principles, as a step in answering our broader research question concerning how to support students' transfer and knowledge transformation.

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The blockchain university: disrupting 'disruption'?

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Abstract

This paper explores the promise of disruption of higher education offered by latest platform technologies - a combination of mobile applications for connecting teachers and students and blockchain technology for secure transactions of information and money. We start with a brief examination of several generations of technological disruptions arriving from the Silicon Valley with a special focus to educational technology. Showing that these disruptions are primarily focused to furthering capitalist mode of production, we question whether the latest disruption could provide different results. We briefly examine a historical (utopian) attempt at disrupting education described in Ivan Illich's book Deschooling Society (1971). While this analysis firmly belongs into the past, it presents us with important insights about connections between education, technology, capitalism and the environment which are just as relevant today. We proceed with an analysis of the world's first blockchain university - the Woolf University. Advertised as 'Uber for students, Airbnb for teachers', the Woolf University offers the seductive promise of radical transformation of higher education based on cooperative principles. We examine blockchain technology in detail and identify its main novelty - the transfer of trust from people to technologies. We briefly question this transfer, leaving a more detailed analysis for further research. Instead we focus to ideological underpinnings of the blockchain university, as they reflect to teaching, learning, and university administration. We show that further analyses of the blockchain university will be best supported by adopting a networked learning perspective and especially its wide body of knowledge about various (learning) connections. The Woolf University has not even admitted its first cohort of students, and the question remains as to whether Woolf will now adopt the blockchain in such a manner as to radically disrupt 'disruption', or it will simply blend into the existing powerful political, educational and economic structures. Our analysis, which is therefore based on early ideas about the development of the Woolf University, indicates that it has the potentials to offer cooperative learning to students, cooperative employment to academic workers, all the while retaining highest quality of teaching and learning modelled after ancient scholastic principles. On that basis, we conclude that the Woolf University, together with other adaptations of blockchain technology for educational purposes, does offer a lot of potential for fundamental disruption of higher education and should be closely watched in the times to come.

Keywords

Disruption, education, networked learning, platform, blockchain, ideology, trust

The (failed) promise of technological disruption

One of the key promises of the Silicon Valley is disruption. During the 1980's companies such as Apple and IBM promised the 'disruption' of the paperless office (Sellen and Harper, 2003); in the 1990's the 'disruption' of the day was working from home (Daniels, Lamond and Standen, 2000); and the early 2000's were marked by the 'disruption' of transferring various transactions online, from online shopping (Amazon, Alibaba) to various 'e-government' systems such as online taxation (Chatfield, 2009). Starting in the 2010's, the newest generation of 'disruptions' is supported by platforms which offer radically new opportunities for using existing (physical) resources (e.g. Airbnb, 'disrupting' the accommodation rental market), and which have the power to radically transform the world of labour (e.g. Uber, 'disrupting' the transportation market) (Scholz, 2014). With each new generation, these 'disruptions' have entered deeper and deeper into the fabric of society. Paperless offices required various legislative changes such as the development of digital signatures, online shops required the development of robust online payment protocols, and contemporary platforms require significant transformations in labour legislation.

Writing about these trends we deliberately wrapped the word 'disruption' in quotation marks because their promise is not all that it is cracked up to be. Our offices are more packed with paper than ever; working from home is suitable only for certain people and certain types of jobs, online shops and taxation systems are restricted to the privileged side of the digital divide, and platforms such as Airbnb and Uber have only exacerbated existing problems in housing and transportation. To add insult to injury, the promised disruptions typically introduce new and previously unforeseen problems. For instance, Airbnb has now been proved to cause gentrification, thus pricing out young families from the real estate markets, and significantly lowering locals' quality of life, so it has recently been either banned or heavily regulated in many tourist cities (O'Sullivan, 2018). Furthermore, the very notion of disruption is an ideological construct developed to serve a certain type of capitalist development (Jandrić, 2017; Platform Cooperativism Consortium, 2019). From appalling work conditions in Amazon's warehouses, to an understanding of Uber drivers as independent contractors without any rights to social and health security, latest disruptions arriving from the Silicon Valley have contributed to development of some of the most ruthless models of exploitation of workers and have turned out to be very powerful vehicles for development of financial capitalism.

Similar trends can easily be tracked in educational technology. The first widely used Learning Management Systems (LMS) such as WebCT and Blackboard promised various disruptions of teaching and learning: independence of time and space of learning, access to video lectures given by the best experts, and so on. Those of us who have worked in e-learning, Technology Enhanced Learning, and other early versions of Internet-supported distance education, can well remember issues related to untested software, slow and unreliable connections, and - above all - lack of pedagogical understanding of how these technologies might be used. Back in the day, institutional misunderstandings concerning workload models and the amount of time it takes to design online learning to a high standard and to support students in this new environment were quite common. Yet the belief that technologies are here to disrupt education has remained strong. In the early 2010s, Massive Open Online Courses (MOOCs) were announced as the latest technological disruption of (higher) education. Rather than MOOC platforms themselves radically challenging traditional forms of education, they presented an opportunity to reimagine how the campus degree might be conceived, thus raising too, questions about widening participation, quality assurance and enhancement, and pedagogy (Hayes, 2015). Whilst MOOCs could perhaps have fundamentally challenged current models of education, the related academic labour became subject instead, to the existing discourse of quality, audit and excellence (Hayes, 2019: 48) Only a few years later, we now realize that the MOOCs are also just another vehicle for capitalist development (Knox, 2016; see also Jandrić, 2017: Ch 9).

While these technological disruptions have definitely contributed to development of the neoliberal managerialist university, academic workers are still more shielded than warehouse workers and taxi drivers. Yet, it has become obvious - in fields from commerce, lodging, transportation, education, and others - that the Silicon Valley model of 'disruption' has dire social consequences. One of these in particular revolves around the importance of trust. Trust as a human value is deeply intertwined with how technological disruption could play out democratically, rather than exploitatively. Whilst trust is important in any number of social contexts, in higher education "the very notion of academic freedom is predicated on a foundation of trust" and "for universities to become more innovative and risk-taking trust is essential" (Vidovich and Currie, 2011). Yet just as Facebook, Amazon, Google, Uber and Airbnb have been criticised for extractive and exploitative practices in the gig economy, many teaching staff in universities now hold precarious contracts. Additionally, a form of platform capitalism, increasingly present in universities has potential to further undermine trust:

> education analytics, adaptive learning platforms and other 'smart learning tools', as well as data dashboards and visualizations used by HE leaders and policymakers to support decision-making processes, are set to be plugged into the architecture of the university, in ways that will impose new modes of quantification and standardization while also bringing new actors and priorities from across the public and private sectors into contemporary HE (Williamson, 2018).

This leaves us questioning what form of disruption might be powerful enough to interrupt this complex web of sociotechnical infrastructure which is "fusing with political reforms in the shaping of a marketized sector of smarter universities" (Williamson, 2018).

In the early 2020s, we are now witnessing an increasing number of attempts at creating radically different models of techno-administrative disruptions. One of the most active organisations in this area, the Platform Cooperativism Consortium, spells out the following vision for development of these models:

In the face of widespread dissatisfaction with capitalism, it is time to ask, "What kind of new economy do we want to create?" Instead of optimizing the online economy for growth and short-term profits for the few, we need to optimize the digital economy for all people.
Platform co-ops offer a near-future, alternative to platform capitalism based on cooperative principles such as democratic ownership and governance. (…)
Platform co-ops introduce economic fairness, training, and democratic participation in the running of online businesses. (…)
Platform co-ops give stakeholders a say in what happens on the platforms. (Platform Cooperativism Consortium, 2019, bold from the original)

As of very recently, similar attempts at using platform technology have started to spring in education. A 2016 article, 'Uber-U is Already Here' (Teachonline, 2016), provides an early vision of a possible platform-based disruption of education. The idea, in a nutshell, is to use a mix of recently developed technologies to develop an educational infrastructure aimed against neoliberalisation of education. The mix includes "a mobile app that enables a user to connect to a central hub, which then connects student needs with available tutoring or other forms of help from around the world"; a tracking system for transfer of fees, an online assessment platform, and "a blockchain system which records all aspects of every transaction" (Teachonline, 2016). In 2018, a similar mix of technologies has been used to develop the first 'blockchain university' aimed at challenging the capitalist mode of educational development. This paper analyses the first blockchain university - the Woolf University (2019). Focusing on the ideological underpinnings of the Woolf University, the paper examines the theoretical opportunities offered by platform technologies for radical non-capitalist disruption of higher education. In this context we question whether an opportunity has finally arrived… to really disrupt 'disruption'.

Historical predecessors - Ivan Illich's educational networks

The Silicon Valley mode of 'disruption' has indeed become mainstream in the past few decades yet attempts at creating radically different models of techno-administrative disruptions also have their own history. In the mid-20th century theorists such as Everett Reimer, Ivan Illich, Paul Goodman, and John Holt developed extensive critiques of the institution of schooling. Yet Ivan Illich, in his book Deschooling Society (1971), reaches far beyond critique and offers a full-on technological disruption of education. Just like the Platform Cooperativism Consortium, the Woolf University, and others, Illich has proposed his own version of "large scale non-institutional educational infrastructure" (Jandrić, 2014: 85). In Illich's proposal, this system consists of a set of four interlocking educational networks:

> 1. Reference Services to Educational Objects-which facilitate access to things or processes used for formal learning. (…)
> 2. Skill Exchanges--which permit people to list their skills, the conditions under which they are willing to serve as models for others who want to learn these skills, and the addresses at which they can be reached. (…)
> 3. Peer-Matching--a communications network which permits people to describe the learning activity in which they wish to engage, in the hope of finding a partner for the inquiry.
> 4. Reference Services to Educators-at-Large--who can be listed in a directory giving the addresses and self-descriptions of professionals, paraprofessionals, and freelancers, along with conditions of access to their services. (Illich, 1971: 34)

Illich's networks reach much further than technology, and provide a whole-rounded infrastructure which allows radically different forms of learning. However, Illich does not stop at development of infrastructures and recognizes the dialectic between education, the capitalist mode of growth-based development, and ecological destruction of our planet. Therefore, his educational infrastructure is much more than an attempt at developing a different mode of learning and implies a whole-rounded vision of a future post-capitalist society.

Purely fictional at the time of their publishing, Illich's ideas have been surprisingly prophetic and therefore are periodically revisited by scholars working in various fields in and around technology and education. At the brink of the millennium, Hart shows that "it is not too far-fetched to assert that Illich predicted the World Wide Web" (2001: 72). Ten years later, Jandrić shows Illich's educational networks are "strikingly similar to the basic principles of Wikipedia" (2010: 54), and more widely, that it now "seems that something so unimaginable to the average citizen of the mass society such as large-scale deschooling has been made possible by the advent of the network society" (Jandrić 2014: 96). While Illich's educational networks now belong deeply into the past, his important insights about connections between education, technology, capitalism and the environment serve as indispensable starting points for analysis.

Uber for students, Airbnb for teachers

In 2018 an independent group of academics affiliated with the University of Oxford developed "the first blockchain-powered university with its own native token" (Broggi et al. 2018). The Woolf University (named after Virginia Woolf) is "a platform startup that aims to leverage distributed ledger technology to remove higher education intermediaries, support decentralized governance structures and ensure the security of data" (Vander Ark, 2018). Crossing platform technology used by the likes of Uber and Airbnb with blockchain technology behind safe transactions of cryptocurrencies such as bitcoin, the Woolf University now aims at disrupting higher education. The Woolf's university White Paper offers a series of revolutionary promises:

> Woolf will be a borderless, digital educational society which reimagines how teachers and students connect. It will rely on blockchains and smart contracts to guarantee relationships between students and educators. For students, it will be the Uber of degree courses; for teachers, it will be the Airbnb of course hosting, but for both parties the use of blockchain technology will provide the contractual stability needed to complete a full course of study.
> It is our view that the model set out in this white paper will disrupt the economics of higher education and provide new opportunities for both students and academics. Blockchains with smart contracts can automate administrative processes and reduce overhead costs. Students can study with lower tuition and academics can be paid higher salaries.
> It is our ambition that Woolf be a revolution without precedent in the history of the university. But at its core, Woolf makes possible the oldest and most venerable form of human education: direct personal, individual apprenticeships in thinking. (Broggi et al., 2018: 1)

While this imagined revolution would inevitably bring about significant social changes, the Woolf University is much more moderate than Illich (or indeed the Platform Cooperativism Consortium) and does not outline a whole-rounded vision of a future society. Therefore, we need to take a closer look into problems that it addresses.

The Woolf University's White Paper identifies four key problems in the contemporary university: (1) The incentive problem. University administrators are incentivised to increase positivist quality criteria, students are incentivised to take large student loans and play 'safely' while they study, and teachers are incentivised to prioritize administration, research, and funding over teaching. (2) The opaque barrier problem. Students and teachers are incentivised to trust opaque decision-making processes and lack democratic mechanisms to decide about their own destiny. (3) The 'market-maker' problem. As administration takes up an increasing part in university finances, student fees get higher while academic salaries get lower. (4) The market liquidity problem. Depending on their location and available resources, some teachers get out of work while others get overworked; some students cannot reach teachers while others can reach more than they can use. (Broggi et al., 2018: 7-8). Consequences of these problems are radical precarization of teachers, high cost of education for students, and the loss of traditional social role of the university (Broggi et al., 2018: 8-11).

In response to these problems and consequences, the rest of the White Paper describes in detail "The Woolf University Solution":

> As the first blockchain university, Woolf will use new technologies to reimagine how students can connect with professors in a personal but geographically agnostic manner. This allows any student with access to a smartphone or computer to have access to a world-class education, no matter where they are in the world. But at its core, Woolf makes possible one of the oldest ways that human beings really learn, which is through individual teaching and instruction. Such instruction simply cannot be provided by a bureaucratic system or a podcast or a MOOC or a book –although these are all potentially important.
> Woolf uses novel forms of organisation to support the most traditional kind of teaching, namely, one-to-one and one-to-two Oxbridge-style tutorials in which teachers come to understand the intellectual needs of their students, and students can be given an academic apprenticeship in thinking. (Broggi et al., 2018: 11).

While it is tempting to proceed with an examination of offered solutions, the Woolf University is still in early stages of development and the first cohort of students is supposed to enrol in the first half of 2020 (Broggi et al., 2018: 55). Both authors of this paper have joined the Woolf University as teachers, and plan to further develop

this research over a lengthy period of time. In order to prepare directions for further research, in this paper we focus to ideological underpinnings of currently available information on the Blockchain University.

The ideology of the blockchain university

In this section we firstly discuss our interpretation of ideology, in relation to technology and education. Secondly, we provide some links to a brief explanation of what blockchain is, and we then consider some ideological underpinnings, based on what is known so far, about the blockchain university.

Our understanding of ideology concerns the beliefs, values and opinions held by people that closely intersect with the powerful political, educational and economic structures of the society in which we live. We take the position that such political beliefs and socio-cultural practices are also dialectically intertwined with both technology and the language that is used by people to speak about technology, in relation to education. As such, ideologies become expressions of how 'the use of technology' is being interpreted, to achieve certain goals in an educational context (Hayes, 2019: 102). In turn, these relationships need to be understood in the context of how they may contribute to, and maintain, neoliberal organisations and related inequalities, in the onset of platform capitalism.

Before discussing the use of blockchain in terms of potential disruption within this political economic context, a brief explanation of what blockchain is, will be needed. Blockchain is a distributed database, or a growing list of records called blocks, linked through a form of secure communication called cryptography. Ian O'Byrne describes blockchain as "a public ledger of transactions that is composed of two parts: peer-to-peer (P2P) network, and a decentralized, distributed database" (O'Byrne, 2016). AP2P network is an architecture of computers that share tasks or files between peers. Each peer is a partner in the network, with equal privileges and powers. Napster is an early example of such file sharing, in relation to audio files. The P2P network in Blockchain is decentralised, so that when information is passed between peer computers (nodes) there is no central point of failure in the system. All nodes eventually receive the same information, which is usually encrypted and private and there is no way to know identities of who added or removed information to the network.

The second element of the blockchain, the database of transactions, refers to the "information" that is being shared across the P2P network. The first element in this database is referred to as the "genesis block", or the first "block" of the blockchain, usually containing the guidelines for the remaining database, which is formed by a series of blocks that link together to form a chain. Information added or removed from the blocks is date and time stamped, thus creating an encrypted ledger, documenting the resources in the database. It is this mixture of transactions, blocks, and decentralisation of data in the ledger that provides tremendous opportunities for many fields (O'Byrne, 2016).

Blockchain technology is based on the idea of delegating trust away from centralised institutions and placing trust instead into a technical architecture. Whether this implies that people no longer have to trust in each other is a further point for debate, if trust is being placed into an algorithm. Yet this technology also connects people interested in cooperative forms of working, based on trust, lending itself to education.

Probably the most widely used definition of networked learning is "learning in which information and communication technology is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources" (Goodyear, Banks, Hodgson and McConnel, 2004: 1). This definition is relational (Jones, 2012: 3), because all elements of the definition are interconnected with each other and permanently transformed. Technological transformations necessarily impact learners, tutors, communities, and resources; learner transformations necessarily impact tutors, communities, resources and technologies; and so on. The networked learning perspective thus enables development of whole-rounded understanding of educational disruption offered by the blockchain - and this type of understanding, we argue, is crucial for understanding the effects of practices such as the Woolf University.

Few are (as yet) adopting the blockchain for educational purposes, despite claims from some that they are actively exploring this possibility. Blockchain can enable tracking of every block of learning that people ever undertake across a platform (wherever they may be located in the world) and credit them with this learning. The ideological elements come into play when particular claims become attached to the use of such a platform. In an article called 'Learning is Earning' (Act Foundation, 2016), a digital platform called the Ledger is described that directly connects everything people learn with directly-related earning power. A connection is made with a new

speculative economy where employers might invest in building a workforce for the most lucrative skills tracked by the Ledger.

Where once universities might have stood apart somewhat from defining learning in direct connection with earning, since the introduction of student fees there has been a much stronger focus on 'employability' and a growing awareness of potential 'technological unemployment' (Peters, Jandrić and Hayes, 2018). Ben Williamson describes too, how education is changing in an emerging 'platform society', with socio-technical data assemblages of for-profit platforms merging with key public institutions. Student and teacher subjectivities then become reshaped by the presumptions and worldviews encoded in digital platforms (Williamson, 2018).

Amidst these concerns, in 2018, David Kernohan wrote in Wonkhe:

> Woolf Univerity might come on like another technology-driven disruptor but really it's a restatement of the oldest idea in higher education: scholars banding together to support each other. The mechanisms may be new, the underpinning may be modish, but there is a straight line between our romanticised vision of 11th century Bologna and a fortuitous conversation between blockchain researchers and humanities lecturers at Wolfson College, Oxford in 2017 (Kernohan, 2018)

At the time of writing, David Kernohan remained unconvinced of any clear benefits (as yet) of adopting blockchain technology over other existing options for Woolf. However, in describing his conversation with Josh Broggi and Martin Gallagher, two founding members of the Woolf team, he refers to the best moments as:

> when they let go of the technology and talked about the pedagogy. Both were passionate about the benefits of the tutorial model, and vehement about the critical and analytical skills that could be taught by sustained interaction with philosophy, theology, and the classics. Both suggested that such skills are not at threat from automation, and I would agree. It made me reflect how long it had been since I'd heard such a powerful case for high-level humanities teaching put as well within the mainstream sector. And it all ties in neatly to their wider concerns around how little control academic staff have over their own working lives (Kernohan, 2018)

As Woolf moves forward in developing their tutorial model, this appears to take the use of blockchain in a rather different direction from simply building a workforce through the precarious labour of fixed term academic contracts to directly meet the needs of employers. As such, the ideology behind Woolf does appear to be genuinely refocusing on the relationships between students and educators as a central starting point, placing value on at least some of the aspects of Illich's proposal. As Uber for students and Airbnb for teachers, the question remains as to whether Woolf will now adopt the blockchain in such a manner as to radically disrupt 'disruption', or like MOOCs, will simply blend into the existing powerful political, educational and economic structures of the society in which we live.

Conclusions

For academic staff who rely upon their collegial networks and have increasingly found a need to build these beyond the institutional constraints of neoliberal forms of education, Woolf holds a seductive promise. For students who have long craved a personal contact with their tutors that has alluded them, despite paying crippling tuition fees, there is likely to be an attraction too. For David Kernohan, there is a need to "move beyond the techno-fetishism of their white paper to take ownership of a moment that would separate them from a million other over-hyped blockchain ideas" (Kernohan, 2018). Such a move, as we argue earlier in this article, will be best supported by adopting a networked learning perspective and especially its wide body of knowledge about various (learning) connections.

Yet perhaps one of the most disruptive aspects of Woolf is in fact their aim to create a university in which the bulk of administrative tasks are either eliminated or progressively automated. This essentially removes the middleman from the teaching relationship. It allows professors to organise their own colleges, teach and take payments from students directly. Using the same logic as Airbnb, Woolf claims that this makes better use of academic resources. As such, it offers potential to radically change the current model of platform capitalism in universities, because it begins from a shared pedagogy and academic freedom to teach, rather than from administration and the bureaucratic audit of teaching. Thus, it seems that the Woolf University attempts at developing its own version of networked learning using a curious combination of traditional scholastic approaches and latest technological developments.

This is a disruption too that comes not from a platform alone, though the technology plays an important part, but from like-minded people working cooperatively. For students whose collective identity in HE has been constructed and marketed back to them in recent years (Hayes, 2019), presenting them as susceptible consumers, Woolf could be an empowering route into cooperative learning. For teachers, disempowered by managerialist policies into precarity, Woolf could be an empowering route into cooperative working. Additionally, there is the opportunity to build skills that are less at threat from automation. Therefore, looking ahead to future research in this area, we raise the question of whether such a return to core academic values, underpinned by a cooperative platform to aid transparency, may really hold the techno-administrational resources we need to begin to rebuild academic trust.

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Learning in the Wild: Exploring the Practice of Learning in Open, Online Forums

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Abstract

The Internet provides many opportunities for learning from static resources to conversational spaces for questions, answers, commentary and exploration of topics of interest to participants, whether organized as Q&A sites such as Reddit, hashtag communities on Twitter, or knowledge-sharing sites such as Stack Overflow. Yet, there is limited research on how learning is happening in these spaces. This paper reviews literature and studies about learning in open, online forums to begin to synthesize what is known so far, and to set a research agenda addressing the question: How do people learn in open, online forums? The review builds on work by the author and colleagues, exploring what we refer to as 'learning in the wild' (in recognition of Hutchins' "Cognition in the Wild", and to reflect the 'wilds' of online forums such as Reddit). The increasing use and reach of these sites raises questions not only about what is being learned and what motivates participation in such sites, but also what kind of organization and learning practices are emerging. While it may be thought that such learning, taking place outside the bounds of institutional settings, is informal learning, the research suggests a more complicated picture, dependent on conversation, networks, membership in communities, and community practices, needing to be addressed by drawing on multiple disciplinary perspectives.

Keywords

informal learning; online learning; Q&A sites; open, online forums; networked learning

Learning in Open, Online Forums

The Internet provides many opportunities for learning, from the resources on Wikipedia pages, YouTube videos, online news, books and journals, to the interactive learning opportunities of online courses and knowledge communities. Within this resource network and ecosystem, areas of discussion and learning are growing, happening in open, online forums such as the Q&A sites Reddit or Quora, hashtag communities on Twitter, and knowledge-sharing sites such as Stack Overflow and Facebook groups. These social media sites offer an arena for discussion that is contributed to, led, and moderated by members of the site, where topics are crowdsourced, questions asked and answered by moderators and participants who comment and present information in informed, accessible ways. Such sites are thriving: Reddit attracted almost 1.7 billion visits in July 2019 (Statistica, 2019a); Facebook has 2.41 billion monthly active users as of the second quarter of 2019 (Statistica, 2019b); and Stack Overflow had 2 million questions, 2.5 million answers, and over 1.6 million new users joining the community in 2018 (Stack Overflow, 2019). Yet, there is limited research on how learning is happening in these spaces.

The author and colleagues have been working for a number of years studying the practices of learning online, observing and researching the trends toward more learner-centred participation. Most recently we have turned our attention to how learning happens in open, online forums, asking the overall question: *How do people learn in open, online forums?* Our research includes in-depth evaluation of learning and motivations to participate in crowdsourced and social media based communities, including OpenStreetMap, Twitter, Reddit, and Stack Overflow (e.g., Budhathoki & Haythornthwaite, 2013; Gruzd & Haythornthwaite, 2013; Gilbert & Paulin 2015; Gilbert, 2016, 2017, 2018; Haythornthwaite, Kumar, Gruzd, Gilbert, Esteve del Valle & Paulin, 2018; Sengupta & Haythornthwaite,

2020). Different studies have included surveying and interviewing contributors, moderators, and lurkers about their motivations to participate and their experiences in these forums; identifying relational exchanges that support learning and community; and evaluating discourse patterns in open, learning online sites. We have chosen to refer to our research as examining 'learning in the wild' in recognition of the ideas of Edwin Hutchins in his work on "Cognition in the Wild", and to reflect the 'wilds' of some of these open online forums (e.g., Reddit) with their absence of traditional etiquette, and educational and organizational structures (Haythornthwaite, et al, 2018).

In researching the new, open arenas for learning, we found that much of the research focused on understanding online interaction in formal educational settings (e.g., Massively Open Online Courses), with limited examination of learning in open, online forums. Moreover, research that does exist can be found across a number of disciplinary domains. In response, we have found it productive to draw on a number of areas of inquiry that are synergistic with learning and online interaction, including areas that address individual, group, and community goals and practices, societal transformations in who learns what from whom and via which media, and theories, research and new practices in knowledge dissemination, construction and sharing.

This review is based in part on the literature reviewed for our studies, but expanded and with the purpose of setting an agenda for wider review and further research on learning in the wild. The following outlines the areas of consideration we have found productive so far and/or see as grounds for further research. This is presented as a starting place for engagement with other researchers and for a more systematic search and review of the literature. The expectation is that understanding the organization and practice of open, online learning will show how such sites can be designed and harnessed as independent sites for learning, as adjuncts to learning for work, career and formal education, and/or as support for individual, community, and societal goals for knowledge exchange and development.

These areas include:
- Learning Framework, examining assumptions about how open, online learning is or should be organized, e.g., whether open, online learning follows the principles of formal or informal learning, or some new form of practice
- Social Learning, and in particular conversational and community approaches to learning
- Community of Practice, adding to social learning the need to learn about the social, i.e., the norms and practices of the learning environment
- Social Networks, addressing the networks of relations and connectivity that structure and support learning
- Motivations to Participate, addressing what motives individuals, and how to motivate contributions and knowledge sharing in a way that meets the needs and practices of the community
- Synergistic Literature, discovering literature that adds further insight into practices of open, online learning.

Learning Framework

Perhaps the first question to ask is: *Is the kind of learning happening in open, online forums formal, informal or some hybrid?* The answer is relevant for designing and participating in such forums. Yet, as new learning venues, we do not know whether open, online learning sites form along the lines of formal or informal learning sites (Greenhow & Lewin, 2016).

A difficulty in pinning this down is that there are varied definitions and delineations of the scope of informal learning, including anything outside a formal, educational setting to the teaching that occurs in the family as adults show children how to accomplish tasks at home.

Perhaps the most useful distinction in the context of our focus is that made by Smith (2008, online): "[I]t can be argued that informal education is largely driven by conversation (and has formal interludes), while formal education is curriculum-driven (and has informal interludes)." Open, online learning aptly fits this description: not only is the process of learning driven by conversation (online posts and responses), but also the topic, scope, and domain of learning is driven by community-agreed practice. The genre of conversation drives both the formation of the discourse community (Miller, 1994) and the epistemic community (Knorr-Cetina, 1999).

A definition by the Center for Advancement of Informal Science Education (CAISE) highlights the role of experts even in informal education: "When we talk about the field of informal science, or STEM, education, we are referring to experiences and settings that are being designed, implemented and assessed by a community of dedicated, trained practitioners" (https://www.informalscience.org/what-informal-science). However, it is not necessarily 'trained practitioners' who provide information and explanation in open, online sites; nor are the open, online settings or experiences designed by such practitioners. Community experts teach community novices (gurus and newbies), credentials are evaluated and assigned internally (e.g., Reddit 'flairs', Stack Overflow 'points'), privileges are granted proportional to demonstrated practice (e.g., user access levels on Wikipedia; https://en.wikipedia.org/wiki/ Wikipedia:Administration), and management of norms and rules of behaviour arise from participant use (e.g., Chandrasekharan et al, 2018).

Perhaps this type of learning represents a new class of self-organizing learning, leading to new ideas about how learning happens (e.g., as 'over-the-shoulder' learning describes a new way of learning computer applications; Twidale, 2005). While outside the classroom, there do seem to be formal role designations present in open forums, reproducing by internal consent the role of authorities, some for knowledge (internally determined expert designations), and some for administrative oversight (moderators).

In general, we find formal vs informal distinctions less productive as a way to understand open, online learning than considering how learning happens among adults, in communities, between peers, and in pursuit of knowledge. However, one reason to continue with these distinctions is to see what transfers from research on formal and informal learning into the open environment. Thus, we leave this open as an area to be explored further in an overall research agenda relating to open online learning.

Social Learning

A number of theories support the conversational and community approach to learning, most notably social learning (Bandura, 1977) and the community of practice (Wenger, 1998). Social learning holds that learning occurs through observation; the learner (e.g., a child), chooses to imitate (or not) the behaviour according to the reactions observed. For adults, apprenticeships provide a framework for this kind of learning by observing and doing, with master craftsman modelling appropriate practice (legitimate peripheral participation, Lave & Wenger, 1991). In open, online environments similar learning processes have been described as individuals lurk before posting, and observe inappropriate behaviour being sanctioned (Haythornthwaite & Andrews, 2011; Preece, Nonnecke & Andrews, 2004; McLaughlin, Osborne & Smith, 1995).

A slightly different take on social learning by Buckingham Shum and Ferguson (2012) emphasizes the 'social' aspect of the interaction. In analysing online social learning they write that, "the focus … is on processes in which learners are not solitary, and are not necessarily doing work to be marked, but are engaged in social activity, either interacting directly with others (for example, messaging, friending or following), or using platforms in which their activity traces will be experienced by others (for example, publishing, searching, tagging or rating)" (Buckingham Shum and Ferguson, 2012, p. 5). This definition, while emphasizing the informal nature of the learning process online, expands notions of social learning beyond observation to what we might call *socializing as learning.* As found in support of online communities, the combination of social interaction with learning can be an important component of online learning, creating the 'safe' space for collaborative learning (Bruffee, 1993).

Buckingham Shum and Ferguson's definition also directs attention to social learning among peers. Where the learning is between peers, theories of relevance include collaborative learning and computer-supported collaborative learning (CSCL) (Bruffee, 1993; Koschmann, 1996; Stahl, Koschmann & Suthers, 2006). Learners help each other to gain knowledge and solve problems, while also creating the environment where it is possible

to ask questions. Expert learning and knowledge construction comes into play as emphasized in development of new knowledge and the way experts work together (Scardamalia & Bereiter, 2006). Further, this definition also echoes the work on persistent conversation (a concept defined by Tom Erickson and Susan Herring), i.e., the activity traces left in the forum record. While many use the term 'traces' to refer to the record of human interaction that creates data suitable for analytics and learning analytics, recent work also shows the equally important actual record of questions and answers. This record forms a knowledge base of an FAQ library within the site. Research is beginning to document how the persistent record is being used as a reference source in open forums (e.g., Gilbert, 2018), and how users gain recognition for working with that record: Reddit recently added a flair for the "FAQ finder", who finds already published answers to newly posed questions; Stack Overflow gives 'points' that add to status of users who carry out this function. Thus, sites are not only locations of interaction, but also repositories of knowledge.

A rapidly growing area of analytics makes use of activity traces to examine learning, both formal and informal, with a number of studies analysing argumentation in learning and online settings. This includes work in learning analytics (Siemens & Gašević, 2012; Teasley, 2019), interaction analysis (Gunawardena, Lowe & Anderson, 1997), persuasion (Khazaei, Xiao & Mercer, 2017), and exploratory dialogue (Mercer, 2004; Ferguson, Wei, He & Buckingham Shum, 2013; Ziegler, Paulus & Woodside, 2014; Haythornthwaite, et al, 2018;). Learning and following effective argumentation practices plays a large role in open, online learning, determining how to present to the forum audience, and identifying what is considered a good or useful presentation of opinion or facts (Wise, Hausknecht & Zhao, 2014; Gilbert, 2018; Sengupta & Haythornthwaite, 2020). Of interest here is also the way authentic dialogue happens online, and the norms that support trust in the knowledge exchanged in the online space (e.g., by norms associated with backing up claims with a reference, such as citing sources as a standard in AskHistorians on Reddit; Gilbert, 2018). As noted by Allen (n.d., online): "Authentic dialogue is the last necessary feature of a collaboratively rational process: it requires that all participants in the conversation must be fully informed, with mutual assurance of the legitimacy, comprehensibility, accuracy, and sincerity of what is brought forward by all."

We leave this section considering the need for *further research on the ways in which social learning defines and supports open, online learning*, and how this relates to the production of a record of knowledge, and to trust in site information.

Community of Practice

It is not just learning of subject matter that happens in online settings. Conversations contribute to individual learning and to group practice. Thus, we add to social learning *the need to learn about the social*, i.e., the rules and practices of the local environment – the local mix of resources, opportunities for learning, and expectations (Smith, 2008). This is not just an instrumental learning of procedures, but also a *communal group meaning-making process*, which has been argued is an add-on to informal learning (Ziegler, Paulus & Woodside, 2014).

Learners entering online conversations join or create new communities of practice (CoP), where rules, norms and communal identity are defined and reinforced (Wenger, 1998; McLaughlin, Osborne & Smith, 1995; Chandrasekharan et al, 2018). Research on both virtual communities and group behaviour show that the task of learning how to be a member of such a community or group can be a major hurdle to participation. The need for such learning is evident in the terms used for new online users (newbies, apprentices, lurkers) and more advanced users (experts, wizards, gurus). Sanctioning those who do not follow the rules is common in online forums, often the job of moderators who keep participants in line about appropriate language, expertise, and genre of posting.

Previous work addressing online forums has often comes back to the need to organize collective action and expression in a way that allows work to get done – whether the project is career, education, or socially related, and whether the work to be done is launching a product, creating or delivering knowledge, or building a community (e.g., Nardi, Whittaker, & Schwarz, 2002; Orlikowski, 2002; Renninger & Shumar, 2002; Hine, 2006). Research on collaborative learning has been particularly focused on the way interaction facilitates peer observation, evaluation, and learning (Koschmann, 1996; Stahl, Koschmann & Suthers, 2006; Buckingham Shum & Ferguson, 2012; Paulin & Haythornthwaite, 2016). Research in group behaviour provides background on small group processes that may transfer to forums such as Twitter hashtag groups. Further, the group literature provides substantial work on the initiation, development and maintenance of groups, which has further

informed understanding of both virtual communities and online learning forums (McGrath & Hollingshead, 1994; Poole & Hollingshead, 2005; Haythornthwaite, Kazmer, Robins & Shoemaker, 2000; Haythornthwaite, 2006; Nardi, Whittaker, Schwarz, 2002; DMTL, 2019). The sum of this research finds that online communities do operate as communities of practice (Wenger, 1989), sustained through continued collaborative practice. Moreover, internal practice balances with external focus, with motivations for contribution including both coorientation to the goals of the forum and to a commitment to the inner workings of the forum (Haythornthwaite, 2009; Budhathoki & Haythornthwaite, 2013), a dual orientation also well documented in the group behaviour literature (e.g., McGrath, 1984).

While many of these efforts carried with them the organizational structures of workplaces (contracts, roles and duties associated with a project or education), open, online forums have generally lacked the traditional frames of reference that come with established institutions, such as rules of behaviour, defined ways of moving up the ranks, and organizational and legal sanctioning procedures. Online forum members by contrast have worked to establish their own rules for success, defining and supporting the roles and rules that afford collaboration: bringing in the lurkers (Preece, Nonnecke & Andrews, 2004), rewarding active participants (e.g., Reddit's flair notations); establishing roles to manage content and behaviours, such as moderators who keep out the trolls, curtail off-topic discussion, manage inappropriate postings (McDonald, 2017; Roberts, 2019); articulating appropriate behaviours and sanctioning transgressors; and learning to work with the technologies and their limitations.

As norms are learned as part of any educational experience, questions arise about *what norms are being learned? And, how will these serve the individual learning them?* Formal education has been tied to building and promoting accepted practice, building cultural capital associated with current societal norms, including the norms of formal education (e.g., Lankshear, Peters & Knobel, 2002; Crook, 2002). What kind of capital is being acquired and valued when learning happens through open, online forums? What norms are learned and practiced from engagement in open, online learning forums? This is another area for further consideration, examining how the norms of open, online learning blend into other educational and workplace learning practices.

Social Networks

A number of approaches to online learning, and open, online learning emphasize network aspects – i.e., who talks to whom about what – whether relating to the way technology enables connectivity or addressing the kinds of social network relations and ties built through interaction. Working, learning and socializing are increasingly oriented around social networks rather than geographical connections (Rainie & Wellman, 2012), and woven into everyday practice as ubiquitous learning (Cope & Kalantzis, 2009). Networked learning directs attention to explicit use of the interconnectivity possible through information technology (Jones, 2015). Learning networks emphasize the social network structures that emerge from learning interaction, concerned with who talks to whom about what, how ties build in networks and what constitutes a learning tie, and how interaction identifies social network roles (Haythornthwaite, 2015, 2019). Networks form the structures that define online, learning communities. Social network perspectives describe the way knowledge held within a network forms the social capital supporting all members of the network (Lin, 2001). Such knowledge includes the resources left in the persistent record as described above, and the knowledge available from the people in the network – their expertise, and also their willingness to share it. Thus, the social capital of a learning network may heavily depend on who is part of the network, and their willingness to participate by sharing knowledge.

A network focus may be on the whole network connectivity among people and/or resources, or on the way individuals manage their personal learning environments and individual learning ecologies (Luckin, 2010; Nardi & O'Day, 1999). Connectivism, described as a learning theory for the information age (Siemens, 2005), highlights using a combined set of online places and spaces to create personal learning platforms supporting individual knowledge needs and management. Open, online forums may act as an element in those ecosystems, and reviewing the research may provide studies of supplementary or complementary use of sources and resources. Connected learning (Ito et al, 2012) emphasizes individual direction in establishing the direction of their learning, and as such connects to ideas of self-directed learning (Hase & Kenyon, 2000).

The benefit of a social network analytic approach is that it can reveal structures not identified in formal organizational roles. Just as the FAQ finder role was present before being named, other roles may be emerging in support of open, online learning. Thus, this points to a methodological approach to support the research agenda on open, online learning that can help identify interaction patterns of significance to the community of learners.

Motivations to Participate

Success of online learning communities depends on individuals being motivated to share knowledge in a way that meets the needs and practices of the community. In part, participation in these forums follows more general societal transformations in acceptance of peer production, online participation, online learning, and open repositories as viable and trustworthy practices (Benkler, 2006; Ito et al, 2012; Jenkins, Clinton, Purushotma, Robinson, & Weigel, 2006; Haythornthwaite & Andrews, 2011). The practices that started with collaborative programming efforts and open source software (Raymond, 1991), can now be seen in open learning for computer programming, e.g., through Stack Overflow. A number of studies address motivations to contribute to open source and open access projects, including Wikipedia (Bryant, Forte, Bruckman, 2005; Farič & Potts, 2014), geographic information systems (Budhathoki, Nedović-Budić, & Bruce, 2010), and citizen science projects (Crowston & Fagnot, 2018). Motivations have been found to include personal and career interests, orientation to the topic and to open knowledge, and to the aesthetics of the products (Budhathoki & Haythornthwaite, 2013).

Not discussed in this literature is the way Q&A sites have the particular challenge of not just adding content, but of responding to questioners in a way that meets their needs. The kind and format of a question may signal to an answerer whether the asker is a novice or expert, and thus provide information about how to form an answer the question. Technical features may provide for a community level 'smoothing' to answers, e.g., as in the way comments on Stack Overflow may clarify questions or answers (Sengupta & Haythornthwaite, 2020). Overall this suggests that a newer research agenda may pursue *how people learn to teach others* in these open, online forums.

Synergistic Literature

The background discussed so far concentrates on the social in various forms, with learning supported through the conversations and enlargement of experience enabled through the actions of reading, asking questions, reading responses, and engaging with a learning community. Beyond the specific work that addresses learning, a number of synergistic areas relate to the overall aim of understanding what kind of learning is happening in open, online forums. As collective and crowdsourced initiatives, research on virtual community, online groups and teams, crowdsourcing, and citizen science is relevant; as voluntary endeavours with voluntary participants, research on motivations, volunteerism, peer production and participatory culture are relevant; and as technology platforms, research on socio-technical systems are relevant. In brief, promising areas for synergistic literature include new synergies being explored at the intersection of the *information and learning sciences* (Ahn & Erickson, 2016; Reynolds et al., 2019), including 'search as learning' (Vakkari, 2016), and transformations in scholarly communication practices (Haythornthwaite, Andrews, Fransman & Meyers, 2016). A large body of work on *distributed knowledge* including distributed cognition (Resnick, Levine & Teasley, 1991), e-science (Hine, 2006), knowledge co-construction (Scardamalia & Bereiter, 2006) and more. *Citizen science* studies sites echo work on open, online learning, with research on newcomers, peripheral participation, contribution patterns, and the role of 'talk'(e.g., Jackson, Østerlund, Maidel, Crowston, & Mugar, 2016; Jackson, Østerlund, Mugar, Crowston, & Hassman, 2015; He, Parrish, Rowe & Jones, 2019).

Summary

This paper drew on research literature and results from our studies of online learning and learners. As a major transformation in learning practice, a key consideration is developing a research agenda to explore how learning is happening in open, online forums. This includes examining how practices are providing new knowledge bases and learning opportunities for individuals; how community dynamics play into successful learning; and how this activity supports knowledge, learning and cultural capital for individuals and communities. The questions and areas discussed here are not comprehensive of all approaches to be taken to

open, online learning, nor of the questions to be asked. They are presented as a starting points for engagement with others about this new experience of 'learning in the wild'.

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Situated Readiness and Transformation of Learning Across Situations and Settings

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Abstract

This short paper introduces the concept of Situated Readiness as a set of skills and dispositions required to participate meaningfully across settings and situations, seeing them as networked and intertwined. Following earlier work within the field, networked learning is here understood as learners' connecting of contexts in which they participate, and as their resituation of knowledge and ways of acting across these contexts (Dohn, 2014). The development of the concept of Situated Readiness is based on a conducted study using a Design-Based Research (DBR) approach to investigate, how student teachers at a Danish Teacher Education Program (TEP) transformed knowledge and ways of participation when transitioning between a course and a public-school class. The findings of the study indicate the needs of socio-epistemic skills and dispositions that enable students to resituate, utilise and transform knowledge from known social contexts to new ones e.g. from a learning situation at the TEP to novel situations in school. Situated Readiness is, in this sense, the ability to attune to the specific social and epistemic requirements and demands, also termed "requirement characteristics", pertaining in these new contexts. To aid the analysis of the skills needed to engage in networked situations, an analytical framework of context levels is presented. The framework points out how requirement characteristics at three interacting levels are posed on the learner. The three levels: 1) the life-setting, 2) the activity-internal level and 3) the domain-internal level form a complex whole and as a learner acting competently in a situation, consists of the ability to respond accordingly to this complex whole. The findings of the DBR study points at challenges towards students´ transformation of knowledge between the two settings, suggesting that the development of Situated Readiness on the learners behalf requires educators to design for learning opportunities, that take into account, how settings and situations are networked and that students are given opportunities and support to recognise these temporally connections as part of their learning trajectories. The lack of explicit articulation of the sameness and differences between the setting leaves the students to realize and attune to these by themselves, which the study shows, is a major challenge to students, who have limited experiences with teaching in practice.

Keywords

Research Context

The paper builds on findings from a conducted Design-Based Research study (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; Collins, 1992) investigating how students within a specific Danish Course, Verbal Skills and Communication, at a Teacher Education Program (TEP) in Denmark, transformed knowledge and ways of participation, when transitioning (Beach, 2003) between the course setting and a classroom setting in local a public school. A learning design, inspired by Engle's research on expansive framing (Engle, 2006), was developed and implemented in collaboration with teachers at the TEP and School. Engle documents that the teacher's articulation of the relevance towards content and processes, beyond the learning situation itself, can foster student's expectation towards the usefulness of what they learn, thereby bridging the learning and the transfer contexts. The learning design required students, in groups, to plan, teach and evaluate a lesson of 90 min. where they experimented with the topics and content of the course.

The study underwent two iterations with two consecutive classes at the TEP, with the primary school class being the same through both iterations, but in their years 5 and 6, respectively.

Data was collected and through video supported classroom observations (Hansen & Carlsen, 2017) in both the course setting and at school. Group interviews (Kvale & Brinkmann, 2014) were held after each visit at the school. Further, the teaching plans developed by the student teachers were made available for analysis.

Findings of the study

Findings of the study show that student teachers transfer propositional knowledge of curricular content, transforming and resituating this knowledge through adapting their academic terminology, through the use of tools and artefacts (Wertsch, 1998; Goodyear, Carvalho & Dohn, 2016), including PowerPoints, video, audio and digital teaching platforms. They also utilize activities introduced in the TEP course, as activities in the primary school class. This requires them to transfer practical skills in conducting the activities and to transform their actions from those of participants in activities to those of persons orchestrating activities for others. This involves transforming and resituating patterns of participation (Greeno & Gresalfi, 2008) in learning activities between the TEP and the primary school class. The findings of the study further indicate the needs of a set of socio-epistemic skills and dispositions that enables students to resituate, utilise and transform knowledge from known social contexts to new ones e.g. from a learning situation at the TEP to novel situations in a school.

Situated Readiness

The concept of Situated Readiness (Hachmann & Dohn, 2018) relies on a view of networked learning, that sees learning not as limited to one situation or resource but as a result of many previous situations and their impact on how the individual's knowledge, understanding of and participation in new learning settings transform. In this sense, former and present situations are networked for the individual and the strength of the connections between the situations will be significant in how difficult it is for the learner to meet the requirement of a given situation.

Theoretical outset

The theoretical outset is a sociocultural understanding of knowledge as situated and context-dependent (Greeno, 1997; Lave & Wenger, 1991; Säljö, 2000) and socially mediated in practice (Rogoff, 1990). Transfer is accordingly conceptualized as transformation of "acts of knowing" (Greeno, 1997) from one holistic unity of situational demands and possibilities to another, where each unity is concretely negotiated between participants in the situation. From this situated sociocultural perspective, participation in educational activities requires students to develop and utilize a set of socio-epistemic skills and dispositions, that enables them to transfer, resituate and transform knowledge and participation across situations and activities. Situated Readiness is the attunement to specific requirement characteristics pertaining in these new situations and relies on negotiating socio-epistemic positions and engaging in content, following Greeno's dual concepts of systemic and semantic positioning (Greeno, 2011). In this view patterns of participation and dispositions are results of continuous negotiations of what (varying) degrees of authority, accountability, and skills each participant has, when engaging in a specific learning context and how they are able to respond to the situational demands.

Framework for analysing context levels

To recognize the requirement characteristics of a given situation an analytical "framework of contextual levels" first developed by Dohn (2017) can be of help. The framework has shown useful in specifically investigating student teachers' transformations of knowledge between the TEP and a classroom setting in a public school (Hachmann & Dohn, 2018; Dohn & Hachmann, 2020). The framework points out how requirement characteristics at three interacting levels are posed on the learner:

1 The life-setting level is concerned with the "real-life" context of activities e.g. participating in an educational program.
2 The activity-internal level is concerned with the activity itself e.g. planning a lesson, solving a problem or teaching a specific topic.
3 The domain-internal level concerns with the domain e.g. pedagogical theory or subject-specific knowledge and strategies.

The three levels form a complex whole, and as a student teacher acting competently in a situation consists of the ability to respond accordingly to this complex whole. While the framework is able to deal with a very wide range of learning situations, this paper presents only some issues which are of particular importance to learning within teacher educational settings that implement collateral transitions between education and workplace. As shown in figure 1 below, Situated Readiness involves resituation and transformation of knowledge and activities, and negotiation of socio-epistemic positions in both settings at the three context levels:
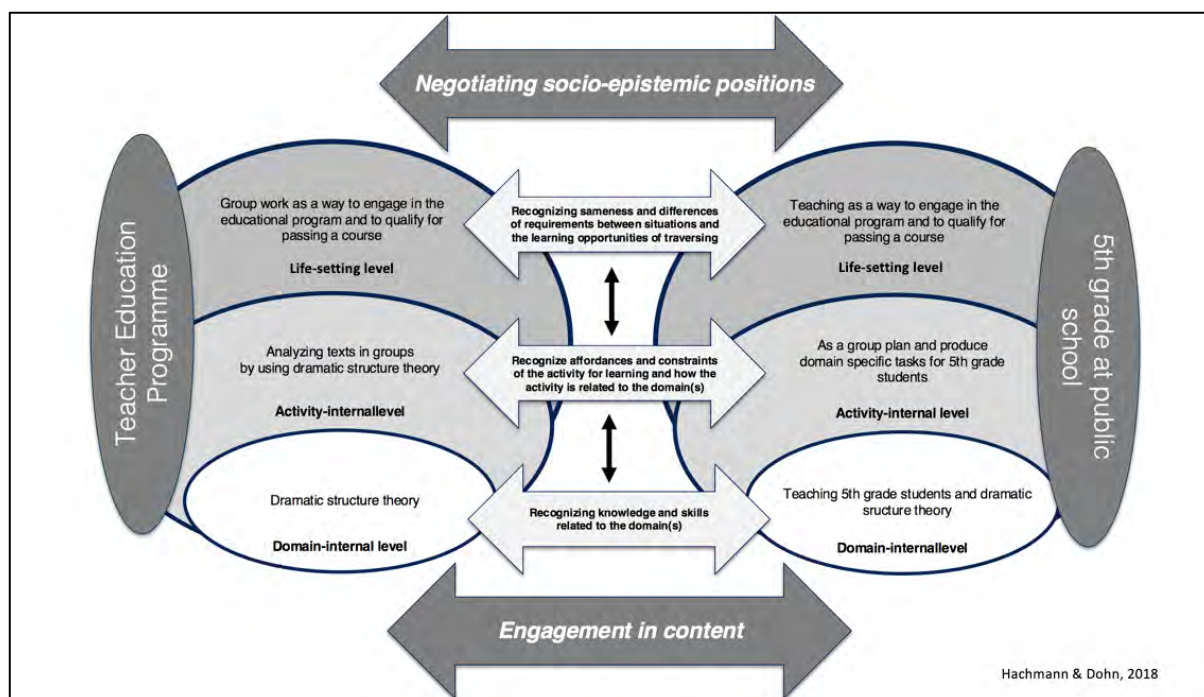
Figure 1: An example traversing between the TEP and the classroom in public school.

Situated readiness at the life-setting level

Meeting requirement characteristics at this level is related to the teacher students' abilities to recognize – if not explicitly, then at least implicitly in their actions – both the contextual differences between the public school and the TEP and also their relatedness. Situated readiness at the life-setting level entails dispositions to recognize, attune to and challenge how frameworks provide structures, norms, roles and cultural beliefs, and how they afford specific activities. Furthermore, situated readiness at this level involves the ability to see analytically how frameworks and situations differ in terms of settings that one traverses between.

Situated readiness at the activity-internal level

Meeting requirement characteristics at this level is related to the teacher students' dispositions and skills enabling them to engage in activities within different life-settings.
Situated readiness at the activity-internal level entails dispositions to recognize the affordances and constraints of the activity, thereby transforming and resituating patterns of participation and participatory identities from previous activities. Participating in activities have both cognitive and practical aspects and depends on what the learners already know from past experience and learning situations involving similar activities.

Situated readiness at the domain-internal level

Meeting requirement characteristics at this level is related to the teacher students' content knowledge and skills to perform specific actions. Situated readiness at the domain-internal level entails dispositions for recognizing the specific knowledge and skills needed for engaging in content that is aligned with the requirements of the domain itself. It also entails dispositions for recognizing how different domains have requirements that differ or can contribute across activities in ways which are not determined solely by the activities but are also sensitive to the life-setting level.

Concluding remarks

This short paper aimed to introduce the concept of Situated Readiness as a set of skills and dispositions required to participate meaningfully across settings and situations, seeing them as networked and intertwined.
From this view transfer, transformation and resituation focus on how student teacher´s dispositions to engage and interact with others play out, as part of collateral transitions between the TEP and a class of pupils. The transitioning between the TEP and School is not an easy feat. The study shows clear examples of transfer at the domain and activity levels, as well as indicating the need for transformation of the knowledge involved for the student teachers. The study shows, that in some situations recognising similarities seemed easy, and in others

very hard. Following the student teachers' movements between the two settings reveals, that they were challenged in justifying their choices and transformation of the subject matter between the two contexts. Due to the differences in the requirement characteristics of the life-setting, they needed far more guidance from the teacher to see, the connections between the activities the TEP and the ones they taught in school. A consideration here is that the student teachers are, of course, inexperienced as teachers so they cannot be expected to be able to see and respond to all situational demands, let alone justify all their actions reflectively and soundly. The concept of Situated Readiness and the framework presented can help analyse the skills needed to attune to the requirements of new situations and illuminate, what goes wrong if such attunement is not attained. Likewise, it can be of use for educators designing for learning opportunities, that involve transitions between networked settings and situations, highlighting the need for explicitly framing the sameness and differences between them.

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Teacher Reflection on their Agency for Change (TRAC) - A tool for school-based social network learning

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Abstract

This short paper introduces an on-line log for Teachers' Reflection on their Agency for Change (TRAC) designed to collect data and provide automatic visual feedback on teachers' social networks. The TRAC tool was developed within a research project 'Making SENse of Teacher Agency for Change with Social and Epistemic Network Analysis'. The project aimed to understand how teachers exercise a form of relational agency defined as a capacity to work purposefully with others within and beyond schools, to support all learners, especially those at risk of exclusion, underachievement or other forms of marginalisation. Teachers' reaching out to others and mobilising their social networks is an essential part of such agency. The study used Social and Epistemic Network Analysis to examine simultaneously the structural properties of teachers' social networks and the nature of content that flows through them. It also provided network visualisations and feedback to facilitate teachers' professional reflection on how they use their relational agency to build inclusive school communities. The aim was to support teachers' professional development by raising awareness about their individual and school network properties and nature of interactions within these networks. Part of the project was the development of the TRAC software that enabled teachers who engaged with a web-based reflective log to receive automatic feedback on their individual networks, as well as on thematic school networks, which were presented by the researchers in school development sessions. Network awareness – one's knowledge of the resources embedded in their social ties – empowers teachers to improve the social environments of their schools. Provided alongside with the summary of research-based features of social network properties (degrees, diversity and intensity of ties), network feedback was used to facilitate professional and school development towards building inclusive communities. During the project, the TRAC tool was tested in partnerships with teachers and other staff in two schools in Stockholm. The project also had a knowledge exchange component to support relational and collaborative learning resulting from engagement with the network feedback. Network feedback based on the data from these sites was used to make adjustments to the prototype feedback tool. This short paper discusses the implications for future uses with a view towards rolling out research-informed professional reflection to larger numbers of schools and teachers anywhere, through dissemination in network learning community.

Keywords

Research Background

Teacher agency has been defined as a capacity to critically shape their responses to problematic situations (Biesta & Tedder, 2007), which is partly informed by the underlying sense of purpose and beliefs about their professional roles (Biesta et al., 2015; Pantić, 2015; 2017). Teachers might perceive their roles as implementers of their school or authorities' policies, as well as 'step up' above and beyond the perceived expectations of their roles (Buchanan, 2015, p. 710). Villegas & Lucas (2002) regard teachers' beliefs about schooling and their roles as a continuum between views of teachers as 'technicians' who apply rules and procedures uncritically accepting standard school practices, and those of teachers as 'agents of change' who see schools as potential sites for promoting social equality (Villegas & Lucas, 2002, p. 54). We used this framework to code the nature of teachers' interactions as aligned to 'role-implementer' and 'agentic' views of teachers' professional roles.

In a socio-cultural perspective, teacher agency is understood in terms of its interplay with the work context in which it is embedded (Eteläpelto et al, 2013). One of the key aspect of teacher agency is the support they are able to mobilise within their social contexts (Lane & Sweeny, 2018; Pantić, 2017). Sense of professional purpose and relationships with other actors within and beyond schools are key components of a relational

agency – teachers' capacity to work purposefully and flexibly with others and become aware of the resources they could bring to bear to take forward what really matters to them (Edwards, 2010). On the one hand relationships with students, families, colleagues and other professionals such as health or social workers are key for building 'protective networks' around vulnerable students. On the other hand the relational structures, or social networks, mediate the opportunities and constraints for exercising agency within given context, e.g. through the levels of trust and influence teachers have within their school communities, which makes relationships both a function of and condition for teacher agency (Pantić, 2017). Social networks, while not deterministic, provide teachers with opportunities to access critical resources by mobilizing their social connections. Research indicates, for example, that frequent interactions with close colleagues foster an environment conducive to change and improvement by reinforcing constructive school norms of formal support, mutual help, and shared responsibility for students (Penuel, Riel at al., 2010). In this view, school-based social networks are dynamic and, at least in part, dependent on the relational agency of teachers. Teachers' interactions with others for a specific purpose are thus conceptualized as building blocks for creating more stable social network structures over time, which in turn shape future interactions.

Aims and Objectives

In this context, TRAC tool is designed to facilitate teachers' professional reflection on their relational agency by raising network awareness that can facilitate network learning and intentionality towards building inclusive school communities. The aim of the short paper is to introduce and promote this new piece of research software and discuss its potential uses with the members of network learning community. The objectives are:

- To introduce the TRAC tool for study of relational teacher agency and its theoretical assumptions
- To present the uses of network feedback features in a study conducted with two schools in Stockholm
- To discuss potential adaptations and future uses of the tool with the network learning community

Design

The study combined Social and Epistemic Network analysis to understand how teacher agency exercised towards particular purposes (collaborative working for inclusive practice) shapes school relationships and community building. Derived from the basic assumption that change towards more inclusive educational practices is a socially embedded process the study examined the content and structures of teachers' social networks. In particular, we used 'egocentric' network analysis to map teachers' social ties with various 'alters' within and beyond school to uncover intentionality in teachers' networking as part of their relational agency. For teachers, ego networks are a critical source of information, social support, access to resources, but also their sense-making processes (Coburn & Russell, 2008). The analysis combined the 'ego-network' approach with the epistemic network analysis to gage the nature of the content that flows through teachers' interactions with their colleagues, students, families or specialists and other actors within the school communities.

Data was collected using an on-line log (TRAC tool) which asked teachers to reflect on specific situations in which they interacted with others. The log allowed teachers to name as many alters as they approached and give reasons why they reached out to them and how these alters supported them. This allowed us to examine simultaneously the purposes, types and impact of teachers' interactions. The project involved data collection and network feedback in two schools which had initiatives to promote teacher collaboration. Teachers from each school (23+32) completed the total of 124 logs, three times at roughly two-month intervals during the 2018-2019 school year.

The content of each log was coded for underlying themes as well as with the 'Agency' and 'Role-implementer' codes reflected in the theoretical framework (described above). The log also provided teachers with automated feedback on their personal networks, which included visual representations of their ego networks with guidance for interpreting their network properties, such as degree (number of ties), diversity (of alters' roles), and intensity of interaction (e.g. one-off exchange of information or advise, or collaboration over a period of time). After the completion of three logs we organised a workshop in each school to present anonymised school network visualisations based on the data from each site. The data from these sites was used to make adjustments to the prototype tool, as well as to help teachers understand their relationships and discuss their practical implications for school community building. The paper presents examples of teachers' reflection and discusses the opportunities and challenges of school-based network leaning for research and professional development.

Preliminary findings

The analysis of teachers' ego networks showed that teachers who displayed higher levels of agency (based on the content coding) also had higher degrees, more diverse and more intense networks in both schools. We identified four broad themes in the content of the interactions: (1) student learning and well-being, (2) lesson planning and professional learning, (3) program improvement and logistics, and (4) working conditions and learning environment. Examination of the frequency of occurrence of agency and role implementation codes within the four themes (Table 1) revealed that agentic interactions occurred most often in situations that involved student learning and well-being. In contrast, the most common type of context in which role implementation took place was lesson planning.

Table 1. Content of interactions for agency and role implementation

Context of Interactions	Agency	Role Implementation	Total Count
Student Wellbeing	33 (46%)	11 (21%)	34
Lesson Planning	13 (18%)	20 (40%)	33
Working Conditions	8 (11%)	8 (16%)	16
Program Improvement	18 (25%)	12 (23%)	30
Total Count	73	51	124

Teacher agency for change is also associated with higher degrees of ties and more diverse and intense interactions, especially when teachers focused on students' learning and wellbeing (see, e.g. Figure 1).

Figure 1. Comparison of model ego-net for agency and role implementation
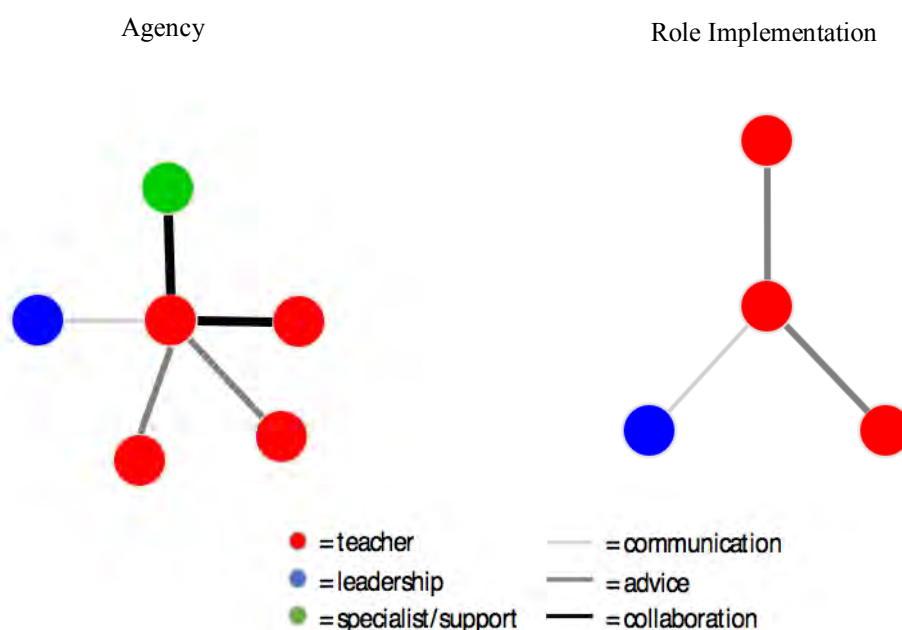
These findings suggests that teachers' agency for inclusive practice is characterised by their working with various others in a way the implies more intense collaboration (e.g. over period of time) in contrast to role-implementation situations in which teachers tended to have more one-off interactions, such as going to their manager or colleagues for advice while focusing on lesson-planning and programme improvement.

Methodological implications

Epistemic and Social Network Analysis have previously been combined to study collaborative learning using data produced in massive on-line courses (Gasevic, et al., 2019). Our study has demonstrated the potential of applying this learning analytic approach in studies set in real setting contexts. Previous studies of teacher agency have predominantly been designed as qualitative case studies to capture the complexity and context-embeddedness of agency in particular locations. Combining Epistemic and Social Network Analysis allowed us to capture a great deal of such embeddedness by analysing situational data report by teachers, while also enabling us to quantify this contextual data to identify patterns in teachers' relational behaviour across school contexts. In the future this approach could be used to study teacher agency at a larger scale, e.g. to distil the essence of agency for change across different policy contexts or study its impact on particular change outcomes.

Network learning

The findings also have implications for teachers' professional learning and school development. The idea that learning and change are better thought of as a social practice, rather than something within the mind of an individual has become commonly accepted. In teacher learning for inclusive practice traditional ad hoc courses had little effect on change in teachers' practices and more embedded learning that involves other colleagues might be more beneficial. Teacher collaboration is seen to be a fruitful setting for developing knowledge and social capital that can stimulate teacher learning and innovation. Importantly, collaborative structures and cultures are malleable through teachers' interactions with others. Some of the participants in our study reported such efforts in their logs – creating the kind of relational structures that improve conditions for their individual and collective practices. In this context, our study provided insights (and feedback to teachers in two schools) about the content and nature of their micro-level interactions that can be useful for understanding how their practices help shape the very relational patterns that enable or constrain their agency for change.

In March 2019 we held workshops in the two schools to present and discuss these findings. The school staff and leadership discussed how the data from their site reflected school policies on collaboration and inclusive practice and potential improvements. For example, some teachers though the feedback would be more directly useful if school network data was not anonymised for participants to be able to locate relevant expertise, which raised discussion around ethical issues and how comfortable levels of disclosure could be agreed between researchers and participants. The participants also expressed views about the potential for cross-school learning.

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Citizen science as interdisciplinary working

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Abstract

Citizen science is a growing trend in involving the public in different types of collaboration with scientists. The growth of this activity has consequences for data collection, data analysis and the way in which science is carried out. It also has a potential impact on what, and how, citizen scientists learn about science when engaged in such activities. The purpose of this research is to explore the practices adopted by participants in citizen science projects, and in particular the influence on learning for the participants in these projects which rely on technology to support collaboration.

The growth of citizen science projects is occurring at the same time as a growth of interest in informal learning and both are supported by technology enhanced learning.

To make best use of the rapidly growing area of citizen science in the development of learning, it needs to be studied as a newly developing interdisciplinary area, with the consequence of unravelling the mechanisms by which interdisciplinary collaboration takes place in these settings, and the identification of conditions which encourage or thwart learning.

Keywords

Citizen science, informal learning, interdisciplinarity

Research Context

This paper explores citizen science as part of interdisciplinary working and at how this may influence learning of participants involved in citizen science projects. At first, the research context that relates to the participation of citizens which has been facilitated by communication technologies is presented. The aims and objectives of the project are discussed. Aspects of learning in citizen science projects and on interdisciplinarity in citizen science teams are presented.

The growth of citizen science has consequences for the way in which scientific activities are carried out. Wyler (p2) notes some recent trends

1.   Increasing coordination and collaboration between citizen science practitioners from different fields, resulting in sharing procedures and best practices, and creation of networks and associations.
2.   Emergence of platforms that support a variety of citizen science projects, creating broader public awareness and encouraging greater retention of volunteers.
3.   Expanding the role played by citizens in the projects beyond simple tasks to include greater participation in all phases of the research process from conceptualisation to publication.

Participation of citizens has been made easier by the growing availability of advanced communication technologies. This growth has been supported by the development of new technologies, and in particular by the development of citizen-cyberscience [Curtis, 2013] where computers are used both for data collection, data analysis and collaboration on tasks; some of these tasks are becoming complex. Foldit, an online puzzle game about protein folding being an example where the volunteer citizen science contributors were credited in a 2010 paper in the journal Nature [Cooper et al., 2010].
As well as being an important method for contributing to the development of science knowledge [Bonney, 2014, Cohn, 2008], citizen science also has a potential impact on what, and how citizen scientists learn about science, both in terms of understanding the process of science, and learning about some area of science content. This requires a novel approach combining a reflection on, and exploration of the links between formal and informal

learning, the growth of such learning opportunities, and the approaches that have been taken in order to enable the public to crossover from participation in citizen science to achieving learning objectives.

Aims and Objectives

The ambition of this project is to explore the concepts of interdisciplinary citizen science, and incidental, informal and inquiry learning in citizen science settings in order to construct a new understanding of how the learning which occurs in citizen science settings can be encouraged. Theories and frameworks of Networked learning will also contribute to how learning takes place.

Design

The project is currently in the first stage of scoping with a literature review and the conduct of pilot observations and interviews. At the next stages of this project, Wyler's (2016) trends will be used to guide the analysis of the data that will be gathered from observations and interviews with participants involved in citizen science projects.

Learning in citizen science projects

Our approach to citizen science activity is citizen science inquiry where the learner takes centre stage. In this approach ' inquiry learning and large- scale collaborations between members of the public come together' [Herodotou et al., 2017]. Most current citizen science initiatives engage the general public (e.g. in the role of volunteers, non-expert individuals) in projects generated by scientists such as species recognition and counting. The public contributes to data collection and analysis tasks such as observation and measurement. The 'citizen inquiry' paradigm shifts the emphasis of scientific inquiry from scientists to the general public, by having non-professionals (of any age and level of experience) determine their own research agenda and devise their own science investigations underpinned by a model of scientific inquiry. Additionally, the profiles of non-professionals may vary depending on their educational background or their age (i.e. children and adults will have different approach on how they are involved on scientific inquiries. Further, the paradigm makes extensive use of web 2.0 and mobile technologies to facilitate massive participation of the public of any age, including youngsters, in collective, online inquiry-based activities. Citizen inquiry aims to leverage the pedagogical potential of inquiry-based learning – a productive approach to the development of learners' knowledge of the world and the enhancement of higher-order thinking skills – through opening-up massive participation in inquiry-based activities. Such collaborations at scale require high risk interdisciplinary working and work on this research area would provide insight into most effective structures for working in this faction.

Interdisciplinarity in citizen science teams

The participation of citizens in projects led by scientists has been growing over the past ten years. Our OU work on our citizen science and inquiry teams, has resulted in the development of a number of classification schemes of types of this activity [see Aristeidou et al., 2017; Curtis, 2015; Author1et al., 2014] These classification schemes are often related to the role of the internet in enabling these activities. Like other forms of technology enhanced learning, this is an interdisciplinary activity [Author1 and Taylor, 2016]. The participants involved in such collaborative projects range from experts to complete science novices. Therefore, if these participants can be considered as a team, such collaborative activities can be considered both as an example of extreme interdisciplinarity, and an example of open research. The engagement of scientists with the public represents engagement with a wider audience, often one on a massive scale. The goal of many citizen science communities is to help scientists make scientific discoveries, but increasingly interest is growing in the possibility of learning both science concepts and processes in these settings. The work of Lemke et al. [2015], and Säljö [2010] offer an approach to examining learning in these technology-enabled informal settings.

While there is a growing recognition of the need for interdisciplinarity in solving complex research problems in many areas of science, the situation in the multidisciplinary arena of learning from science projects which use technology is worthy of exploration, and essential to underpin both as a new research area, and as an arena in which the contribution of practical solutions based on technology are developed to educational problems such as maintaining motivation in the study of science and technology. Finally, the time and the ways that networked learning scholars can rely on the use of citizen science should be investigated further.

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Openness: Student perceptions

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Abstract

This short paper describes a research project which aims at investigating how students conceive and use open educational practices (OEP). A recent definition by Cronin (2017) emphasizes collaboration, participation and learner empowerment to encompass "collaborative practices that include the creation, use, and reuse of OER, as well as pedagogical practices employing participatory technologies and social networks for interaction, peer-learning, knowledge creation, and empowerment of learners" (2017, p. 4). Researchers and educators alike have considered the role of OEP in more effectively engaging learners in the co-creation of knowledge, critically considering how digital practices and open platforms can be used in practice.

Early research on OEP focused on adoption and development of OER (Cronin & MacLaren, 2018), but has recently shifted student perceptions of impact (Jhangiani, Dastur, Le Grand, & Penner, 2018, Lin, 2019) and improved student learning and empowerment (Hodgkinson-Williams & Trotter, 2018). However, there are gaps in our understanding of learner experiences in other dimensions of openness, such as negotiating identity, privacy, visibility, literacy and the co-construction of knowledge. As educators we need to consider how the structures of these spaces will influence the open teaching practices we are using, both in how they may make our spaces permeable, and in how they might make them more impenetrable. If we want our learners to be able to explore what we as educators see as the benefits of open practices, such as co-creation and sharing of knowledge, then we need to explore both their perceptions and direct learning experiences.

The focus of this project will be on students' perceptions of openness in education, exploring their identities as open educational practitioners and how they negotiate their open educational spaces. Participants will be situated in an online graduate program (including multiple courses) designed around open educational practices, including open platforms and open educational resources, and endeavouring to include learners in critical digital pedagogical practices. To explore learner practices, the following research questions will be explored using a virtual ethnographic case (Hine, 2008):

• What are learners' understanding of open educational practice? How do they see themselves navigating open platforms, open digital pedagogies and practices and critical digital perspectives?

• What practices, values and/or strategies are shared by learners who are working within an open educational practice framework?

Keywords

Open educational practices (OEP), student perceptions, open participatory technologies

Research Context

Though there has been a long history and discussion of openness in education (Morgan, 2016), over the past decade there has been a move from educators and researchers to embrace and explore what are being termed open education practices (OEP). Early definitions of OEP were often grounded in the development and adoption of open education resources (OER) in teaching and learning contexts, but have evolved to consider the role open practice could have in creating more equitable, accessible and transformational learning experiences (Hodgkinson-Williams & Trotter, 2018; Lambert, 2018). Though there is not one overarching characterisation of open education practice (OEP), a recent definition by Cronin emphasizes such aspects as collaboration, participation and learner empowerment, encompassing "collaborative practices that include the creation, use, and reuse of OER, as well as pedagogical practices employing participatory technologies and social networks for interaction, peer-learning, knowledge creation, and empowerment of learners" (2017, p. 4). If, as educators, we want to focus on how to embrace OEP to focus on what can be considered the transformational aspects of openness, we need to consider what types of pedagogical practices might encourage this.

Like OEP, open pedagogy has varying and evolving definitions, but common elements are student agency, transparency, and the possibilities created through open networks and opening traditional educational boundaries (Cronin & MacLaren, 2018; Jhangiani & DeRosa, 2017). Open pedagogy challenges the traditional roles of learners and teachers, often by using networked and digital technologies to promote more collaborative and participatory engagement of learners. As highlighted by DeRosa and Robinson (2017), open pedagogy can use "OER as a jumping-off point for remaking our courses so that they become not just repositories for content, but platforms for learning, collaboration, and engagement with the world outside the classroom" (p. 118). Paskevicius (2017) also points to OEP to "provide an impetus for innovative teaching and learning processes" (p. 126). To meet this potential, both educators and learners need to critically consider what engaging with openness might mean for practice, which includes working with open platforms and tools, developing critical technological literacies and adopting open pedagogical and learning strategies. But what does this look like in practice? How are learners engaging critically with these spaces, and how do they consider their own relationship with openness?

As highlighted by Cronin and MacLaren (2018), many empirical studies on OEP use have focused on the practices and policies that support the development of OER and open textbooks, such as curriculum development, quality assurance and open publishing. Recent research has evolved to include a focus on OEP frameworks that address improved student learning and empowerment, using other lenses to consider the impact and transformation of teaching practice. It has also considered student perceptions of OER adoption and use (Jhangiani et al., 2018; Lin, 2019) but there is a gap in our understanding of learner experiences in other dimensions of openness, such as negotiating identity, privacy, visibility, literacy and the co-construction of knowledge. OEP research into the incorporation and implementation of open platforms and tools with open educational practices is also lacking. Downes (2019) suggests that, with the rise of artificial intelligence, open data, and cloud computing, pedagogical considerations will be more about using and creating content rather than consuming it. Jhangiani & DeRosa (2017) echo this when they indicate open pedagogy is also "a process of designing architectures and using tools for learning that enable students to shape the public knowledge commons of which they are a part" (para. 13). As educators we need to consider how the structures of these spaces will influence the open teaching practices we are using, both in how they may make our spaces permeable, and in how they might make them more impenetrable. We need to critically examine the idealized version of "technologically mediated openness" (Oliver, 2015) that is often associated with online, networked learning space, to consider what kinds of exclusions and closed-ness can be introduced. In addition, Cronin (2018) highlights that "Openness is not a one-time decision and it is not universally experienced; it is always complex, personal, contextual, and continually negotiated" (p. 291). This points to a need to explore these open spaces from a learner context, examining learner perceptions of their use and how we as educators can more effectively incorporate them into our practice. If we want our learners to be able to explore what we as educators see as the benefits of open practices, such as co-creation and sharing of knowledge, then we need to explore both their perceptions and direct learning experiences.

Aims and Objectives

This study focuses on students' perceptions of openness in education, exploring their identities as open educational practitioners and how they negotiate their open educational spaces. In particular I hope to explore their uses of open educational tools and how they how they consider private/public spaces, and how the inherent openness of the platforms may both enable or inhibit their learning practices. This study is in the early stages and will be situated in an online graduate program (including multiple courses) that embraces open educational practices, such as the use of open platforms and open educational resources, and endeavours to include learners in critical digital pedagogical practices. As participants will be engaging with different tools and resources in different space/time configurations, one focus will be to better understand how learners navigate and use open platforms. To explore learner practices the following research questions will be explored using a virtual ethnographic case (Hine, 2008):

- What are learners' understanding of open educational practice? How do they see themselves navigating open platforms, open digital pedagogies and practices and critical digital perspectives?
- What practices, values and/or strategies are shared by learners who are working within an open educational practice framework?

Design

As this project aims to explore not only student perceptions, but practices and strategies used by learners in open spaces, an ethnographic case study approach (Simons, 2009) will be used. Methods for the exploration of online spaces, particularly educational online, open spaces are still relatively under-developed and exploratory. As

outlined by Dodge (2005), our online spaces are "not a single, homogenous and continuous phenomenon, but a myriad of rapidly evolving digital spaces, channels and media, each providing a distinct form of virtual interaction and communication." Virtual ethnography (Hine, 2017) offers researchers a way to go beyond the "mapping of the technological landscape" to "capture the subjective experience of living in such a landscape" (p. 325).

Participants will be recruited from three open, online graduate courses at an open, online institution. Data collection methods will use a modified version of web-sphere analysis and "network ethnography" outlined by Schneider and Foot (2005), where online practices are viewed and explored through the examination of web-objects, such as texts, links and sites. For each of the courses, analysis of texts, structures/features and field research (participant interviews and questionnaires) will be combined to provide a detailed description of the relations between participants and spaces. A detailed examination of the course spaces and linked social media spaces, including both the physical or virtual and the activities that happen within them, will help describe the visible and invisible practices and perspectives of learners. This will include a common participant observation approach that uses a combination of online surveys and interviews, combined with systematic analysis of online communications. Visuals and maps will be used to trace the networks of spaces, including conceptual linking of the webpages, screens, images, weblinks and readings that constitute the framing of the open activities.

The researcher hopes that, through this detailed examination of the spaces and their associated practices, we can get a better understanding of how our learners negotiate the complex landscape of working and learning in an open space. Using a similar design which explored student perceptions of learning in cMOOCs, another type of open course, Saadatmand & Kumpulainen (2014) found that though learners were challenged in managing the open spaces, they were able to participate actively in generation of knowledge and to share their own content. They were able to make tangible recommendations for learners and designers working in this space and it is hoped that this project will find further insights into practice. If we truly want to embrace the aspirational aspects of open educational practice, we will need to critically examine what types of spaces support learners to become partners in their own OEP journeys.

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Students' views of a networked practice inquiry course: energising and challenging higher education teaching

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Abstract

In the higher education sector both networked learning and inquiry-based learning are signalled as flexible pedagogical approaches which support and encourage the development of skills, competences and qualities expected of "21st century" learning. Whereas networked learning distinctively attends to connectedness enhanced and mediated by technologies for the creation of learning networks and socio-material assemblages, inquiry-based learning distinctively brings together teaching and researching encouraging students' learning engagement and development. A networked practice inquiry approach was envisaged as helpful to encourage postgraduate students to engage for learning on and with digital technologies and inspire professional practice development. Past the course experience an interpretative study was taken up in an attempt to obtain an initial picture of the student perspective of this course approach.

This paper shares a preliminary qualitative picture describing students' viewpoint of the networked practice inquiry learning experience. It is a first glimpse into technology enhanced and mediated learning experience of the postgraduate student in Malta. These preliminary findings suggest that students are forward looking. Students demand and celebrate innovative digital tools and practices in and for learning, especially when these are seen accommodating them and resonating to their wider life and work practice experiences. They are generally enthused to assume explorative and inquiry attitudes into life and work practices for learning and practice development. They are also into connectedness for learning but on their own terms. This is a threefold appeal coming from mature students regarding their higher education course experience which, in a local context of fast developing socio-technological change, is simultaneously energising and challenging. Considering that in the local context there is currently a lot of work going on the political and executive tables to see artificial intelligence and immersive technologies compellingly transforming mainstream societal sectors including education, in the local higher education scene we urgently need to make a start for making the course experience the first port of call where one has the "an opportunity to think and dream" as one of the research participants put it; constructively and critically laying down our future and that of the generations to come.

Student experience, networked learning, inquiry-based learning, qualitative research, higher education

Introduction

Technologies are a facet moreover an integral aspect of our work, our life, and increasingly part of our physical selves. Fast and unrelenting techno-social developments and increasingly immersive surroundings accentuate the need for the development of higher order competences and qualities moreover factual knowledge when in formal learning. Against this backdrop, a networked practice inquiry approach was adopted for taking forward a social science course within an overarching postgraduate programme of studies. In the higher education (HE) sector both networked learning and inquiry-based learning are signalled as flexible pedagogical approaches which support and encourage the development of skills, competences and qualities expected of "21st century" learning. Whereas networked learning distinctively attends to connectedness enhanced and mediated by technologies for the creation of learning networks (Goodyear & Carvalho, 2014) and socio-material assemblages (Gourlay & Oliver, 2018), inquiry-based learning distinctively brings together teaching and researching (Brew, 2010; Healey, 2005) encouraging students' learning engagement and development (Spronken-Smith, 2012). This networked practice inquiry approach was envisaged as helpful to encourage students to engage for learning on and with digital technologies and inspire professional practice development. This paper shares preliminary qualitative results describing the student viewpoint of the networked practice inquiry learning experience. These results suggest that students are forward looking. They demand and celebrate

innovative digital tools and practices in and for learning, especially when these are seen accommodating them and resonating to their wider life and work practice experiences. They are enthused assuming explorative and inquiry attitudes into life and work practices for learning and practice development but demand more time for such active engagement. They are also into connectedness for learning but on their own terms. This is a threefold appeal coming from mature students regarding their higher education course experience which, in the Maltese local context of fast developing socio-technological change, is simultaneously energising and challenging.

Research Contextualisation

This last decade the HE student experience of digital educational practices has attracted a lot of attention, much because of the student consumerist outlook seeping into the sector (Jones, 2018; Johnston, McNeill & Smyth, 2018; Mayo, 2019) but in part and more constructively because of a genuine concern to respond better to the students' learning needs at what is increasingly seen as the digital university (Gourlay & Oliver 2018; Johnson et al., 2018) trying to keep up with the wider community and societal evolving context (Siemens, Gašević & Dawson, 2015). I would like to think this effort falls in the latter category. Although the networked learning literature includes a good number of studies on the HE student experience of technology enhanced and/or mediated learning (Goodyear, Jones, Asensio, Hodgson & Steeples, 2005; Jones & Bloxham, 2001; Ramanau, Sharpe & Benfield, 2008; Beetham, 2008; Thorpe et al., 2008; and so on), such studies in the local higher education context of concern are a rarity. In-depth research looking into the postgraduate student's perspective of the digital learning experience in the Maltese context is strikingly missing (and this at a time when there is a local drive to advance and spearhead technology enhanced and mediated practices in different societal sectors including education). This research study is a preliminary attempt to address this research gap. It also comes just in time when a new University of Malta (UM) strategy issued recently declares the need to be giving special attention to the student experience and the development of teaching and learning at the institution, alongside blended and online learning policy initiatives. In its statement regarding the nurturing of "a culture of quality based on the principle that quality comes from people" the UM strategy states that "teaching, learning and research are fundamental core missions" and "student engagement and involvement are indispensable in the design, development and review of programmes, evaluation of procedures and governance" (p.61). This initiative is also seen as a small early response implementing the new institutional vision; an unpretentious attempt to involve the students in the review of formal HE teaching and learning.

Research Background

When the author was invited to take forward the study-unit on the digital dimension of community action and development within an encompassing Masters level programme of studies on community action and development at a HE institution in Malta, she strived for a preach-through-practice learning design aspiring "communal" learning enhanced and mediated by available digital technologies. The implemented networked practice inquiry course strategy meant to encourage students to actively engage exploring the digital dimension of community action and development for themselves in learning and additionally support their professional practice development considering that the 12 enrolled course participants where professionals already engaged in communal, education and other public and private community activism.

The implemented networked practice inquiry approach included 11 on-campus weekly, 3-hour, evening meetings and an online component intended to make seamless the course experience across the virtual and the physical and (in a small way as an initial attempt) the closed and open spaces. Through the study course students were introduced to curricular concepts on the theme of digital practices for community action and development and invited to reflect on their professional work and other life practices in cooperation and collaboration with fellow students offline and online. The offline meetings were a mix of discussion activities which were meant to continue in the dedicated online space, and student led seminars presenting a critical review of a self-selected case-study and project work in progress. The assessment was based on their online contributions (20%), seminar presentation of the project work in progress (20%), participation in the peer reviewing exercise (10%) and the 1500-word written project report (50%). For their individual project work, students were encouraged to engage in an inquiry-based enterprise critically appraising some self-chosen aspect of their life and/or professional work practice relating to community action and development with the aim of improving it in consideration of surrounding digital technologies and practices. Through the study course the students also had the opportunity to explore, experiment and connect using a small selection of social media and other innovative technologies, and critically appraise them in (what were intended as relaxed and easy-going) conversations with fellow peers and tutor with regards to their wider life and professional practices. Further to teaching the intended curriculum for

personal content knowledge development, an aspiration in adopting this networked practice inquiry strategy was to support the course participants develop critical and analytical competences, and a discerning attitude to learning and wider practice development which are considered crucial commitment in higher education teaching and learning.

Past the course, a qualitative research study was taken up to evaluate the course experience from the students' standpoint and so involve them more intimately in the review of the course for feeding future teaching and learning development. The students' course evaluation feedback collected by the anonymous post-course online survey issued by the institutional unit responsible for the quality assurance of academic programmes and resources yielded 4 responses. Markedly, the survey highlighted that although the course was generally well received, students found it hard to keep up with weekly tasks because of time limitations. Nonetheless there was found a comment which along with the criticism of the many tasks for part-time study commitment, stated that the course was "not engaging", and that in spite of "potential to help in community work outreach and engagement" the course "took another twist, more targeted for professional growth". The qualitative study meant to gain a better understanding of the different student perceptions and experiences in more detail to hopefully improve this postgraduate blended course experience, reaching out to the all the different students' learning needs (which evidently for some students fell short despite the careful planning). The following section sets out the qualitative description of this course constituted from the transcribed comments of participating students who kindly consented and dedicated some of their precious time to contribute to this study (and for which, as the course co-ordinator, tutor and researcher, this author is very grateful).

Research Methods

For this exploration of students' perceptions of the networked practice inquiry course experience, an interpretative attitude was assumed in an attempt to arrive at a depiction from the students' viewpoint. Semi-structured interviews with consenting participants were held 3 months after the end of the course and the publication of course results. The emailed call for research participation attracted 2 out of the 12 invited students (who completed the course). The additional attempt to recruit more participants using a snowballing strategy failed. The interpretative approach within the qualitative research paradigm (Hennink, Hutter, & Bailey, 2011) to understand students' lived course experiences sidestepped the problem of the small research sample because each data transcript incorporates multiple instances of perceptions and experiences (Norman Denzin in Baker, Edwards, and Doidge (2012)) so at most a small research sample yields a description which is more partial than that which could have been obtained employing a larger data set. The study is considered mostly preliminary quest into the Maltese postgraduate student experience of digital learning practice but nonetheless a noteworthy starter.

During the interview the participants were encouraged to describe episodes of their learning enterprise and to reflect and comment on how they approached tasks, what they saw themselves gaining from these experiences, what they found helpful or otherwise for their learning and professional practice development, and what they thought would have supported them better for their personal learning and wider life and work practice development. The audio-recorded interviews were transcribed verbatim and emailed to the interviewees for approval before the data analysis process.

The interpretative data analysis process consisted of two main stages. The first level of analysis consisted of 3 iterations through the data. Through the first iteration, each transcript was read and annotated with neutral codes. In a second round through the individual transcripts, potential themes and subthemes were identified and illustrative data excerpts marked. In the subsequent iteration of this first level of data analysis, the set of themes and subthemes from across different transcripts were brought together along with corresponding quotations (and other transcript tracking information) into a single data tabulation. Past this first stage of data analysis, the activity-centred analysis and design (ACAD) framework (Carvalho & Goodyear, 2014) was brought in as a theoretical frame for structuring the interpretative narrative describing the lived experiences of the learning course. The set of themes and subthemes was grouped and regrouped to devise a representation of student views set out in consideration of the tools and spaces supporting the lived experience of the set design, the tasks setting forth the lived experience of the epistemic design, and the people and places upholding the lived experience of social the design. The next section outlines the resulting interpretation.

Research Findings

The blended course intending an in inquiry-based attitude within an overarching networked learning approach for exploring the digital dimension of community action and development was portrayed as follows:

The lived experience of set design – what of tools and spaces

The networked practice inquiry course approach was a different pedagogy than what the students are used (#1). The lectures were not lectures (#1) but a discussion space where you could talk and everyone was sharing their thoughts on the discussion theme (#1). The case-studies describing innovative projects were a welcome inclusion because they provide examples of state-of-the-art innovation, so a source of ideas for assignments and work practice development. It was also a pleasure for students to have the possibility to access the webpages of projects they were reading about. The approach was different than going to the lectures where you can sit to silently listen and you do not have "homework" but can do a little bit of reading and think about the assignment (#1). In this study-unit the student was involved very much (#1). There were the online discussions besides the discussion in class for the students to keep up with every week (#1, #2).

The institutional (Moodle-based) course-site conveying the learning resources and the online discussion forums is not so convenient for being accessed using the mobile phone (#2). Part-time students who are trying to get on with their studies often take the study work to bed. Mobile devices such as the smart phone or the tablet are more convenient (#1, #2) to juggle part-time studies with life and work commitments. Behind the scenes, the students maintain a secret group to keep connected (for this student cohort a Facebook group). The tendency is for students to download and share course resources within this secret group away from the institutional course-site which is more tedious to navigate (#2). This students' online space is a lifeline for students to help themselves through the study programme. Students who do not make the effort to keep connected to this invisible student community and active in this informal space are losing out (#2).

Social media beyond the popular Facebook and WhatsApp such as the more public Twitter are problematic. The students need time to figure out how an unfamiliar technology works (#2). They need time to explore, experiment and critically appraise it. During the course there was not enough time for this exploration and experimentation. The incorporation of innovative technology applications such as the smart learning activity (bringing in the media developer as a guest speaker) is appealing especially when the student sees similar innovation being developed at the workplace (#2) so the resonance between course learning activity and workplace practices.

Considering the course focused on the digital dimension of community action and development, the student sees the importance of the learning resources needing to be frequently updated to keep them up to scratch (#2) aligning to wider world and work life practices. The consideration of troubling issues (such as cybersecurity) serves the student to build confidence (#1). The invitation of a first-hand expert as a guest would have served better for students' learning (#2). Other participants' suggestions with regards to tools and spaces include recommendations for "weekend workshops" (#1) and that the online components of the course are easily accessible through the mobile smartphone (#2).

> "those were not lecturers where you listen and cannot speak - obviously that was really helpful; that you talk and we are all expressing ourselves, and at the same time we a keeping to the topic. But the thing was more interactive" (#1:5)

> "We discovered other [web] pages because the [web]pages we were doing we never heard of them before. I mean all the groupwork which we did were new to us, both our work and that of others. There was a group that had [web] page on plants … I mean we discovered how vast the Internet is. By being an Internet user, it does not mean you are seeing all the content there is because it is very vast. But we all had a certain sense of team-work in doing that work. At times we lack that because with the Masters it is as if everyone is working on their own on the assignments" (#2:3).

> "Because do not forget, [raising the smart phone] this is what we most frequently use … So the mobile, let me speak for myself as well, when I did the assignment I emphasised that a person will access the website I was trying to create from the mobile rather than from the PC or the laptop. I mean we need to adapt our Internet reach through the mobile … Because this is what we use. Nowadays this has become kind of my computer because if I have an email I answer it from here. I look at the Calendar from here. If you have a FB [account] you access it from here. And here you have the best thing [because] it is practical and lightweight – true it is addictive as well – But when I wake up the first thing I use it to check the time, I check the notifications, I see what I have to do. And before I go to sleep I do the same thing. Because you are not going to take the laptop to bed. But this sits next to your bed. There are negative attributes to this. But I wanted to explain to you that nowadays people check things, access websites, [use] applications, from the mobile [smartphone]" (#2:1/2).

The lived experience of epistemic design – tasks

Students participating in this study see value in the course tasks incorporating opportunities to critically inquire life and work practices. Individual readings of printed and online articles are a means for reflection, even on professional work practices (#1). These are the learning tasks students are used to. Together with the lectures, they serve as a springboard to extend the exploration of the study topic after the lecture (#2). The readings and lectures lead to the discovery of other resources for learning (aspects of the topic you are interested in as a student). But the students were not sure what to expect (#2) despite the available course description outlining the course approach, organisation and structure. The (networked practice inquiry) course approach, related methods and tasks for learning did not fall in with the way students are used to in going about their studies (#1). The lectures were more of a discussion space for expressing your thoughts and listening to what others have to say (#1). This also served as a means of reflection. The discussions and the sharing of work and life experience also encouraged self-awareness, helped to build self-confidence, and to critically engage for learning. The expectation to be explorative and to participate online on a weekly basis is overwhelming for the limited study-unit time alongside other studies, work and life commitments. From the part-time postgraduate student's point of view, the online tasks are time-consuming, too demanding and put you in a vulnerable position because you have to be certain of what you are putting in writing (#1). Added to this there are instances when technology fails you so further hindering you from participating in online activities (#1); and the choice of technologies may not be so responsive to students' preferences for learning (#2). Grading tied to online participation is unnecessary pressure because as an adult you know that participation in the online discussion helps you for learning, but then again, the grading was a motivation for contributing to these discussions (#1).

The case-study summaries served to take stock of state-of-the-art examples, and to help generate ideas for work and life practices involved in community action and development. The task approach in the form of small group presentations was an opportunity to learn to work with others with different working styles (#2).

The individual assignment focusing on a self-chosen issue related to work and/or life practice permits you to work on something that goes beyond the assignment requirements of the study-unit; hopefully leading to something useful for serving the community of concern (#2). This leads the student to take time in coming up with a project proposal (#2). The opportunity to obtain feedback from peers and tutor is useful for improving the initial project idea (and for achieving a better course grade (#1)). Students participating in the study appreciate the peer-reviewing exercise of draft projects. Through the task of paired peer-reviewing of project work, the research participants claim that they learnt to critically and constructively review the work of others; something which is pointed out as being done at the workplace and in wider world situations such as when evaluating public consultation propositions. Through the peer reviewing process participants also claim that they learnt how things work in different organisations and institutions. This access to insider viewpoints is claimed to have helped reduce "frustration" and increase "empathy" for when liaising with external stakeholders for work and life purposes (because you get a better understanding of what is happening on the other side (#1)).

Additional recommendations with regards to tasks include the careful scheduling of this challenging course alongside other programme study-units which are not so demanding (#1) and the widening of the time window allocated for the study-unit so that students have more time for engaging in inquiry processes (#2) for completing set tasks:

> "I think that as a course it was too demanding because you had to give an input every week. Now we are mature students. At least this is the way I work: I go for the lectures. I take notes. When the assignment comes, I start to think about it. Then I spend about a fortnight mentally preparing for it. This and that; and thinking about it during the lectures. Then I sit down and write. With this [course] you had to work from the start. So, full-time (work). You have to come to the university. You have to go to work. At times you stay late at work. The university, part-time, it was difficult to contribute as much as I would have liked, or perhaps I could have gained much more" (#1:3)

> "Peer reviewing helped me a lot. First of all you need a buddy - for me it worked well because we chose our own buddy. And <Beta> was my buddy throughout the course. So even we encounter a difficulty, we talk about it, or when we do not understand a topic. The fact that she was my (peer) reviewer for the project work helped me because she was highlighting that which I left out. I think that was a good thing. The peer review was a good exercise. And we learn how to give each other feedback. I think we Maltese suffer in this thing of mutually giving feedback. I think that this is something which should stay … Obviously, you are not going to take on board all that is said in the peer review. I mean, it is up to you to whether you want to accept what you are being told. But I think, it helps you. And the fact that you have to do a review to someone else also gets you out of your own niche. Because at times it happens to us that we take the information which applies to us and that other information - Look, especially in our world, we use things for our practice but what interests us are the marks. And you are selective in what you listen to and adopt. So the peer

review of other's work was an opportunity and a task and a responsibility to understand what someone else is doing. It might be that I am not going to use it but I learnt just the same". (#1:7)

The lived experience of social design – people and places

Participants attach importance to the on-campus meetings with peers and the tutor. As can be noted from the first quotation in the previous section, students are used to the traditional learning approach attending transmissive lectures and following this up with readings and a written assignment. Nonetheless students appreciate the divergent face-to-face meetings as a place for people congregate, express their thoughts on the discussion topic and listen to the views and experiences of others (#1, #2). This celebration stands in stark contrast to the students' outlook of the online meeting places within the formal learning space backed up by the institutional platform. The research participants do not show the same enthusiasm for the discursive online events meant for people to meet online, express their thoughts and read about what others have to say in the institutional learning spaces. The online and written characterisations here raise concerns for students. A participant confides that if you lack self-confidence, the online discussions with peers (outside that small close-knit subgroup) are unnerving because you need to be certain about what you are writing and not posting "xi cucata" [something silly] (#1). The permanence of the written comments in formal learning spaces is not something the students look forward to when they are struggling to gain an understanding.

The mixed age of the students is interpreted as another possible source of pressure. Older students might feel pressured to show themselves as digitally literate as their younger counterparts who are perceived to be more digitally competent (#1). Reflecting on the peer-reviewing exercise, a participant remarked that younger students may be annoyed that a peer gets to review their work (#2).

Group work is a collective event for learning which students generally fear because people have different working styles and you need to find a way how to work together (#2) which does not always work out well. The research participants both note that for their particular course experience, the strategy permitting the students to form the work groups amongst themselves helped for things to work well (because they already knew each other well when into the second year of the encompassing programme of studies and already had their established ways of working together in subgroups). A participant explained that the 4-member group she was in, agreed on a subdivision of the work and collaborated online (in their own secret spaces) for putting it all together so "practicing the digital dimension of community action and development" as part of their course experience (#2). The peer reviewing task encouraging students to collaborate for learning and development was highlighted as a new experience for the participants in the local formal learning setting. Participants emphasised the importance of the pairing organisation of the peer review process left in the hands of the students. They flag the fear of criticism of peers which can be experienced as unacceptable. Trust (#1) and maturity (#2) are seen as necessary conditions for the success of peer reviewing as an activity for learning and development. The participants also noted that informally there is a tendency for students who are close to be helping each other but the actual reading of the draft work and writing a review of the work (and attaining a grade for it (#1)) was all new to them. A participant remarked that behind the scenes the students were consulting with each other on the review before posting them online in the more "public" peer review space on the institutional platform so highlighting wariness and uncertainty:

"I do not see any methods that we could have used. Because you used the best method. During the [face-to-face] session we could talk. We could share our experiences. They were simplified. I mean there wasn't the use of difficult words that we could not relate to. We were discovering something which we are in touch with all the time. So we could understand better what we are saying, what we are doing. The digital dimensions are an integral part of our lives nowadays. Without them, it is difficult. In fact, we experience it even as a Masters [earning] group. We feel that who does not use Facebook so much falls behind from [the rest of] the group. I mean, we have a small community as a Masters group on Facebook. Those who do not log in, huh." (#2:7)

"There may be people who do not like it [peer-reviewing]. But if you genuinely give constructive feedback you do not have to dislike it … maybe we [peer-reviewing pair] are grown-ups, we have reached a certain age. But maybe with the younger ones, they may be annoyed that a younger peer [reviews your work]. But personally, it did not upset me. On the contrary, it was helpful because those things which I failed to see, <Alpha> noted them, and we discussed them. I mean we should not be upset by peer-reviewing" (#2:5)

I ran into difficulties during the course. I mean, I cannot say that it was plain sailing because I could not keep up for example. And I am a type of person - how shall I say this - although I am very outgoing, I am very wary and shy. I was very self-conscious when writing in places where

everyone can see it. I mean, I tend to hold back from writing. And I start saying to myself; "But am I correct in saying this?". It is as if my self-esteem in this respect is a bit low. So, that of the [online] writing, and having to writing things that make sense was a bit stressful. And how much are you going to write online? For example, when we get into a debate I am not going to write something silly. I used to be very self-conscious that for example - and time was against me. As we always say, time is against us. So a person like me, who struggles to make a step forward in writing online, I did not have the time to think and be certain [of what I wrote]. So I used to choose not to write, or not write that part" (#1:2).

Discussion and Conclusion

From this small-scale study, students are nowadays taking for granted the incorporation of digital technologies for taking forward a formal learning study course, and demand that these are chosen with the specific aim to accommodate them. This may be partly the result of the permeation of digital technologies in most of our practices locally, and also because at universities such as the HE institution of concern there is increasing coercion for enhancing teaching with digital technologies. For the case of the concerned university, it is for using the automatically generated created course-sites on the institutional Moodle-based virtual learning environment in association to running study-units within programme of studies. But then students still find issue with technologies they are not familiar with and more so with technology mediated learning activity which seeks to steer them away from individual knowledge acquisition learning attitudes to connectedness with others online as well as offline. Considering the surrounding context, this is no surprise when observing that on campus the traditional transmissive lecture continues in earnest despite the vast amount of educational research challenging this HE teaching attitude with the online space mostly used as a depository for subject content to be conveniently passed on to students (Caruana, 2019). In fact, research participants commented on the unusual course approach.

The participating students appreciated the opportunities of the set tasks for reflecting and rethinking work and life practices incorporating the digital dimension (and even their learning practices) but they are overwhelmed by the demand on their time this active engagement signifies in contrast to traditional lecture attendance followed by literature readings and the submission of a written assignment for course assessment purposes.

At the same time students demand and celebrate innovative digital tools and technology enhanced and mediated practices remodelling their formal learning experiences more in line to wider life and work practices, participating students convey hesitancy and wariness to a networked practice inquiry approach for learning. All at once, the research participants flag pressure and stress generated by invitations to technology enhanced and mediated learning with others and celebrate and demand innovative digital tools and practices incorporated into their formal learning experiences. They are not used to the learning going on "publicly" visible, "formally" graduated and "openly" discussed through the run of the course. They find all this overwhelming and time consuming (because they are "on the stage" all the time compared to the relaxed attitude when all the organisation and management of the study work is left in the hands of the students to take up in their own time, invisibly and in isolation. In secret spaces and places shared with those few trusted others the students are connecting for learning and mutually supporting each other for learning within their limits of understanding, but here they are safe from judgment, grading and the authoritarian and derisive. The students are nurturing connectedness for learning but on their own terms. In my opinion, the way we often go about our HE teaching and learning does not encourage them to do otherwise, and an isolated case of trying to go against the mainstream attitude cannot be expected to bring change in students' attitudes and outlook overnight.

The picture arising from this study needs to be acknowledged as a partial description of students' perceptions and experiences of a networked inquiry course approach because of the limited number of research participants. Further exploration is required to add more detail to this emergent picture. However, this picture is no less authentic and worthy as an interpretative representation. What clearly emerges from this representation is that students question the what and how of their course experiences from within the encompassing and surrounding environment. Students are not against digital tools and practices infusing their HE course experience; and especially welcome them when these are seen accommodating them and resonate to their life and work practice experience. Students see the worthiness of co-operation and collaboration for learning and development, but they are upset by them in the formal learning spaces where they feel being continuously assessed, and not only by tutoring staff for grading purposes which is already stressful but also by untrusted peers which is disappointing. Students are comfortable and see it as significant to connect for learning in their secret informal places with that close-knit subgroup of peers whom they trust. They see this as critically important to keep in the loop and help themselves for pulling through the study programme.

Considering this developing picture, perhaps as educators we need to be looking more closely at our own stance and how we can support students in their networked learning pursuits on their own terms. This may require us to

involve them more in learning design and delivery including the curriculum and assessment simultaneously preserving quality (if not also improving it). In so doing, we need to convey trust (so preaching through practice in this respect) and potentially boost participants' confidence as worthy partners in learning.

Concurrently we need to persist in our effort to understand students' perceptions and experiences of our teaching and learning propositions. This helps us support students develop the competences for learning in groups (Jaques & Salmon, 2008) and peer learning (Boud, Cohen & Sampson, 2014) and the development of networked learning we refer to in our calls for 21st century competences expected of 21st century learning and teaching. In a local context where a lot is currently on the political and executive tables to see artificial intelligence and immersive technologies compellingly transforming mainstream societal sectors including education (Malta the Ultimate AI Launchpad: A Strategy and Vision for Artificial Intelligence in Malta 2030), this author is of the believe that in our HE we urgently need to wake up and make a start for making the HE course experience a first port of call for our students (and community participants) and making their learning experience "an opportunity to think and dream" (#2) as one of the research participants put it; remodelling our HE teaching and learning (indisputably permeated by digital tools and practices nowadays) that safely and without intimidation truly supports student (networked) learning today and tomorrow.

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Anticipating the near future of teaching

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Abstract

The ways in which digital and networked higher education futures are imagined are rarely built around the values of universities, students and staff. Too often they are projected according to the values of 'ed-tech' industry and aligned policy discourses in which technological determinism, the interests of profit and the instrumentalisation of higher education are taken for granted as the inevitable drivers of change. This paper describes a methodology designed to enable universities to define and 'own' their own digital future, and to base it in the values of their communities. Such future visioning can be used as the basis for institutional strategy and planning, enabling us to advocate for resource and institutional policy change from a collectively-defined position. Equally importantly, it can be used to push back on other kinds of 'inevitable' futures described for us by agencies whose values are radically different. The paper describes the methods developed at the University of Edinburgh to achieve this future vision. It details the process we devised for defining a set of shared values and how we defined a preferred future for our own university. For the future of digital and networked education to be one that works in the interests of faculty and students, we argue that universities need to develop new, creative and values-based ways to envision and build it.

Keywords

Future; anticipation; digital education; values; methodology; institutional strategy

Introduction

Anticipated and present social, environmental and technological disruption dominates discussion of the future in current academic and popular discourse. In this context the 'future of education' is a subject of intense scrutiny, debate and imagining. To give just a few very recent examples, the OECD has released a new learning framework for education to 2030 (OECD 2018), proposing new 'transformative' competencies to enable young people to become 'innovative, responsible and aware' (p.5). NESTA (nd) has defined its work as being focused on our 'fast changing future', advocating for an education which is 'broader, fairer and smarter' (np). The European Commission (2018) has released a 'future of learning package' with recommendations for key issues at stake: lifelong learning, digital education and shared European values (np). Deloitte (2018) has paired with the Georgia Tech Centre for 21st Century Universities to map future(s) for public universities which can mitigate risk posed by perceived deficits in the US higher education sector: reduced public funding, lack of efficiency, lack of connectedness to industry, lack of attention to the needs of lifelong learners. The World Economic Forum (nd) foresees a future in which education is 'fundamentally transformed' by 'technological innovation' declaring the need for a new curriculum which is 'future-ready' for the 21st century.

The list goes on and the versions of the futures mapped and advocated are multiple and various, driven by the agendas, perspectives and interests of whoever is doing the imagining. For higher education, the framing of these 'future' debates is very often focused on how universities need to respond to 'inevitable' change driven from beyond the walls of the institution, with the horizons of that change most often determined by a combination of taken-for-granted neoliberalism and a technological determinism crafted by the interests of corporate ed-tech. Rarely are these future imaginaries defined by universities for themselves, or based in a set of values which see higher education as something more than a service sector tasked with 'producing' work-ready graduates at a challenging political and planetary moment.

Those who predict – and create convincing narratives for – a particular future, do so with their own interests and values at the centre of their visioning. Where strong narratives of the future of higher education are spun by the technology industry they have the advantage of appearing to make a highly technologically and politically complex area of social practice seem simple and inevitable, often advocating for futures in which their own products play a pivotal role. For example, IBM's 5-in-5 series releases annual future scenarios predicting innovations 'which will change our lives within five years' using infographics, press releases, papers and videos

to futurecast particular aspects of social change. In 2013, they released a 5-in-5 on education entitled 'The Classroom Will Learn You', mapping out a technology rich 'smart classroom' in which analytics and prediction would routinely stand in for teacher professionalism and insight. In fact, the human teacher is barely mentioned.
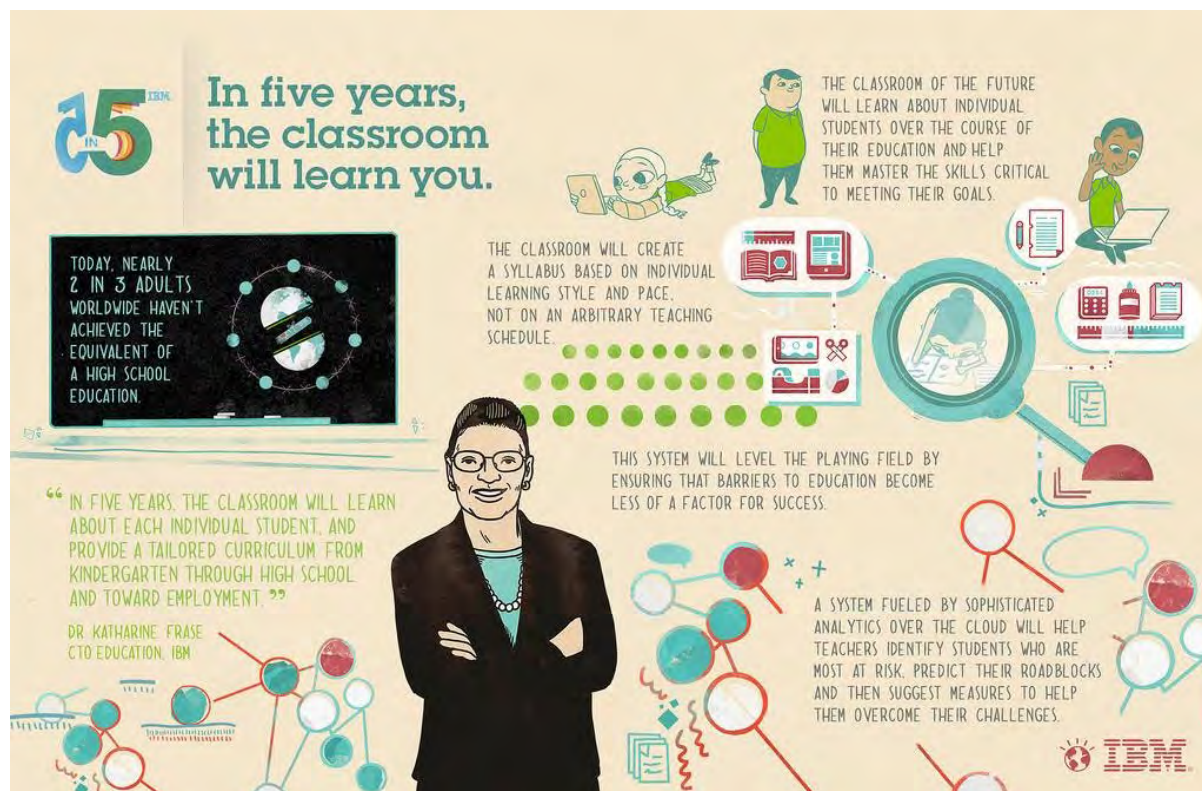
IBM 5-in5 series (2013)

Such 'predictions' are powerful because they define particular futures as inevitable, futures in which social challenges and problems will be 'solved' by technology (that corporations make substantial profits along the way is rarely mentioned). These strong narratives define, normalise and do the groundwork for building that future. Such speculations therefore *create* a future which aligns to the values and interests of corporate ed-tech, not to the values and interests of schools or universities.

We argue in this paper that universities need to develop methods for imagining and describing their own futures, and by doing so to advocate for futures which are driven by the values of universities as communities of scholarship. This is particularly vital for digital education, which has a strong tendency to see itself as being driven by technological change and the determinist, solutionist perspectives through which popular and policy narrative is often framed. The paper outlines one approach to doing this by describing a values-led, design-led methodology developed at the University of Edinburgh. The Near Future Teaching project started from the position that the university community is a critical agent able to build and take responsibility for a *preferred* future, rather than one which develops solely in response to futures defined by others.

The Near Future Teaching project

Near Future Teaching was launched by the University of Edinburgh as a formal institutional project – sponsored by the university's Senate, and intended to define a future vision for digital education which could inform university strategy. In this sense it took place within the disciplinary domain of Futures Studies, defined by Poli (2017) as 'a field that lies between the essential unknowability of the future and the effort to use the future for decision- and strategy-making in the present' (58). The field of Futures Studies has been described as having three different forms or phases: 1) prediction/forecast, 2) foresight and 3) anticipation. In describing the most recently emergent of these – anticipation – Amsler and Facer (2017) suggest that:

> Whereas attempts to *predict* organisational dynamics, political developments, financial
> behaviour, economic demands or ecological disasters aspire to eliminate risks of uncertainty,

and *foresight* aims to equip actors with insights into multiple possibilities, *anticipation* assumes an active and critically reflective interaction with futures that are unknowable. (1) [our italics]

It was this emphasis on agency and critical reflection which drove the design of Near Future Teaching. At a time when technological change is assumed to be driving the future of education, we wished to take a step back to formulate a vision that was based not on prediction, technological determinism and the instrumentalisation of education, but on the values and perspectives of a large community of students, academics and aligned professionals.

The University of Edinburgh has around 40,000 students and 15,000 staff (of whom around 7,000 are formally defined as academic). It is organised into three Colleges – Arts, Humanities and Social Sciences; Medicine and Veterinary Medicine; and Science and Engineering. Just under half our students come from countries outside the United Kingdom – this is a highly international and diverse student population. We also have high numbers of distance learners for a research-intensive university – just under 4,000 of our current student body study online, mostly within our College of Medicine and Veterinary Medicine, and we have over 2.5 million people studying on our portfolio of MOOCs. It was within this context that we developed our methodology and articulated our vision for a preferred future for digital education and networked learning.

The project began at the beginning of 2017 and ended in the Spring of 2019, and ran over four phases, briefly outlined below. Full detail of all phases of the project and outputs are available for viewing and re-use on the project web site: www.nearfutureteaching.ed.ac.uk

Phase 1: scoping

This first phase took around one year to complete: approximately 300 students and staff from across the University raised key issues, concerns and priorities for the future of digital education through 15 events and workshops and 50 short, video-recorded interviews. Insights from the events were captured in blog posts on the project website. The short interviews were recorded on video, analysed, clustered and edited into common themes. The resulting 13 short, thematic videos are all available on the project site. They demonstrate how students and staff, when asked to speculate on the future of digital education, very quickly moved away from focusing on technologies to expanding on the kind of future they *wanted* for the university: one based on generally very well-articulated values. At the end of this phase, we were able to define the four core values emerging from this part of the work, which would define and structure the outcomes from the project.

During this phase we also researched and published two short reviews and mappings of current technological and social trends which seem – from our moment in the present – to be likely to inform the near future of teaching (Gallagher and Bayne, 2018a and 2018b). These 'Future Teaching Trends' reviews were deliberately brief, intended to be easily usable by highlighting areas of particular relevance to digital and networked learning. They are summarised in the following table.

Education and Society	Science and Technology

Recruitment demographics:
    Increased competition for international students globally
    Declining numbers in domestic groupings traditionally attending university (young, full-time, middle class)
	Datafication
	    Of society
	    Of education

Lifelong learning:
    Ageing population
    Emergence of alternative providers of education
	Artificial intelligence
	    In society
	    In education

Unbundling and new degree models	Neuroscience and cognitive enhancement
	    Educational neurotechnology
	    Cognitive enhancement drugs

Automation of teaching, automation of work	Virtual and augmented realities

Urbanisation	New forms of value
	    Blockchain and distributed ledgers
	    Smart contracts

Wealth and inclusion Widening participation	

Trust and precarity
    Collapse of trust in institutions
    Academic precarity and casualisation	

Table 1: A summary of the reviews: both are available in full online and reusable under a creative commons license (Gallagher and Bayne, 2018a and 2019b).

Phase 2: Scenario development

During this phase we contracted a small design strategy company to work with us: called Andthen, they were able to bring expertise in design and futures thinking to the project, and worked closely with the core university team over the rest of the project, designing and facilitating workshops, helping with the synthesis of workshop outcomes, and designing the final project report. Using the values developed in conversation with students and staff during the scoping phase, and drawing on the trend reviews, we debated and developed four plausible future worlds and institutional responses to these in two very intensive half-day workshops attended by a group of 20 students and staff. We outline the speculative future universities in a later section of the paper – developing and discussing these enabled us to establish what a preferable future for digital education would look like at the University of Edinburgh.

Phase 3: Testing

From the phase two workshops a draft set of aims and indicative actions for a preferred future for digital education were developed by the project team, and taken out for testing in intensive workshops with staff and students. They were also compared with next-generation students' future visions of higher education through two sessions with 57 children in primary and high school. More than 100 people were involved in this testing phase.

Phase 4: Finalising

The vision, aims and actions were finalised in response to testing, and approved by the relevant university committees. A launch event took place in March 2019.

Core values

The vision formulated from the Near Future Teaching project is based on the values of students and staff at the University of Edinburgh, values surfaced through the phases of activity described. These values are critical to the type of futures work being performed in the Near Future Teaching project, being critical to 'any futures work, which aims to empower individuals and groups to make decisions about possible future paths rather than simply coerce them towards certain predetermined actions' (Facer and Sandford, 2010).

On the basis of this scoping work conducted in Phase 1, four core values were distilled from the work with staff and students using an 'affinity mapping' approach, a process of identifying and sorting ideas generated from the data collected in the scoping phase (Roberts et al, 2013). This involved looking across the interviews and event records and defining common opinions and perspectives that were raised by individuals. These key issues were captured in the form of a series of 'opinion cards'. Each opinion card had a theme on one side and a sample of quotes direct from the students and staff of the University of Edinburgh on the back (all the 19 opinion cards are viewable on the project website). Aome representative examples are provided in Table 2.

Opinion	Representative Quotes
Opinion 1: Education should not be treated like a commodity	'We resist being treated as consumers, and seeing our education treated as a commodity' 'It puts everyone into a box and if you don't fit in you won't do well' 'The risk of reducing every aspect of learning to a form of economic capital.'
Opinion 4: Education should encourage creative thought	'The university should be a space for learning and un-learning.' 'The opportunity to wonder about stuff...I think that if you lock that off too much you will be too deterministic.' '...avoid being too driven by training in some sense it should be on education that we are focussing on. It should be trying to encourage curiosity.'
Opinion 13: Students and staff should be more involved in decision making	'Co-curricular and students as partners' 'I didn't get a voice and couldn't shape the way I learn or choose the material I work with.' 'Students and staff who should directly and cooperatively control their learning, their teaching, their research and their contributions to the common good.'

Table 2: A selection of opinion cards (from 19 total) along with the representative quotes that constituted the theme presented; all opinion cards are available in full online and reusable under a creative commons license.

Through further analysis of the opinion cards developed from the interviews and events with students and staff, we established four core driving values. These form the basis for all the aims, objectives and actions in the final report. We see these are the most important outputs from the project, expressions both of the kind of future that students and staff *wanted* for the university, as well as methodological objects in their own right which would be used in subsequent phases of the project. The distillation of these values aligns with the position that 'socio-technical change is not determined by technological development, but by the social contexts, values and institutions within which it develops' (Ulicsak and Facer, 2012). For the purposes of the Near Future Teaching project and for near future teaching at the University of Edinburgh, these values drive all subsequent aims, objectives and activities.

Value	Description
Experience over assessment	Learning should not over-assessed and instrumentalised.
	Teaching should share a focus on employability and success with an understanding of the value of rich experience, creativity, curiosity, and – sometimes – failure.
Diversity and Justice	Education should design-in meaningful diversity and real inclusion across all areas of activity.
	All near future teaching should further social responsibility and global justice.
Relationships first	Relationships, dialogues and personal exchanges between students and staff build understanding in a way that is not possible via transmissive forms of teaching.
	Teaching should be designed to provide the time and space for proper relationships and meaningful human exchange.
Participation and flexibility	The University community should cooperatively shape how – and what – it learns and teaches.
	Flexibility for the individuals, fluency across disciplines and cooperative responsibility for curricula should shape near future teaching.

Table 3: The four core values for near future teaching at the University of Edinburgh as defined by students and staff; all value cards are available in full online and reusable under a creative commons license.

Four future worlds

During phase two of the project, four scenarios were developed that distilled our trend reviews (Gallagher and Bayne, 2018a and 2018b) into a set of 'plausible divergent future worlds' (Facer and Sandford 2010). From these, further scenarios were developed to shape a discussion around what universities might look like within these four future worlds, with each scenario representing a *possible* future university. The four speculative future university scenarios were co-designed in an intensive workshop with 20 students and staff, and are outlined below: none are intended to be either dystopic or utopic, negative or positive, but rather to work as detailed thought experiments which would give us something to work with as we defined a *preferred* future.

Future University 1: Data, data, everywhere
Key drivers in this world: datafication, tight borders, marketisation of education, and increased competition

The shape of the university: Accelerated datafication of everyday life and the normalisation of ubiquitous surveillance makes quantification, measurability and trackability the key markers of value. Data-driven decision making across all sectors positions STEM and data science at the top of the disciplinary hierarchy. Higher education shifts toward a focus on provision at the point of need, with timely routes to accreditation in particular skills areas taking priority over extended periods of study within co-located communities of scholarship.

Future University 2: A new ecology

Key drivers in this world: Climate change, data-driven decision making, compulsory renewability, compassion, and global justice

The shape of the university: Global crisis has shifted collective mindsets, with a strong emphasis across all areas of human activity on responsible and sustainable action. The goal of economic growth disappears as a key driver with all activity instead measured according to an 'eco bottom line' making sustainability and renewability the new indicators of human advancement. Data analytics for compassion are funded globally to better understand and manage issues around environmental impact, equity and sustainability. Education and research become focused almost entirely on addressing global crises, with teaching in universities increasingly designed around action and practical solutions to 'real world' problems.

Future University 3: Human-machine interdependence

Key drivers in this world: automation, human-machine hybridity, personal missions, increased leisure

The shape of the university: Automation has replaced much human work, resulting in growing demand for education focused on personal creativity, criticality and problem solving. Easy access to information, and the automated synthesis of large, complex bodies of knowledge, have created a shift in education away from fixed curricula toward 'experience', with the most successful universities offering rich, time-intensive, student-led pathways extendable over the entire life course. Discipline boundaries have largely disappeared as STEM and social science converge with the creative arts and humanities.

Future University 4: Uberfication from cradle to grave

Key drivers in this world: Ageing population, sharing economy, consumer power, unbundling

The shape of the university: The role of the university as trusted gatekeeper and source of accreditation has shifted as new forms of value and economy re-shape higher education. Learning is highly commodified, as each individual purchases micro-credit from multiple providers, accumulating credit through life while building a personal portfolio evidencing all their key competencies. The boundaries between education, employment and retirement become blurred as the population ages, and higher education now takes place across the course of a lifetime, with 'upskilling' at point of need becoming a key part of much provision. Academics work for the most part as freelancers, building personal and team reputations which compete in the global education free market.

Applying the values-based approach

These possible future universities were debated and developed in a second half-day workshop attended by the same group of 20 students and staff. These set out to understand what a preferable future for digital education would look like at the University of Edinburgh largely by exploring how the core values described earlier would manifest in these four university scenarios.

In groups, the workshop began by mapping the four core values to each of these worlds, trying to understand how they might be played out in each, and then followed that mapping by identifying speculative examples of what digital education might actually look like for each of these mapped values. From the outputs of this workshop, an understanding of the kinds of futures that would be *preferable* to students and staff was identified. This was translated by the core Near Future Teaching (NFT) team into a draft vision and associated strategy for building a preferable digital education future at the University. This vision took the form of five over-arching aims, accompanied by a set of indicative actions, and are detailed in the final section of the paper.

Throughout October-December 2019, the vision and aims were tested in a series of sessions with staff and students from across the University and in local primary and high schools. The purpose of these sessions was to test the response to the draft vision and strategy and gather feedback and input for a further iteration from both the current and future university community. Following these testing sessions, the aims, objectives, and indicative actions emerging from the Near Future Teaching project were finalised and published.

Aims for a preferred future

The identified aims emerging from this process are an expression of our preferred future among all the futures available to us, one not based on determinism or the instrumentalisation of education but rather on the values of a large academic community. Each aim carries with it a set of objectives as well as indicative actions that might

be undertaken to achieve them. These indicative actions are by no means definitive but are rather an attempt to translate *anticipation* into action, to address futures that are unknowable based on our present values. They identify how as an institution we might practically build the preferred future identified.

Aim	Objectives	Indicative Actions
Community focused: Digital education with the University community at its heart.	Prioritising human contact and relationships. Connecting our community of scholarship in new and diverse ways.	Use technology to build relationships between students and staff based on trust, resisting logics of surveillance and unnecessary monitoring. Accompany these with innovative, cross-discipline community building approaches including peer pairing based on shared interests and geographies.
Post digital: education which recognises that technology is fully embedded in daily life.	Reworking the concept of 'contact time' to reflect contemporary practice. Rethinking what it means to be 'here' at Edinburgh.	Define and embed a re-worked understanding of 'contact time' into workload models and course descriptors, which takes account of student mobility, distance education and flexible patterns of study. Plan for the introduction of technological capacity to teach online and on-campus students together in joint cohorts.
Data fluent: digital education that understands data, data skills and the data society.	Addressing automation with an emphasis on human skills. Engaging creatively and responsibly with learning data.	Use our research expertise in data to build an ethical, responsible near future for our teaching and to improve student experience. Embed critical understanding of data ethics and algorithmic accountability within academic development and staff training.
Assessment oriented: digital education with a focus on assessment and feedback.	Diversifying assessment practice. Making assessment more engaging for students and academics. Supporting new kinds of feedback.	Focus academic development and course design around building exceptional learning experiences, rather than on assessment and performance. Critically evaluate and build capacity for high quality automated assessment and feedback appropriate to disciplines, as a way of augmenting and supporting human assessment.
Playful and experimental: enabling creative, academic and student-led R&D for digital education.	Confidently opening our teaching practice to technological change. Being energetic in designing new, creative ways of teaching digitally.	Invest to give academics more time to be creative and risk-taking in their use of digital education. Provide teaching staff and students with central access to programmers and developers for joint prototyping and trialling of new ways of doing digital education. Support staff and students to scale up and spin out digital education ideas and applications.
Boundary challenging: digital education that is lifelong, open and transdisciplinary.	Building a culture of lifelong learning. Supporting teaching which transcends disciplines. Committing to openness. Connecting to the city and region.	Build capacity for individuals to develop a lifelong relationship with the University regardless of their geographical location or career stage, via open and digital education. Make it easy for local people to be part of the university community through informal as well as formal learning.

Table 4: The six aims emerging from the Near Future Teaching project, along with representative objectives and indicative actions.

Conclusion

This paper has described a methodology designed to enable universities to define and 'own' their own digital future, and to base it in the values of their communities. Such future visioning can be used as the basis for institutional strategy and planning, enabling us to advocate for resource and institutional policy change from a collectively-defined position. Equally importantly, it can be used to 'push back' on other kinds of 'inevitable' futures described for us by agencies whose values are radically different, and whose primary objectives are often profit and growth. For the future of digital and networked education to be one that works in the interests of faculty and students, universities need to develop new, creative and values-based ways to envision and build it.

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Enactivism and Digital Learning Platforms

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Abstract

Within the field of education, the concept of active learning building on constructivism has emerged as a dominant framework of the past three decades. This perspective is critical to the objectivist idea that knowledge is something static, as an object to be acquired from the external world. Instead, it states that the learner is responsible for the knowledge construction, and therefore shall become autonomous towards this goal. From an epistemological point of view, despite the important shift of assumptions that this viewpoint has brought to education, constructivism still presents some shortcomings in terms of a change of the instructional paradigm. This paper takes a step forward and explores enactivism, as an alternative philosophical and educational worldview. It presents a theoretical discussion of the enactivist perspective and its differences from objectivism and constructivism. Enactivism proposes a more radical alternative to dualistic and objective approach, as it focuses on the intertwined and multiple interactions between mind, body and the environment. The two main perspectives of enactivism, which we grouped into the categories of "embodied cognition" and "situated cognition", are present in the field of education. The paper relates them to the two core concepts of reflection and intentionality. Drawing on these theoretical considerations, the paper applies the framework of enaction to a fieldwork research in a Danish school discussing how this concept may provide some new lenses to understand the potential of participatory approaches to the implementation of a digital learning platform. The intervention was organised through two workshops. The first workshop use the technique of the future workshop (Jung & Müller, 1984), which includes a critique phase and a fantasy phase. The second workshop (14 days later) was a design-workshop. This intervention is an example of how to understand enactive modelling, considering the relations between the participants and the environment as a dynamic and emerging relation of autonomy-dependency, a symbiosis. The analysis shows that the implementation takes place into an ecological living system made up of humans, non-humans, things, and societal entities. For the teachers (and more general the humans) to possibly accept, appropriate, act and re-enact such a learning infrastructure, it is of great importance to establish spaces for reflections, which e.g. a future workshop provides, and to support and facilitate (alternative) enactments of some of the more hidden affordances of the digital learning platform.

Keywords
Enactivism; Digital Learning Platforms; Teachers; Future workshop.

Constructivism and the learner-centred approach

In education constructivism, and to lesser degree socio-constructivism, has emerged as the dominant framework of the past three decades. According to this theoretical perspective, knowledge is constructed through experimentation and social interaction, in a historically and geographically situated context. Piaget suggested cognitive structures emerge from the subject's interaction with the immediate environment, in a process of testing the world and receiving feedback from it. Vygotsky focused on the sociohistorical context, suggesting that the individual learns through the engagement with the others, rather than in isolation. According to this view, the world is independent of our mind, but knowledge is always a human and social construction (Crotty, 1998). The dialectic between knowledge and action, contemplated by Piaget and Vygotsky, takes a step away from the objectivist view of an organized world based on immutable laws. It opens the possibility that there is

new knowledge to be produced, new properties, qualities and entities of the world to be discovered, as well as new understandings to be constructed. It transports us beyond the scope of the Cartesian objectivism, which understands the world as a sum of material artefacts and knowledge as the process to disassemble, analyse and recompose an object, according to the laws that regulate its functioning.

For the purpose of this paper, it is worth noticing that the interpretation that has been made of constructivism and socio-constructivism in recent years has partially distorted this view and placed more emphasis on the subject, rather than on the situated action. The context has become an "accessory", an element that is always mentioned, but in fact is not very important: who makes the difference in the learning relationship is the subject him/herself. Besides, there is lack of consensus on what context actually is (Dohn et al., 2018). In this way, often in literature the "constructivist teaching" or, more generally, "active learning" has become an antonym of the "traditional teaching" method (Pischetola & Miranda, 2019). From this partial and biased understanding, much of the focus of current learning theories, which define themselves as constructivist, is set on individual engagement, student's protagonism, and learning as an active and spontaneous process. Holton (2010, p. 4) underlines a "romantic" notion of these constructivist-inspired approaches, which "conflate constructivism with pure unguided discovery learning", problem-based activities and simulations. From an epistemological point of view, we recognize in these educational/instructional approaches an assumption of a dualistic relationship between reality and knowledge, and a limited change in the educational paradigm. Moreover, the emphasis on the student's centrality disregards the complex environment of interactions that the classroom represents, an environment in which the student is one element of the network (Pischetola & Miranda, 2019). In this perspective, ICT and online learning platforms are seen as a dissociated element of pedagogical practice or the learning process, another tool that "supports" teaching practice.

Based on these reflections, we argue that most of the theories that fall within the framework of (socio-constructivism) adopt the point of view of an instrumental relationship with technology and show a root in the Cartesian objectivism and dualism. According to Fenwick et al. (2011), the problem lies in using the idea of a networked and complex relationship merely as a metaphor, where concepts from concrete socio-material dynamics are abstracted and then applied as representations to pedagogical situations. Drawing on this critique, we could say that the problem in literature is that networked learning is mostly adopted as a frame, rather than considered as an analytical tool. In the following, we will approach a theoretical perspective that takes into account a non-dualistic philosophy about learning, as well as understanding technologies as one of the elements that are part of the situated environment where learning takes place. In line with Biesta and Osberg (2010), we understand that recognising the complex (and complexivist) character of educational processes is a political intervention in itself. In fact, public policies that have focused on ICT integration in the last decades have mainly addressed learning outcomes as something that can be controlled, and expected, in a deterministic cause-effect approach (Heinsfeld & Pischetola, 2019). The policy that rules the introduction of learning platforms in Denmark, which we will present in the last section of this article, is another example of this top-down approach.

Enactivism as an alternative to constructivism

Enactivism proposes a more radical alternative to Cartesian dualistic and objective approach, as it focuses on the intertwined and multiple interactions between mind, body and the environment. As a label, "enactivism" emerged from the biological work of Francisco Varela and Humberto Maturana, who in 1974 introduced the concept of autopoiesis ("self recreation") of a living organism, related to internal coherence, rather than mere adjustment to the environment. The notion of autonomy is the core of the organization of an autopoietic system. This view evolved from the biological field into a theory of human cognition and action. Varela, Thompson and Rosch (1991) offered radical critiques to some assumptions of the cognitive sciences, namely the computational model of mind as dominant aspect of the entire field, and the conception of cognition as the representation of a world that is independent of our perceptual and cognitive capacities. Drawing on these critiques, enactivism sees mental processes not only as a result of brain processes, but also as constituted by sensorimotor knowledge and bodily structures, and by the organism's ability to exercise an action on the environment. The focus placed on one or the other aspect has created different theoretical perspectives. In order to present a brief summary of each current, we will group them as follows: (1) embodied cognition, including theories on grounded cognition and sensory-motor experience; and (2) situated cognition, including theories of embedded and extended cognition.

1 Enactivism and embodied cognition

Embodied cognition is a phenomenologically inclined approach. For the French philosopher Merleau-Ponty, the space between the self and the world would be not a space of separation and distance, but rather a space of continuity and circularity. Thus, the world is not an object to be accessed through knowledge and thinking. It is

the natural setting of human thoughts and perceptions. Heidegger and Husserl, on whose ideas Merleau-Ponty draws his theory, had already stressed the pragmatic, embodied context of human experience in both its reflective and its immediate, lived aspects. The enactivist models that come from the phenomenological tradition understand thinking and cognition as "grounded in bodily actions" (Holton, 2010, p. 3). There is no more need for a distinction between "inside" and "outside" the subject, as if a learner encountered knowledge as something detached from him/herself. According to Varela et al., a key element in this encounter between the subject and the world is the concept of reflection. They suggest "a change in the nature of reflection from an abstract, disembodied activity to an embodied (mindful), open-ended reflection. By embodied, we mean reflection in which body and mind have been brought together" (Varela et al., 1991, p. 27).

In objectivism, one does not include him/herself in the reflection. Boler (2002) explains that in Cartesianism the thinking self is autonomous, isolated not only from other selves but also from one's own body. With the constitution of a clear boundary between inner and outer, between the self and the world, there is no possibility of connections and shared material existence. Thinking and knowing are "free-from-body" processes of an autonomous and isolated being. This ideal of reality reflects a "repression" of materiality and the body (Boler, 2002) and allows to pursue only partial knowledge of the world (Varela et al., 1991).

In the phenomenological tradition, on the contrary, cognition is intended as embodied action. On this account, enactivist research focuses on the relationship between the concrete bodily experience and the mental processes, sensory behaviour and cognition, considering these aspects inseparable (Damasio 1994; Gangopadhyay & Kiverstein, 2009; Shapiro, 2004). Most of the evidence supporting this framework focuses on how abstract concepts are grounded in sensory-motor processing. One promising idea, for example, is that individuals simulate concrete situations and their related feelings to represent abstract concepts: even when they are not actually perceiving or interacting with the objects, the sensory-motor systems are active in the cognitive processes (Pecher et al., 2011, p. 220).

To sum up, the cluster of theories of embodied or grounded cognition take action and perception to be interdependent. However, as Susan Hurley (2001) points out, this model is still separating cognition (as a central core of the mind) from perception and action (peripheral processes). Cognition and sensory-motor control are assumed to belong to different categories, while - she argues - we need a more dynamic approach to the mind, where perception, action, perception compose a circular way of knowing the world. A perspective that considers the perceiver in constant interaction with the environment. In a post-Cartesian, feminist and socially progressive pedagogy perspective, says Boler (2002, p. 336), bodies are not transcended by reason. Rather, they are part of a "dynamic objectivity", where individual experience connects to the material and social environment.

2 Enactivism and situated cognition

Central to the enactive approach is also the idea of "sense-making" process, an interplay between the organism and the world. In this sense, the environment is not neutral; it has a meaning and a significance for the organism and knowledge is measured by action on the environmental structures. Here, a concept of cognition arises, as embedded in the environment and extended within the individual's networks of meaning. Both ideas refer to a decentralized view of cognition. On these grounds, the individual (or organism) and the environment are not only interdependent, but co-dependent. According to the principle that Morin (2014) defines as self-eco-organization, an autonomous living being does not exist apart from its biophysical environment. This idea is based on a conception that looks as a paradox: our autonomy is inseparable from our dependence on the environment. That is, the more autonomous we seek to be, the more environmentally dependent we have to be. Apart from the interdependence of the parts and the exchange with the external environment, other elements characterize a living being, such as non-linearity, unpredictability and emergence (von Bertalanffy, 1950). The famous phrase that summarizes this systemic perspective was coined within the German Gestalt movement: "the whole is greater than the sum of the parts". Applying this systemic view on cognition, we see it as dynamic and environmentally situated. It depends on complex patterns, which emerge from the way the organism couples with the environment, where by "environment" we should understand not only the discrete objects, but the network of relations and contents co-determined. This idea, stresses Hurley (2001), makes it possible to overcome the rivalry between the inner activity and the external environment (fostering the aforementioned idea of enactivism as embodiment). The core concept the author brings about is intentionality.

Enactivism in education

The two main perspectives of enactivism mentioned above – which we grouped into the categories of "embodied cognition" and "situated cognition" – are present in the field of education. We can relate to them through the two core concepts we identified in each category: reflection and intentionality.

From the point of view of the embodied or grounded cognition, we saw the importance of reflection as an activity that intertwines perception and action. The first philosopher to introduce this topic in education was John Dewey in his work "How we think" (1910). He emphasizes the importance of considering the individual in its entirety, rather than separately in two dimensions, intellectual (reflecting the facts) and emotional (reflecting the imagination). The author cites some attitudes that, when present in the act of thinking and reflecting, are significant in the process of learning and knowing the world. They are: determination and wholeheartedness; trust and directness; receptivity and open-mindedness. Finally, the responsibility is the link that unifies all the other attitudes, as it ensures that the act of thinking has a real consequence that results in conscious, informed and committed action.

Drawing on some of Dewey's considerations about experiential education, the psychologist Jérome Bruner (1961) introduced the definition of enaction in education, referring to the idea of "learning by doing". According to the author, the child's active participation in the learning process results in several benefits: an increase in the subject's intellectual potency to make the acquired information more readily viable in problem solving, the incentive to intrinsic motivation, the pleasure of learning from discovery itself, and an increase of memory. In this perspective, the goal of education is not only the acquisition of knowledge, but also the improvement of thought processes. The inherent discovery in problem solving would be a method of teaching and learning designed to learn to know the world (Bruner, 1981).

The second concept of enaction, which is related to situated cognition, has its roots in the cultural/historical activity theory building on the idea that the human mind is social in its very nature. Further, that the concept of activity "bridges the gap between the subjective and the objective" (Kaptelinin & Nardi, 2006). Activity theory maintains the idea that "no properties of the subject and the object exist before and beyond activities (...) they truly exist only in activities, when being enacted" (p. 31). However, activity also has a narrower meaning, where it refers to a specific level of subject-object interaction. Kaptelinin & Nardi (2006 p. 64) present activity as a hierarchical structure, where activities are a response to a motive based in needs (biological and psychological needs). Activities have a 3 level structure composed of activities, actions and operations, which correspond to motive, goals and conditions (p. 64). Kaptelinin & Nardi underline the dynamics within the activity structure, however the graphic model illustrates a hierarchical structure of activity (p. 64), where movements depart from activity towards an object, through actions and operations.

Another important concept is agency. Leontjew defined human agency "as the ability and the need to act" (Kaptelinin & Nardi, 2006, p. 242). In a more standard definition, agency is defined as the "ability to produce an effect" or "producing an effect according to an intention" (ibid. p. 242). The first definition is related to a thing (natural or cultural) and the second to non-humans (natural or cultural) as well as human beings and societal entities. A stone produces an effect as it gives shadow, while an it-system produces an effect according to the intentions, which have been built into the system (though many of the very big IT system fails). Finally the human being also produces an effect according to an intention, but what radically divides them is that a human being is able to act according to own cultural needs, and can act on non-human beings as well as on other human beings. What is central to human agency is the concept of intention. Human beings' agency cannot be separated from intentions.

Enactivism and cultural historical activity theory are closely related providing a framework that links enactivism
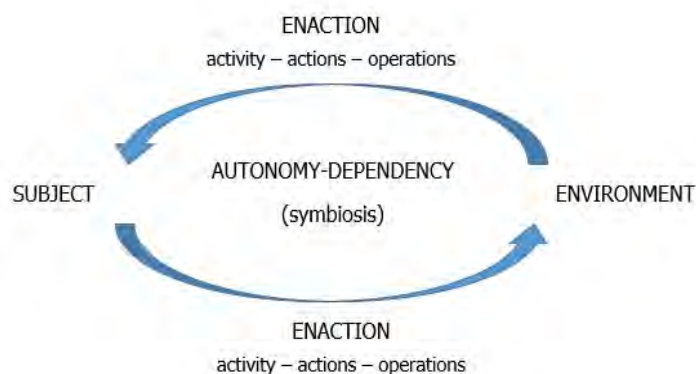
to motives and intentions towards an object. However, the difference between these two perspectives is the focus. The cultural historical activity theory looks into a situation and sees the subjects and objects, the links and the conflicts, which are present among them. On the other side, the enactive perspective focuses on the relationships, rather than on the distinction and dialectic between subjects and objects. With the evolution from activity theory to enactivism, knowledge emerges of an interaction between living beings and their environment that involves both emancipation and dependence, as we mentioned above. A living being – be it a person, an organization or a forest – can be considered as an ecosystem, which is always interacting with other ecosystems.

This interaction causes the ecosystem to change in its organization, and to become flexible in order to adapt to the changing environment to survive.

Figure 1 – Relationship of subject and environment in enactivism

If we consider the classroom as an ecosystem (Pischetola & Miranda, 2019; Rossi, 2011), where multiple interconnected and entangled relations occur (Fenwick et al., 2011), we acknowledge that a teaching and learning situation is situated and unique. If we apply the same analytic perspective to a learning platform, enactivism will show us more clearly the existence of a networked architecture, which includes all the information about the environment where the educational situated action takes place. The role of collaboration, as well as the development of learning communities, are central to the systemic model. Thus, understanding the principles that underlie the learning platforms' networked learning will be of great importance for understanding the classroom from the point of view of enactivism.

Building on the early definition of networked learning developed in the JITOL project and reiterated in the book that came out of that project (Steeples & Jones, 2001) and confirmed by Goodyear et al. (2004) and which has served as a common definition for the networked learning community ever since (McConnell et al., 2012), networked learning is defined as "learning in which information and communications technology (ICT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources" (p. 6). This early definition of networked learning underlines the entangled perspective of learning as dynamic and complex activity enacted by the learners, the teachers, the ICT, the learning community and its learning resources. This is in line with enactivism in educational theory, which "looks at each learning situation as a complex system consisting of teacher, learner, and context, all of which frame and co-create the learning situation." (Breen, 2005, p. 240). All the elements of an environment – student, teacher, interactions, climate, place, historical moment, emotions, brain, body, objects of knowledge, disciplines, events, society, community, relationships, connections – are taken into account, as part of a complex network that characterizes the situated context for learning (Pischetola & Miranda, 2019).

Returning to the thinking of Maturana and Varela (2001), cognition here is not considered as the result of an internal event of an ecosystem, nor does it represent the result of an external event of the world. In the enactive view, a learning process is circular, as a living organism responds to the stimuli from the environment and alters itself under this feedback. It is a constant changing system, where the relationships that the living organism establishes with the environment also feed and shape its own dynamics. In this bidirectional interaction, the reciprocity between organism and environment is what is responsible for the changes in their structures, without losing their organization. Bateson (1977) defines this process as "a dance of interacting parts", which shows the "pattern that connects" all the existing living systems. In this sense, a core concept that the author brings to the ecological/enactive theoretical perspective is the one of "co-evolution": that is the ability of a system to modify and be modified, in a relational and reciprocal way, through the interaction between systems. Bringing the matter to the realm of didactics, Rossi (2011) considers the classroom as system where co-evolution takes place with mutual influencing, which has implications for knowledge and learning. In the next section, we will argue that this idea can be applied to the implementation of learning platforms, with very interesting results.

Enactivism and implementation of digital learning platforms

In the following, we will use data from a large-scale intervention-based research project on the implementation of digital learning platforms at 15 schools in Denmark in 2016-2017 (Misfeldt et.al, 2018). We will discuss the participatory methods used in the project re-interpreting the process using the concepts from enactivism. However, before we do this, we will give a brief account of the context for digital learning platforms in the compulsory schools in Denmark.

Digital learning platforms in the compulsory school in Denmark - context

In 2014, the Danish Government decided that all Danish municipalities should purchase and implement digital learning platforms before the end of 2017. Instead of centrally creating one national learning platform, as in the case of the communication platform, AULA, which is under implementation right now (fall 2019), the government provided a functional specification of 64 requirements for the learning platform. It was then put to private business to build digital learning platforms that could live up to these requirements (Kommunernes Landsforening, 2014). A central aspect of the functional requirements is the prominent role of goal-oriented learning in teaching sequences, and the competence objectives defined by the Ministry of Education (Kommunernes Landsforening, 2014).

The above-mentioned focus on learning objectives in the digital learning platforms were intended to support the implementation of the then-recent curriculum reform from 2013. Whereas the previous curriculum described the content of teachers' lessons, the reform focused on describing students' expected learning outcomes. The reform included goals regarding students' knowledge, skills, and competencies within the different areas of each subject taught in school (Tamborg, 2019). Among others, the Danish Teacher Union argued that this reform over-emphasizes and details the learning objectives leading to a fragmentation of school subjects and to an instrumental approach to teaching and to a deprivation of teachers' professional autonomy (Tamborg, 2019). The digital learning platforms in the Danish Schools have been designed as a reification of this change in curriculum approach. As such, there are strong values and functionalities embedded in the platform to support the learning goal oriented approach.

The research project

The objective of the large-scale intervention-based research project has been to create generalizable knowledge of how learning platforms potentially and effectively support and influence the work of the educational staff, the pupil's learning and the collaboration with the parents. The focus has been on an implementation perspective more than a co-design project (Dirckinck-Holmfeld & Ræbild, 2017; Misfeldt, 2016). In the following, we will especially take a closer look into the experiences from one of the participating schools, where the second author participated as a researcher.

At each school, a group consisting of teachers, local supervisors, and representatives from the management participated in workshops facilitated by researchers/consultants from the project. The intervention was organised through two workshops. The first workshop, a future workshop (Jung & Müller, 1984), consisted of a critique phase and a fantasy phase. The second workshop (14 days later) was a design-workshop (Brown & Katz, 2009), where the teachers in groups should develop a single design idea, which was transformed into an intervention that the participants conducted as an experiment at their schools. In-between the workshops, the researchers made an "Activity-System-Analysis" (ASA) of the future workshop based on Engeström's triangles (second generation, Engeström, 2001) in order to identify tensions and contradictions in the activity system, which then could serve as a kind of springboard for the development of the design ideas (Dirckinck-Holmfeld & Ræbild, 2017). This analysis was presented for the teachers in the second workshop in order for them to choose a tension to work on and to design an intervention on. The teachers interventions run through 2 months and the teachers did a logbook in order to document their experiences and reflections. Finally, there was a small seminar in the end at each school for all the participants and representatives from the management and school district to present and discuss the interventions very detailed and the learning of the project.

Enactivism and digital learning platforms

Learning platforms are important infrastructures in the networked environment as they mediate the interactions of the participants, teachers, pupils, parents, school administrations etc. The relations between the participants and the environment is a dynamic and emerging relation of autonomy-dependency, a symbiosis (see fig.1). An infrastructure is not given, but becomes an infrastructure through use (Bygholm & Nyvang, 2009). When the workshop took place, the digital learning platform seemed to be an obstruction for the teachers in order for them to do their work. The teachers found it very time-consuming to follow the routines for describing learning goals and learning tasks, the assessment of the pupils' performance in an absolute scala on pass/not pass; moreover, they were very concerned with the values on teaching and learning, which the learning platform presented.

The main problem identified in the critique phase, and which set the framework for the vision phase and the subsequent design workshop, dealt with the human view on which the teachers believed that the digital learning platform is based. According to the teachers' proposals, the digital learning platform a teaching practice that does not see the children "as 'someone', but as 'a thing' that must always be measured and weighed". In the critique phase, the teachers formulated statements as "The system vs. Man. For the platform's sake! The platform is increasingly in focus. Do we end up spending more time on the learning platform than on the children, when teaching?"; "Robot factory"; "The use of the learning platform creates "teaching to test"!!! There is no room for formation"; "Childhood: What does it take for people to be evaluated, measured and weighed from day one in school? Quality of life. Meaningfulness. Community. Presence" (Dirckinck-Holmfeld, 2019 p. 117). In the vision phase, the teachers visualised their ideas for a learning platform arguing that the digital learning platform should facilitate fundamental values of "Meaning, caring, becoming, the child as 'some-one' not a 'thing' supporting inquiry-based learning, problem- and project based learning, outdoor school, and tangible and sensorimotor learning using Lego ++ based on trust on the pupils that "they do what they can". The future workshop provided a necessary space of reflection for the teachers and shared meaning construction. From a methodological point of view, a future workshop is an enactment by the participants and the environment. It takes place in a specific environment (a specific school, historical moment, educational reform, the management and teaching and learning culture at the case school, the affordances of the room for sharing

and elaborating, and not least the contributions of the participants, teachers and facilitators). In this enactment the participants formulated a shared understanding of the learning platform and the built-in values for child formation, teaching and learning, and it became very present for the participants, that the design of the learning platform was conflicting with their professional identity and engagement as teachers. On the other hand, as the school has to use the learning platform, the second workshop – the design-workshop – was used to "work-around the digital learning platform", and to establish didactical design interventions, so the teachers could try out some of the functions, they would like to use in the digital learning platform in a meaningful way. The teachers focused on two interventions – how to use the learning platform for formative assessment using the portfolio function, and how to use the learning platform to strengthen the teacher-pupils-parent dialogue of the pupils progress using a function for visualising the pupils' progress in a spider web. The process of re-enactment of the platform included, on one side, the body reintegration into knowledge production. Teachers experienced embodiment when they did their interventions and began to use the learning platform.

On the other side, the teachers reinterpreted the designers' proposal of the platform, discovering some features that would suit their pedagogical goals, and even inventing new ones according to their needs. In this process, we could see a new sense-making production and a self-reflection that could take to further pedagogical creativity (see Figure 2 below).
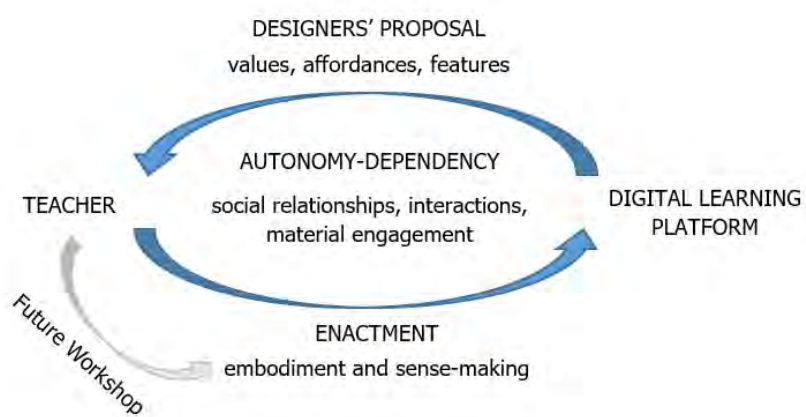

Figure 2 – Relationship of teachers and digital platform within the enactivist frame

This intervention is an example of how to understand enactive modelling. According to Holton (2010, p. 8), an enactive modelling would be a technique "in which a student does not merely observe a dynamic system, but takes over the role of one of the elements and re-enacts and controls its behaviour, observing the effects on the rest of the system". We observe that the wording of this model does not allow to look at the system overcoming the limits of objectivism. We ask here: would it be possible for a subject to "control" the behaviour of an element? Would it be possible to observe the "effects" on the rest of the system? Finally, it does not seem as the student has a say in which roles to take over. However, what we take from Holton is this idea of "taking over the role of one of the elements and re-enact it". In our intervention, we as researchers did not decide which roles the teachers would work with, this was the teachers' responsibility. This re-enactment provided the teachers with an opportunity to explore and work with some functions of the digital learning platforms, which they were not aware of. As documented in Dirckinck-Holmfeld & Ræbild (2017), the re-enactment also provided insights into some of the shortcomings in the design of these functions, however overall the teachers got a more positive attitude towards the learning platform as they found out how they partially could use it and skip other functions. From an implementation point of view, this example demonstrates that the implementation of the digital learning platform takes place into an ecological living system made up of humans, non-humans, things, and societal entities. For the teachers (and more general the humans) to possible accept, appropriate, act and re-enact such a learning infrastructure, it is of great importance to establish spaces for reflections, which e.g. a future workshop provides, and to support (alternative) enactments of some of the more hidden affordances of the digital learning platform.

Conclusion

Under the enactive perspective of a learning platform, it is necessary to bear in mind that the environment does not produce a mechanical change in the classroom system. It is through the interaction of the individuals that are present in that historical situation and in that space that the change will possibly occur. An essential principle of

the enactivist model in education is the provision of multiple perspectives on any problem. This is a very important learning to take on from the enactivist perspective. However, we would suggest to differentiate this perspective following how the ecological living system is made up of humans, non-humans, things, and societal entities, and these elements establishes qualitative different dependencies within the ecology. In conclusion, we affirm that having enactivist models and systemic thinking as a core functioning of the learning process would bring great benefits for the learner, for the teachers and for the implementer of digital learning solutions.

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The ties that bind us as a community: a qualitative reflection on the networked learning research

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Abstract

This manuscript was concerned with the extent to which the definition of the networked learning is manifest in the networked learning research. To this end, it explored how the definition is utilised in the design and application of the research. Technology (mediation and/or facilitation), connections (interactions), and network (community and/or context) were the three categories I explored the networked learning research. While the definition of the networked learning is open-ended in nature, the findings show that the networked learning researchers have enough commonality in their approach to the networked learning.

Introduction

The first Networked Learning Conference took place in Sheffield in 1998 and the conference in Kolding in 2020 will be the 12th addition to the biennial conference series. As Heraclitus once said, change is the only constant in life; and indeed, much has changed in the world during that 21 years (by the time of this manuscript being written) and much has changed in the networked learning community. This manuscript is interested in documenting whether research in the networked learning community changed or whether it remains in line with its roots since the term networked learning is defined. In specific, it explores how the application of the concept of "networked learning" has utilised in the papers presented at the Networked Learning Conference series. I believe this is important for the networked learning community for at least two reasons.

First, practical reasons. The definition of networked learning is necessarily open-ended; thus, the variety of theories we apply, methodologies we employ, contexts we explore, technologies we use hinder us from defining our identity and communicating it to the outside world. We need to understand *what we do* as scholars and researchers interested in the theory and practice of networked learning. So far, attempts that analyses the research trends in the Networked Learning Conference series are scarce (see, for example, de Laat & Ryberg, 2018). The findings presented in that paper are invaluable and provide a great insight to the research within this community. However, those findings are based on the quantitative measures of word counts and, as the authors rightly acknowledge, what can be meaningfully drawn from that analysis is limited. This manuscript builds on the findings presented in de Laat and Ryberg (2018)'s work and qualitatively explores the ways in which the concept of networked learning is utilised.

Second, theoretical reasons. Practice is always epistemic (Hodgson & McConnell, 2018); therefore, we need to define the epistemology of our research practices if we are to define ourselves as a research community. We need to understand *what we do* to understand the epistemic practice of networked learning community. The work described in Hodgson and McConnell (2018) is the first ever attempt for defining and understanding the networked learning community as the knowledge community. While the findings presented in that paper provide a great insight to the characteristics of this community, data are collected from selected participants of the previous conferences. This manuscript builds on the findings

presented in that work, but it shifts the focus participants' attitudes to the papers presented in the conferences.

I acknowledge the strengths of the aforementioned studies; yet, I take a different approach in this work. In this manuscript, I qualitatively analyse how the application of the concept of "networked learning" was utilised in the proceedings published at the Networked Learning Conference series. In specific, I analyse the discourse in the papers presented semantically (Fairclough, 2001) and explore the theories, technologies, networks, and contexts in relation to the definition of the concept of the networked learning coined by Goodyear, Banks, Hodgson, and McConnell (2004).

In what follows, I discuss the definition of the networked learning as it is the anchoring point by which the proceedings are analysed. Then, I reflect on the technologies (means by which such connections are facilitated and mediated), connections (interactions between a learning community and its resources), and the network (the space or community in which networked learning is conceptualised).

The Gold Standard: The definition of networked learning

"Networked learning is learning in which information and communication technology is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources" (Goodyear et al., 2004, p. 1). While the authors did not claim (or intended) their definition to define the epistemology of the networked learning community, by and large, it is the most widely accepted explanation; and thus, it has been subject to scrutiny (Sinclair, 2018). It is worth to discuss when the concept is coined and why it is coined in that particular way. Online learning was just emerging both as a research discipline and a research space when 90s were closing and 2000s were starting. With the exponential growth of online technologies came the opportunities to think of educational practices in formats and ways that was not possible before (Harasim, 2000). The terms e-learning, web-based learning, and online learning were widely used to label any sort of teaching or learning activity that employs online technologies. The alluring impact of using technology for the sake of technology itself enforced researchers to define a distinctive theory of learning that necessarily values cooperation, collaboration, and dialog. The concept of networked learning is one answer for such an attempt. It differentiates itself from other applications of e-learning by stressing the importance of connections: interactions with others or online materials in isolation are not sufficient enough to constitute networked learning (Goodyear et al., 2004). Fundamental to this perspective is that learning is a matter of engagement with others in a community (Oztok, 2019).

The definition of networked learning implies certain theoretical beliefs about what networked learning is. The definition can be breakdown to three meaningful components: Technology, connections, and network. Below, I will explain how I conducted the analysis and then will present my findings in relation to these three components.

Method

I downloaded 412 papers presented in the Networked Learning Conference series between 2004 and 2018; a timeframe between the definition was coined and the latest conference. I catalogued these papers using NVivo and, then, I searched the term "networked learning" in order to narrow my focus down on papers that makes explicit references to networked

learning. About one third of the papers were eliminated during this process. Then, I searched the remaining 266 papers using the terms "technology", "connections", and "network" in three separate searches per the reasons explained above. For each category of analysis (technology, connections, and network), I employed the descriptive and critical discourse analysis in order to construct meanings across different papers (Fairclough, 2003). Several meanings emerged through this process and I combined, compared, and contrasted them in order to create more comprehensive yet more distinct meanings. The findings presented in this manuscript does not report each and every single paper that deals with technology, connections, or network; rather, the findings summarise what these terms mean and how they are utilised in research. In this sense, the papers that are cited in this manuscript typically represent the general approach rather than they stand out because offer a counterargument or an unorthodox approach.

Needless to say, findings in this manuscript should be considered in relation to the limitations and biases in my analysis. First, I only analysed the papers that specifically uses the term/concept "networked learning". This was purely a logistic decision. Second, I only explored how the concept of networked learning shaped the design and delivery of the research without really making any judgements on the research itself. Third, I based my judgements on Goodyear et al. (2004)'s definition of the networked learning without considering whether the author(s) in those papers I analysed subscribe to that definition or not.

Although not necessarily a limitation, it is also worth acknowledging that I am a relatively new member of this community. My peripheral membership, surely, means that I cannot know the previous discussions and debates among the participants, which had an impact on my capacity to understand the spirit of the past conferences. On the other hand, I aimed to use my "fresh look" into the networked learning community as an opportunity to question the established practices and agreed-upon meanings. In other words, I tried exploiting the advantages of being both an insider and outsider in my analysis. Lastly, I can only reiterate the words of others whom I use their work as a point of guidance for my sense-making (de Laat & Ryberg, 2018; Hodgson & McConnell, 2018): this is not an authoritarian analysis; but a step towards for better understanding ourselves as a knowledge community.

Technology

The definition of the concept of the networked learning does not specify certain technology or favour one over the other. Nevertheless, it tailors a certain role for technology: it should be used to promote connections.

The analysis of the proceedings revealed that networked learning researchers rely on *online learning* to promote connections. However, I concur with (de Laat & Ryberg, 2018) that online, distance, and blended learning are often used synonymously. The interchangeable use of these concepts surely blurs the distinction among these different forms of mediation. To be fair, I acknowledge that these modes of delivery are inherently very close to each other. Yet, the implication is that the networked learning research does not clearly tease out which practices best optimise the connections that serves as the social fabric for the networked learning to occur. Despite the confusion with the terminology, it was evident that the members of the networked learning community continue to conceptualise and utilise the technology in line with the original definition; that is, technology is tailored for mediating connections among participants and resources (for example, Creanor & Walker, 2010; Zenios & Steeples, 2004).

Another important finding was that the networked learning researchers are quick to experiment with the affordances of emerging technologies. In specific, when a new form of technology emerges (for example, mobile learning) or a new platform gains world-wide popularity (for example, MOOCs), that particular technology is scrutinised for its capacity to utilise connections within a learning community (see, for example, Czerniewicz, Glover, Deacon, & Walji, 2016; G. Jones, Edwards, & Reid, 2008; Mackness & Pauschenwein, 2016). The findings showed that researchers discussed the ways which such technologies can best support networked learning activities.

Interestingly, in other times, technology remains mostly invisible. That is, a discussion on the role of technology is less prominent when the technology or the platform being utilised is already known in the community. The analysis did not yield an immediate conclusion, but one suggestion is that the interest in that particular technology does not wane, but it becomes normalised enough, whereby a great deal of discourse focuses on actual teaching or learning practices using that particular technology rather than studying the technology itself.

As discussed above, the definition of networked learning was born out of attempts that goes beyond using technology for the sake of it. It might be concluded that after two decades, the networked learning community continues with this stance towards the use of technology.

Connections

It is beyond doubt for the networked learning community that the connections between community members and its learning resources are the key for networked learning occur. The analysis suggested that orchestrating connections to form a learning community has always been the interest for the researchers in the networked learning community.

The results concurred that the networked learning is closely aligned with other sociocultural theories of learning (C. Jones, Ryberg, & de Laat, 2015), including social constructionism, activity theory, constructivism, and actor-network theory just to name a few. This was evident in the papers I analysed. While the variety of perspectives both enriches and blurs the conversation on conceptualisations of connections, these theories are fundamental for understanding *what we do* as the community of networked learning researchers. The results showed that the networked learning research studies how knowledge is cultivated (Gerdes, 2008), utilised (Dohn, 2012), and distributed (Carmichael & Tracy, 2018) within a community of learners (Carvalho & Goodyear, 2014). The point of which these theories part ways from one another is how they operate and configured. Below, I will summarise some of the most commonly used theories.

In constructivism, knowledge is believed to be constructed individually and resided in people's head; thus, those networked learning researchers who adopted constructivism probe how knowledge can be mobilised and shared (Brown, Smyth, & Mainka, 2006). Actor-network theory puts more emphasis on social ties. It argues that nothing exists outside constantly shifting networks of relationships. How people interact within these networks of relationships carry the utmost importance. Those networked learning researchers who adopted the actor-network theory describe how objects, ideas, and processes create the social fabric for networked learning (Roberts, 2004). Activity theory recognise human activities as a systemic and socially situated phenomenon. This theoretical framework aims to address the sociocultural factors by bridging the gap between the individual subject and complexity of real-life activities. Networked learning researchers who adopt this framework regard

connections as culturally mediated human activity or collective system (Czerniewicz et al., 2016). They discover patterns of interactions (Guldberg, 2010) and explore the nature of them (Karasawidis, 2008) with a particular focus on the use of tools (Kaulback, 2012). By and large, other theories can be studied under the umbrella term of sociocultural perspectives. In those studies, the focus is on the social learning activities within a community – albeit *sociocultural* is used loosely as a unit of analysis. That is, theoretical discussions are relatively invisible or largely implied. It is important to note that these studies are not necessarily weak but rather they are not determined (and thus limited) by what theories dictate.

It is possible to conclude that the networked learning researchers study connections in line with the original definition. Interactions with resources in isolation are not sufficient to constitute networked learning; interactions should connect learning community and its learning resources (Goodyear et al., 2004). This remains to be the guideline for the networked learning researchers. Regardless of the learning theory that is being used, the networked learning community tackles with the ways in which connections are created, sustained, and utilised for sharing knowledge and experience in order to form a learning network. How this should happen and what impact it has on learning is rather a matter of theoretical standpoint. While I appreciate the richness of perspectives, arguably, the variety of approaches blurs the boundaries of the networked learning community. Perhaps, this is where the networked learning community should concentrate its focus. The original definition does not make any reference to what learning is but rather speaks about what network is. How to design networked learning should not be an open-ended endeavour but a careful pedagogical design, distilled through a clear understanding of what learning is.

Network

The original definition regards network as the connections between a community and its learning resources. In broader terms, the network is the context in which learning occurs (Goodyear et al., 2004). The findings suggest that community is the concept by which *networked* is overwhelmingly associated with and studied through. This is not entirely surprising given the concept of community resonate well with the concept of network. The question, then, is whether network and community are the same concepts or whether every community can represent networked learning.

Etymologically, community is derived from the Latin word "communis", which means common. The idea of commonality is inherent in the meaning of community. According the Oxford Online Dictionary, community is a group of people with common values, attitudes, and interests. What are the common values, attitudes, and interests the networked learning researchers study? The findings suggest the ties that binds a community is conceptualised in three different ways: sense of community, pedagogical activities (e.g., collaboration or cooperation), and socialisation. These three categories should not be understood in opposition with each other or as mutually exclusive.

By and large, sense of community attracted the most attention from the networked learning researchers. It refers to the degree of one's sense of belonging to a community (Oztok, 2016). The pedagogical value of the sense of community has long been established within the community of the networked learning. It allows people to perceive the networked environment as a space, wherein the members can develop relationships among one another (Carson, 2014). Since the definition of the networked learning strongly argues for establishing healthy connections among participants, the concept of the sense of community

provides means by which the networked learning researchers can study the quality of those connections. Dialogue, sense of isolation, consensus, trust, and identity are among the directions that the networked learning researchers explored in relation to the sense of community (see, for example, Brouns & Hsiao, 2012; Davis, Cronin, & Seitzinger, 2014; Tremblay, 2018).

The networked learning research links the concept of community with cooperative and collaborative forms of learning (Goodyear et al., 2004). This is reasonable since the pedagogical principles underlying these learning activities are inherently concerned with how people engage with and react to each other in group-based work. The networked learning researchers, then, study dialogue (Crosta & Gray, 2014), knowledge construction (L. H. J. Lee, Rahmat, Lim, Lin, & Tan, 2018), cognition (Parchoma, 2016), high-level thinking (Ramanau, Sharpe, & Benfield, 2008), and critical thinking (Corich, 2006). The findings suggest that for the networked learning researchers, "network" meant approaches to teaching and learning that involve a group of people working together towards a common goal, whether this common goal is learning a subject, solving a problem, or creating an artefact.

Socialisation refers to the process of learning to enact in a way that is acceptable to society; a process of internalising the norms of a community (Oztok, Lee, & Brett, 2018). Although the term socialisation is not widely used in the networked learning community, research concerning how people create and sustain social relationships (Simmons, Parchoma, & Koole, 2018), whether these relationships are strong or weak (K. Lee, 2018), and whether there is a sense of coherency and membership within a learning community (Allan, 2006) can be grouped under socialisation. I believe it is an important term as socialisation can provide means to discuss whether the connections between community members and its learning resources are meaningful enough to form a network.

Of course, it is erroneous if we only focus on the benefits associated with the concept of network (Oztok, 2019). While the research concerned with the exclusive nature of group work is not new to the community of the networked learning, it is thin in volume and nature. The findings suggest that the negative impact of normalisation is only studied under sense of community (Johnson, 2012). What impact does social hierarchy have on pedagogical practices (and outcomes) and how to address these problems remains to be largely understudied. It is possible to summarise that the networked learning research can be more attentive to the questions concerning social justice in group work.

Lastly, as I have argued above, the findings suggest that community is the concept by which *networked* is overwhelmingly associated with and studied through. However, there can be other forms of network. What are the alternative frameworks for and approaches to the networked learning? How can the networked learning research can go beyond the concept of community in its understanding of what networked is? Perhaps, these are the questions that the networked learning community can pay more attention to.

Conclusion

This manuscript was concerned with the extent to which the definition of the networked learning is manifest in the networked learning research. To this end, it explored how the definition is utilised in the design and application of the research. Technology (mediation and/or facilitation), connections (interactions), and network (community and/or context) were the three categories I explored the networked learning research. While the definition of the

networked learning is open-ended in nature, the findings show that the networked learning researchers have arguably enough commonality in their approach to the networked learning.

In my approach the definition of the networked learning, I wanted to explore who we are and what we do as the networked learning researchers. The intention was to better understand ourselves both as a knowledge and a research community. I never aimed to draw lines on what we do and set boundaries on who we are as a community. I do not see the membership in binary terms of being in or out, but I wanted to use *who we are* and *what we do* as pockets of interests by which to negotiate our membership with the community. In this sense, the findings in this manuscript concur with the perspectives from one of the previous attempts of studying the networked learning research, that is worth citing in detail (de Laat & Ryberg, 2018, p. 30):

> from a theoretical perspective it seems clear and that network learning is strongly associated with theories that emphasise social relational and cultural aspects of learning … it's a field interested in community oriented and collaborative forms of learning … it's a field that been interested in digital technologies also reroutes its interest or object of study is the technological landscapes and trends change.

To a great extent, the findings in this manuscript provide further qualitative explanation to these claims.

The notion of "network" is more prominent than "learning" in the definition of the networked learning, and this was evident in the approaches to the networked learning. Learning is studied under various theories; and in accordance, the networked learning researchers adopted numerous ways of studying learning. The findings in this research concur that "networked learning is not a unison theoretical perspective, but rather is a theoretical perspective that is composed by or underpinned by a range of other theoretical outlooks" (de Laat & Ryberg, 2018, p. 9). There are two important implications of this.

First, despite the variety of perspectives available, the networked learning community inclines towards the learning theories that support relational perspectives within sociocultural settings. Yet, there is a need for more discussion on learning. What do the members of the networked learning community mean when they study learning? This is an important point of further conversation since designing networked learning should not be an open-ended endeavour but a careful pedagogical design, distilled through a clear understanding of what learning is.

Second, despite the prominence of the notion of network, the findings suggest that community is the concept by which *networked* is overwhelmingly associated with and studied through. There is a need for a discussion and debate on other forms of network. What are the alternative frameworks for and approaches to the networked learning? This is an important question if the networked learning research is going to adapt itself to the changing nature of the educational uses of technologies.

I should, perhaps, end this manuscript with some provocative thoughts to catch some attention. This is not to satisfy a narcissistic urge but to start a discussion that is long due. I will not reiterate questions whether networked learning is a unified field of study or whether it is an unbounded dialogic space (Sinclair, 2018). I will instead try to strengthen the ties that bind us. The findings of this manuscript warrant for two agenda items for the society of the

networked learning. First, we need a more nuanced definition of networked learning, one which accounts for the current practices where we are almost always "connected" to each other due to the ubiquitous nature of digital technologies. Second, we need to put the concept of learning to the centre of our attention and debate, discuss, and hopefully agree upon what it means and how we can research it. The current definition, perhaps, served its term and deserve a well-earned retirement?

I hope this manuscript will spark curiosity and encourage others join the debate and discussion.

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Scaling engagement in MOOCs 4D: Redress for Bloom's 2-sigma challenge

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Abstract

This short paper and presentation reviews a design implementation for scaled inquiry-based learning. A MOOC design resting on the community of inquiry (CoI) theoretical framework and the historical work of Bloom and Wahlberg was tested in a large, open, online course. Over multiple implementations, results indicate higher engagement and completion rates beyond what normally occurs in MOOCs. These results may be attributed to enhanced opportunities for engagement. Beyond a test of MOOC design, this design is in reference to the needs of education broadly. The iron triangle of education requires the adequate combination of cost-effectiveness or affordability, accessibility, and quality. Difficult to offer in combination, this is particularly challenging when learning opportunities are scaled to networks of learners. As one example of networked learning, this MOOC design offers suggestions for high engagement in technology-enabled learning for large groups of learners.

Keywords

Online learning design, MOOC design, social learning, scaled learning, community of inquiry

Introduction

The most recent form of open and distance learning has caused a significant stir: Massive Open Online Courses, or MOOCs. MOOCs are large open online courses, often offered without cost, to learners from around the world. As such, they provide learning opportunities and access to knowledge and experts previously out of reach for many. Some suggest that the advent of the MOOC initiative is the most significant innovative event in higher education to occur in decades. In reference to education access, MOOCs are an improvement to access but may compromise education quality; the evolution of MOOC design has involved not only increasing consideration of access but concern for the learner experience, satisfaction, and learning outcomes.

As a point of reference for MOOC development, Open Universities have been offering accessible post-secondary education to large groups of students for decades. MOOCs take open, accessible learning delivery a step further, allowing free no cost access to any interested participant who joins a course. However, this scaled version of online learning does not uniformly carry all the requirements of a sound, measured online learning experience with appropriate and necessary outcomes. This paper reviews a MOOC design sensitive to long-standing issues of scaled education, where limited one-to-one student instructor engagement is remedied with learning opportunities known to improve learning outcomes (Walberg, 1984).

Background

The Community of Inquiry is a theoretical framework that embodies Dewey's experiential learning, Vygotsky's social learning, and early notions of Anderson's equivalency theory (Garrison, Anderson, & Archer, 2000). We used the overlap of teaching, social, and cognitive presences to create a meaningful learning space that encouraged deep, personal learning. Teaching presence represents the design, facilitation, and direct instruction of the course. Social presence depends on teaching presence to foster open communication, group cohesion, and

personal expression. Cognitive presence rests on the elements of social presence as a sound foundation and is additionally supported by teaching presence opportunities to respond to triggering events, explore complex ideas and applications, integrate new cognitive schema with previous experiences and ideas, and come to temporary but meaningful conclusions about what is right in the world.

In addition, MOOC design activities consider the seminal work of Bloom (1984) regarding mastery learning and the impact of one-to-one instruction, applied to group instruction with attention to remedies (Walberg, 1984).

The resulting design is what we call an inquiry-based MOOC, or iMOOC (Cleveland-Innes, Ostashewski & Wilton, 2017)). The iMOOC, in brief, includes the three CoI elements situated in a personal context. Firstly, Teaching Presence for an iMOOC is divided into three activities. The first activity is labelled 'instruction.' Here there is no opportunity for student response but a video lecture (also made available through transcripts and audio files) provides both an introduction to course content and, most importantly, a view to the learning activities available to participants. In other words, participants are encouraged to engage in activities that Walberg (1984) suggests remedy the loss experienced without one-to-one instruction, including peer teaching, active participation, and asking questions. Activities that foster social and cognitive presence are also encouraged. Students are guided thought the weekly activities using a suggested set of learner tasks: read, respond, review, explore, and assess your learning.

The second Teaching Presence activity is labelled 'inspiration.' This learning support is offered by an experienced online instructor who plays the role of Inspirer; communicating through text-based announcements and short-videos, the Inspirer opens and closes each week of the course, bringing learners along through the content being presented. This communication provides encouragement, direction, and inspiration at the start of each week and validation and closure at the end of each week. The Inspirer also interacts with learners in the discussion forums each week as further support for the "live instructor" element of the iMOOC model.

The third type of Teaching Presence is offered through roving facilitators who provide 'information' as needed. A facilitator for every 250 participants is available online to answer questions about technology, learning processes, and encourage students to respond to each other's questions, comments, and discussion forum posts. One of the facilitators significant tasks during the course is that of connecting learners to each other, in a sense, guiding their networking across the community of inquiry that is established as part of the course. In this sense the course facilitators are supporters of networked learning, where this kind of learning can be understood as having significant supportive value for MOOC participants. The definition of networked learning supporting this characterization is one where the communication and information technology network created inside the MOOC space is "used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources." (Jones, Asensio, & Goodyear, 2000). The networked learning that is a result of the course design is integral to learners contextualizing content presented in the course. Further, the networking support in the iMOOC allows learners that have similar issues and challenges to connect directly with each other. MOOCs certainly have the capacity to create peer-peer networking and support opportunities: however this is often lost without intentional and explicit support from facilitators aiding learners across potentially thousands of forum posts.

Results

The learner engagement pattern demonstrated by recent participation data from TELMOOC4 shows an engagement pattern that is shallower than the typical weekly decline seen in MOOC interaction and engagement (Clow, 2012). In addition, completion rates in TELMOOC4 are significantly higher than what is normally reported in MOOC data (Anderson, 2013; Khalil & Ebner, 2014).

Conclusions

Underneath all practical applications, we rely very much on theory and especially Presti (2013), who guides us through the depths of interaction theory; this work on social ontology explains interactive processes themselves and their role in creating a shared social reality. Other people and the social environment, virtual or not, constitute underlying social and cognitive understanding and give rise to meaning and deep learning. Preliminary data from the TELMOOC experience suggests that the early work of Bloom (1984) and Walberg (1984) may provide design direction for scaling high engagement learning activities in large, technology-enabled courses. These design directions, once confirmed, may be further scaled through adaptive responses to information from learning analytics. Students may then be additionally guided by algorithms to learning

activities that will improve learner engagement and outcomes (Scandura & Kovak, 2017). We suggest this may work where engagement with other humans via continued social and cognitive interaction, even if informal and self-directed, remains a significant part of the experience.

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Hybridity, Transparency, Structured Freedom and Flipped Engagement – an Example of Networked Learning Pedagogy

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Abstract

In this paper, we contribute to current discussions of what constitutes the field of networked learning as a research domain and what makes networked learning particularly relevant and distinct within the broader landscape of digital technology in higher education. We enter this dialogue through discussing and reflecting on a hybrid learning design for a 10-ECTS module that builds on a Networked Learning Pedagogy. The purpose of our discussions is to elicit tensions and contradictions that surface when students are confronted with a networked learning pedagogy. We discuss the module in relation to ideas of networked learning pedagogy, present four pedagogical principles underpinning the module, and we draw out interesting tensions and contradictions that have emerged. Following this, we use the discussions to feed into the ongoing dialogue of 'what is networked learning', and we discuss how networked learning can contribute to practice and policy in higher education through developing practice.

Keywords

Hybridity, transparency, structured freedom, flipped engagement, epistemic practice

Introduction

In this paper, we contribute to current discussions of the field of networked learning, and what makes networked learning relevant and distinct within the broader landscape of digital technology in higher education. We speak into discussions that have emerged in the books of selected papers from the Networked Learning Conferences (in the book series Research in Networked Learning) (Dohn et al., 2018, 2020), and we shall emphasise values and pedagogy as central characteristics of networked learning and the research field of networked learning.

We enter this dialogue through discussing and reflecting on a re-design of a 10-ECTS module towards a flipped semester/curriculum model building on networked learning pedagogy (Hodgson et al., 2012). The module is part of the Communication and Digital Media bachelor programme (CDM) in Aalborg University (AAU) and titled "Learning, networks and orchestration". This is of interest to the field of networked learning as the re-design builds on a networked learning pedagogy, but equally because networked technologies play a central role in the module. While the field of networked learning has traditionally arced more towards online courses and programmes (Laat & Ryberg, 2018), ubiquitous mobile technologies and pervasive access to digital networks have been reshaping on-campus spaces and learning activities. Blended learning (Hrastinski, 2019) and flipped classroom approaches are prominent in the current discussions of digitising higher education and there is a strong need to enrich contemporary debates with theoretical, methodological and pedagogical insights from the area of networked learning. An area which emphasises its theoretical and critical approach to digital learning (Dohn et al., 2018; McConnell et al., 2012; Ryberg & Sinclair, 2016). In the paper, we discuss four pedagogical aspects or principles (hybridity, transparency, structured freedom, flipped engagement) that have shaped the re-design of the module, and which we argue are useful concepts in developing networked learning pedagogy.

The wish to re-design the module originated from a growing concern that the module was becoming too monological and lecture based (similar to other courses and modules within AAU). This sits uncomfortably with the fact that AAU heralds a problem and project based learning model, and various initiatives have therefore been launched internally to introduce more active learning methodologies into courses and modules. Secondly,

working with active learning methodologies is assumed to heighten study intensity e.g. the time and energy students invest in a course. This is of interest to lecturers, but is also becoming a hot topic at management and policy level with possibly troublesome implications.

In relation to these two concerns, the re-design and implementation of a flipped semester approach and working with the four principles of hybridity, transparency, structured freedom, and flipped engagement have raised interesting tensions and contradictions. As explored by Cutajar (2018, p. 79) this is not unusual as a shift to a networked learning pedagogy can be:

> "[…] a significant shift from the prevalent classroom-based lecture which students are used to. Teachers are assumed to take a less prominent position permitting students to experience learning through active participation in cooperative and collaborative activities with others"

We therefore discuss the tensions arising between the design and students' experiences and expectation. One concern emerging was specifically related to the students' experience or reporting of study intensity of the module. Here a contradiction emerged between students' reports of being more engaged and motivated, while simultaneously claiming to have spent less time than in normal modules.

We use the discussions to feed into the ongoing dialogue of what is networked learning and how networked learning can contribute to practice and policy in higher education by developing practice as suggested by Hodgson & McConnell (2018, p. 462):

> "This is a theme that epitomises the idea of epistemic practice where the theory of networked learning is captured in the practical accomplishment of not only one's learning designs but in our situated performative actions/work and social practices".

In this way, the module reflects an example of networked learning as an epistemic practice or networked learning as a "developing practice". We further argue that such development processes need not be smooth and friction-free, but should perhaps be thought of as a fly in the ointment.

Case description – history and context

In AAU, a problem and project based learning model has been used as an institution-wide pedagogical approach since the university's establishment in 1974 (Kolmos et al., 2004). More recently, the model has been formally described in a number of principles (Problem Based Learning, 2015) underpinning how Problem Based Learning (PBL) is practiced at AAU. On a macro-curricular level, this means that semesters in different AAU programmes are often structured as 3*5 ECTS course modules that run alongside a 15 ECTS project module (in the European Credit Transfer System (ECTS) a semester is 30 ECTS).

As part of the 15 ECTS project module students work in groups. They identify their own real-world, societally relevant problems to address (often in collaboration with external stakeholders). They engage in long-term project work (3-4 months) where they choose relevant theories and methods in collaboration with a supervisor. They carry out empirical and theoretical studies; analyse and discuss empirical data and/or theories to address their problem. Finally, they present the solution to the problem in a final project report accounting for (typically) half of the students' credit for a semester (15 ECTS). The three 5 ECTS course modules have their own exams, but are also supposed to provide students with relevant disciplinary knowledge, theory and methods that can support their self-directed project work. However, reports and research suggest that course modules and the project module are drifting apart and courses are becoming increasingly discipline-oriented and self-contained (Kolmos et al., 2013). Furthermore, a growing concern internally in AAU is that courses have become too lecture-oriented and teacher-centred running somewhat counter to the original ideas of PBL.

Within the CDM bachelor programme, the fifth semester is organised differently from the other semesters and from the overarching Aalborg PBL model. The intention was to provide students with alternative experiences to the usual structure. The macro-curricular design for the fifth semester is three 10 ECTS modules running in succession, each of them finalised within six weeks with a brief group report (15 pages) and an oral group exam (1½ hours). Within this structure, the 10-ECTS module on "Learning, networks and orchestration" has run since 2012. It builds on the central idea that students are introduced to the theory and practice of teaching and (digital) learning through creating a learning design for others i.e. they have to teach others. In the course, fifth semester students are therefore tasked with introducing first semester students to digital academic PBL practices.

Structure and overall design of the module

The structure of the fifth semester aimed to provide students with different experiences, than the classic PBL structure. However, a growing concern amongst the group teaching the first module (and more widely across AAU) was that the teacher-led activities tended to become monologic lectures, where students are introduced to

concepts followed by self-directed work on developing their project (their teaching). One concern is that this stands in stark contrast to fundamental ideas of PBL, namely that students are active, engage, discuss and reflect together. Another concern relates to study intensity, and whether students invest sufficient time and energy in courses if lectures are primarily presentations more than working with tasks, exercises, preparation etc.

Discussing these tensions with other PBL researchers across AAU led to ideas of experimenting with what we named flipped curriculum or flipped semester (Bertel & Kristensen, 2018; Kofoed et al., 2018). In the past three to four years, we have therefore developed the course towards a flipped semester or flipped curriculum model.

The name flipped semester was a playful response to the growing interest in flipped classroom emerging globally and locally. While we agreed with the underlying idea of encouraging more student activity and interaction in the classroom, we also found that much of the practice emerging around flipped classroom locally and globally was too focused on lecture recording + class activity, rather than more fundamentally rethinking relations between students, teachers and curriculum. Hence, we developed the idea or ideal of a flipped semester, which we described loosely as:

> "Semesters or modules with no courses, but where students and teachers can access relevant material online […] semesters where students' self-identified problems/research questions become decisive for courses and choice of teaching material/literature and where time and activities between students and teachers are organised as workshops, discussion groups, peer-learning, critique, seminars"

This represented a return to original ideas of Problem Oriented Project work as it was conceived in Aalborg and Roskilde University in the 1970s where "the problem is the curriculum".

While not adopting fully the ideas of a flipped semester, the module did undergo major changes. The amount of disciplinary lectures (e.g. on design, pedagogy or learning) were reduced and replaced with weeks structured around topics and with a recurrent structure or rhythm. The module is now designed in the following way.

Within the first three weeks, the students have to identify an important digital academic practice they wish to introduce to the first semester students. They have to familiarise themselves with theories of teaching and learning, and design a 45 minutes workshop. They teach the workshop in week four. The overall progression of the module is loosely modelled over an adoption of Design Based Research called the ELYK-model (Christensen et al., 2012; Gleerup et al., 2014). More specifically the weeks are structured as:

- Week one and two focus on problem identification, domain knowledge and theory. What is relevant to teach to first semester students and why? This includes theory of learning and pedagogy.
- Week three on designing and prototyping (design workshops and introductions to learning design).
- Week four on intervention and reflection (actually teaching first semester students and reflecting).
- Week five for reporting (writing up and handing in a 15 pages report critically arguing for and reflecting on their teaching).
- Week six for group exams.

Each week has a relatively recurrent structure:
- Mondays and Tuesdays for brief lectures, group work, discussions, and seminars
- Wednesdays for reading groups where students present text to each other
- Thursdays for a weekly reflexive assignment that feed into the final report (e.g. write a page on learning theory)
- Fridays are for supervision/meetings with supervisor

The lecturers assign the students into groups of five and each group has a supervisor they can meet with and discuss their project.

Networked Learning Pedagogy – hybridity, transparency, structured freedom & flipped engagement

Pedagogically the module is rooted in networked learning ideas as they are summarised by Hodgson et al. (2012, p. 295) in their lengthier discussion of NL theory and pedagogy:
- Cooperation and collaboration in the learning process.
- Working in groups and in communities.

- Discussion and dialogue.
- Self-determination in the learning process.
- Difference and its place as a central learning process.
- Trust and relationships: weak and strong ties.
- Reflexivity and investment of self in the networked learning processes.
- The role technology plays in connecting and mediating.

These aspects were part of guiding the design of the module, and we have crystallised them into four principles that underpin the module: hybridity, transparency, structured freedom and flipped engagement.

Hybridity expresses that digital technologies play a central role in the course. Students reflexively explore how digital technologies are part of their own studies and how they mediate collaboration and learning. With the term "hybrid" we emphasise that the digital/non-digital or online/onsite are always co-present and tightly interwoven. In seminars and workshops during the module there are tasks where students need to collaborate online whilst being co-located in the same room, and they are encouraged to integrate online resources (such as online lectures) in their own learning (and their own teaching). They are designing digital resources for the students they teach, and asking them to work together online, whilst being co-located (e.g. exercises on the suggest function in online writing). Whereas some conceptualisations of flipped are about alternating between online and onsite (Hrastinski, 2019) we wish to highlight the simultaneity with the term hybrid. The hybridity, however, also refers to the notion of hybrid presence (Koutropoulos & Koseoglu, 2018) where both teachers and students adopt roles as co-explorers and co-dependent learners transgressing the traditional teacher/student roles.

Transparency, as explored by Dalsgaard & Paulsen (2009), refers to the idea that we ask students to share their group work with all the other groups and something which is enabled by networked technologies. For example, small assignments are handed in as links to online documents available to all students in the module. We do so to instil the idea that students can be resources to each other beyond the group and learn through more weakly tied networks such as a semester cohort (Ryberg & Davidsen, 2018). In this way students can alternate between strongly-tied collaboration in small groups, to being inspired by others via more loosely-tied cooperative forms of engagement (McConnell, 2002).

By structured freedom, we are referring to an inherent tension in the pedagogical design. On the one hand, the whole process is heavily structured with scheduled group readings, reflexive assignments and milestones (for example when to have their design and teaching resources ready). On the other hand, the students are largely free to choose when, how, and where to work (although we encourage them to work in a shared, open room), as activities Wednesday to Friday are teacher-initiated, but student-driven (meaning there is no teacher present). This relates pedagogically to the ideas of indirect design (Goodyear, 2015; Jones, 2015) where teachers can design worthwhile tasks, appropriate tools and places as well recommended division of labour that students then appropriate into their learning activity, which cannot be directly designed.

Finally, the concept of flipped engagement is a core principle in the module and reflects values such as self-determination in the learning process and reflexivity and investment of self in the networked learning processes. Fundamentally, the intention of flipped engagement is an intention of prompting, provoking or inviting students to take more ownership of the learning process and to address the concern we had with the increasing gap between monologic lectures and students' self-directed work. However, it is equally a means to heighten students' study intensity i.e. the number of hours students spend studying pr. semester by creating a more activity-based design (Goodyear, 2015). Study intensity has become a hot topic of public debate in Denmark as many politicians, opinion makers (and students) have criticised that students have too few classes and do not study the number of hours they are expected to (according to the ECTS scale)[1]. This public/political critique has prompted universities to guarantee a minimum number of contact hours (i.e. hours where students meet or interact with a lecturer). Subsequently this has spurred a concern amongst staff of overly simplistic measures of hours and contact time being implemented (leading also to increased administration and documentation). This, because the term study intensity seems to reduce engagement to time spent studying, whereas other approaches to student engagement (Trowler, 2010) represents a more holistic approach involving both behavioural (attendance and involvement), emotional (interest, enjoyment and sense of belonging), and cognitive (investment in learning e.g. beyond requirements) forms of engagement. Thus, our idea of flipped engagement entailed a wish to heighten the students' engagement, curiosity and interest by granting more ownership and

[1] As a background to this discussion: University education in Denmark is a public good i.e. students do not pay fees. The universities are public funded and every student receives an amount around 825€ pr. month from the government. This being also the reason for a quid-pro-quo debate emerging.

responsibility over the learning process (as is the fundamental idea in the Aalborg PBL model and in networked learning). We conceived of this as a way of creating an alternative response to the study intensity problem, rather than a managerial or simplistic counting of hours.

Data collection and method

In autumn 2018, we collected two types of data in relation to the module. The authors who were part of teaching the course made an evaluation (open-answers survey) with the students. One of the authors, who was not part of teaching the module, collected data as part of a wider research project called "PBL Future". PBL Future is a large research project funded by AAU and with researchers from all faculties of the university. The aim of the project is to understand current state-of-the-art of the AAU PBL model and to develop scenarios and ideas for how to develop PBL in a digital world (PBL Future, 2019). The module was selected to be part of an ongoing study of various implementations of flipped curriculum/semester. The researcher therefore followed some module activities and conducted focus group interviews with students during and after the module.

The course evaluation was an open-answer survey with five questions on the students' experience of 1) the structure and working methods, 2) the course literature and resources, 3) information and communication (use of the technological platforms and sharing and reading of own and other groups assignments), 4) the role of the lecturers and supervisors, and 5) groups and group work. For each question, the student could write about their experiences (long answer). We asked the students to initially discuss their experiences in their group, then individually fill out the form, which left us with 36 answers out of 74 students.

Importantly, our aim in this paper is not to evaluate the course, rather we wish to draw out some tensions and contradictions we found, and we use these to discuss further networked learning pedagogy. The tensions are a first attempt to read into the interviews and evaluation and represent a first broad qualitative reading of the material that can later be expanded into a full thematic analysis (Braun & Clarke, 2006). It is a reading and analysis that takes its point of departure in systematic reflexive practice, evaluations, and experiences over a number of years designing and re-designing the module. Nevertheless, we wish to make it clear that treatment of data, the analysis and conclusions are preliminary and tentative.

Evaluation data – summarising

The different organisation of the module stands out in the students' evaluations. The module is recurrently contrasted to a usual semester with exposition of theories and literature through lectures, where there is a minimum of scaffolding on how to integrate course knowledge in their problem-oriented projects (according to the students). In general, the students were positive in relation to the shorter project period and the organisation of the module with more dialogue and workshops and less lecturing than usual. According to the students, these changes lead to increased motivation but also confusion in the beginning. However, while only few students explicitly expressed they would have preferred more lectures over workshops and dialogues, some students pointed to a wish for having more lectures as well.

While some students briefly described the structure as good, fine or worked well; others elaborated and pointed out positive aspects. For example, that they have been more active and felt more responsible for their own learning. A greater relevance and coherence between the teaching, the assignments, and the literature on one hand and then the project and their teaching of the first semester students on the other.

Many of the students are particularly positive about the peer-reading activities in groups. It gave a good overview of the literature and at the same time, they read texts more thoroughly than they would normally have done. However, they also report that too much time was devoted to reading and reviewing the texts. More students suggested that the peer reading of Wednesdays and the assignments of Thursdays should be reduced to a one-day program instead.

Evaluation data - discussion

In the evaluations, we find an ambivalence and uncertainty related to the organisation of the module residing on the one hand in students' positive experience of alternative activities over lectures with a simultaneous feeling among some students of being short of lectures.

> "Structure has been a relief compared to other semesters and it has been a pleasure. Personally, not something I would prefer as permanent change (lectures are too valuable), but it was engaging and motivating to change pace" (student evaluation)

"First week was confusing because we were not used to the structure. But the structure has meant that I have been more motivated to immerse myself in the subject because we knew all the time what to use the knowledge for" (student evaluation)

Students substantiate the wish for lectures by describing lectures as a way of to check or confirm their understanding of literature. In contrast, others point out feedback on weekly assignments and supervisor meetings verified both their understanding of theories and of the project group being on track.

"Supervisor was good at confirming that we had understood and used the literature correct. This is something I have felt insecure about in this module, as we have just had information from other students and not had our own understanding "validated" in the lectures."

We find a similar tension in the students' descriptions of peer reading. Some students describe the dependency on each other's annotations and understanding of the literature as a drawback to peer reading. Some point out that the quality of the annotations varies, while a few describe peer-reading as a disadvantage regarding the exam because "you do not understand the literature, reviewed by the group member, as good as if you read it yourself" (paraphrased from evaluations).

Another tension related to peer-reading and Thursday assignments was that some students reported that too much time was allocated for these activities and they could be shortened and combined. A couple of students describe this as a question of priority and attitude; the assignment and peer reading became a question of efficiency, getting the work done and get home early; rather than, as intended from our side, a matter of discussion, reflection, exploration and absorption. One student writes:

"…what I hear from almost all groups, the fact that we had to work ourselves Wednesday to Friday meant that it was prioritised to get home early and therefore rush through the assignments. This was frustrating for those of us who wanted the important discussions about the texts – that never happened." (Student evaluation)

Clearly, there were here some tensions between our (and some students') intentions of deep engagement and reflection and then a more efficiency oriented perspective of getting things done. This could be read as discrepancies between what could be expressed as deep learning vs surface learning strategies (Biggs & Tang, 2007), but as we shall return to, we should like to locate these strategies at an institutional level rather than as properties of the individual students. They, however, concern questions of engagement and study intensity, which were issues also popping up in the (independent) interviews carried out with the students by an external researcher.

Flipped engagement and study intensity – insights from interviews

The term study intensity refers to the total time the student use in their studies and is increasingly considered an important indicator of student motivation and learning impact in a Danish context (and beyond). For example, it is assumed that high study intensity leads to high motivation and learning, whereas low study intensity leads to decreased motivation and learning, and perhaps even increased drop-out rates (Danmarks Evalueringsinstitut, 2016). Active, student-centred learning methods and feedback are positioned as one of the means to increase study intensity (more frequent exams are also considered an effective way of increasing study intensity (Danmarks Evalueringsinstitut, 2016)). As previously mentioned, the course was designed to increase study intensity through flipped engagement.

However, here we found an interesting tension or contradiction. In the interviews carried out by the external researcher, we found a contradiction between student motivation and study intensity, suggesting that students' experience of study intensity and engagement might not necessarily correlate in modules adopting a flipped semester / networked learning pedagogy. In the interviews, we found that the students in general were positive about the design of the module (as also reflected in the evaluations). Further, the learning outcomes demonstrated in project reports and at exams lived up to expected academic standards. Students interviewed reported increased gains on learning outcomes, increased interest and experiences of being more motivated and self-directed in the networked learning designs. However, the same students simultaneously claimed to have spent less time on the module compared to traditional lectures, i.e. indicating a decrease in study intensity (this was also the case in a comparable courses carried out in AAU (Bertel & Kristensen, 2018)). While our perception, and that of other teachers in similar modules (Bertel & Kristensen, 2018), was that students did not invest less time in the module, we were (and are) a bit perplexed with this finding. While not having a clear answer to this, we are speculating that it could perhaps be an effect of increased motivation and that self-initiated and self-determined activities are not always consciously categorized as study activities. Some students even reported that they were significantly more aware of study intensity (i.e. time spent in-class) in a traditional

lecture-based course following the networked learning module, even though they felt less motivated to participate (Bertel & Kristensen, 2018).

This poses challenges, not only in relation to the increasing attention to study intensity in quality assessment of courses and curricula across educational institution, but particularly in PBL and networked learning environments that seek to support students in taking responsibility for their own learning through project work and networked learning pedagogy. If experiences of self-determination and engagement in such learning activities do not translate into an increase in reported study intensity, this could pose quite a challenge in an environment increasingly concerned with study intensity as a measurement of quality. Similarly, increasing the number of traditional lectures and tests might enhance students' awareness of how much time they spend studying and thus increase reported study intensity, however this would not necessarily be a valid indicator of neither engagement nor learning, and would run counter to many of the values and ideas in networked learning.

Concluding discussion

In this concluding discussion, we address two overarching questions: 1. What is the paper's contribution to networked learning research? 2. What is the contribution of networked learning research to higher education?

In relation to the first question, it is useful to return to Hodgson & McConnell's (2018, 2020) ideas of networked learning as an epistemic practice or as developing practice:

> "[…] the idea of epistemic practice where the theory of networked learning is captured in the practical accomplishment of not only one's learning designs but in our situated performative actions/work and social practices." (Hodgson & McConnell, 2020 (in press), p. N/A)

The module we discuss is pedagogically heavily inspired by networked learning principles (Hodgson et al., 2012) and as such an example of developing networked learning practice. We have suggested four principles, as alternative ways of expressing and capturing some of the aspects laid out by Hodgson et al. (2012), namely: hybridity, transparency, structured freedom and flipped engagement. While each of these could be explored further in their own right, we believe they are concepts that may have wider currency than as only internal thinking tools for developing our own module.

They are concepts that have been born out of a developing networked practice and can perhaps now prove useful for other networked learning practitioners. Hybridity we see as an increasingly important way of thinking about new relations between spaces, places, activities and people, and new opportunities for designing learning experiences (Carvalho et al., 2017; Ryberg et al., 2018). Hybridity not only concerns the increasingly complex mixes between being online or onsite, but equally new relationships and roles between teachers and students (and potentially other stakeholders) (Koutropoulos & Koseoglu, 2018). Transparency is a principle tightly connected with ideas of alternating between and supporting both weak and strongly tied networks in learning activities (Jones et al., 2015). For example by asking students to share reflexive group assignments with the entire cohort or contribute to building a shared pool of resources. Structured freedom expresses the tension between on the one hand, a wish for students to take ownership of the learning process and practice investment of self in the learning process, and on the other hand, the need to design a structure within which this can occur. This is closely related to the idea of flipped engagement, which entails a wish to heighten the students' engagement, curiosity and interest by granting more ownership and responsibility over the learning process.

However, granting more ownership and responsibility also comes with costs. For one thing, we experienced the strange discrepancy between students' reports of increased motivation and self-investment vs reporting spending less time spent (though our perception as teachers was that they spent the same or more compared to other courses). This is an aspect we wish to look further into, as it poses challenges to PBL and networked learning pedagogies, where students are meant to take increased responsibility for their own learning. If self-determination and engagement do not translate into an increase in reported study intensity, this could pose quite a challenge in an environment increasingly concerned with study intensity.

Secondly, from the evaluations and interviews it was also clear that some students experienced insecurity and frustration with the module being differently designed than other modules within the programme; this particularly in the first week or two of the module. Experiencing different relations between lecturers and students and different expectations can lead to frustration and bewilderment (Cutajar, 2018), but this can also be seen as a positive trait, rather than a deficiency to be fixed. It is also clear students have embraced ownership and responsibility very differently and we alluded earlier to the notions of surface vs deep learning strategies. We should however like to adopt the concepts proposed by Katznelson & Louw (2018) who have studied pre-university students across different educations (15-19 years old). They adopt the terms "præstation"

(performance) vs "mestring" (mastery). Performance being a more strategic, instrumental approach aimed at getting things done most efficiently with the highest gain (grade) and thus prioritising one's resources. Mastery in contrast, is associated with curiosity, engagement and interest. In their analyses, they suggest that the performance orientation, due to various systemic reasons, is becoming increasingly widespread and dominant in the Danish educational system. Particularly in the educational tracks that typically serve as entrance to university.

This orientation is echoed in the comments made by one of the students (earlier cited). They point out that working on their own meant that many prioritised rushing through the assignments to get home early. It was reflected also in the wish of combining two days, as some students felt too much time was allocated for these activities. A strategy applied by many groups initially was to finish everything on Wednesday. There is clearly an uneasy tension between intentions of reflexive investment of self and then a performance orientation, which we have also experienced as a challenge in teaching and supervising the module. These tensions, in our experience, have been most pronounced in the beginning of the module, and seem to lessen as the module progresses and the students become more comfortable with the structure (a transformation also noted by many students in the evaluations). While we have strived to ameliorate some of these tensions, we are also wondering whether we - from a networked learning perspective - could view these as potentially productive, rather an as deficiencies. Ferreday & Hodgson (2010, p. 11) drawing on Foucault discuss the notion of heterotopian space:

> "A heterotopian view acknowledges that it may well and often does test customary notions of ourselves and of participation but at the same time offer space to imagine and desire differently."

Perhaps, we should see networked learning principles, pedagogies and their embodiments (courses, modules etc.) as opportunities to disturb and provide students with different experiences. In this way, we can view networked learning as developing practice or an epistemic practice, which has a transformative view through which it continuously contribute to the development of higher education. The contribution of networked learning research to higher education is therefore not only theoretical and conceptual in the form of theory, papers and books, but also theoretical and conceptual as embodied in actual networked learning practices.

Networked learning practices are necessarily imbued with values, such as the pedagogical ideas or values of collaboration, dialogue, and investment of self, as adopted from (Hodgson et al., 2012). We should however like to add here, also ideas of imperfection, inquiry, curiosity, annoyance, heterotopian spaces - or echoing Ross & Collier's (2016) ideas of complexity, mess and not-yet-ness. Rather, than thinking about networked learning practices only in terms of what works or striving towards frictionless acceptance and satisfaction amongst students, we should perhaps occasionally strive towards designs that generate tensions, challenge and frustrate students and lecturers and prompt them to think differently about their own learning practices and education.

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Affordance of a learning application for supporting student's development of academic literacy

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Abstract

This paper takes as its starting point the problem area that deals with how students at university can develop academic literacy. One of the methods is through learning technology. This paper examines what affordance a new developed learning technology - the study app - has for developing student learning technology. The RQ is: what are the affordances of a learning application and its integrated design of learning tools in order to support student's development of academic literacy? The study app is an example of technology enhances learning, where technology supports operational improvement in teaching and learning because students with the study app can experience a ubiquitous learning environment, designed on basis of user studies that are designed to be integrated in student's everyday life. The question is whether a learning technology also supports the student's activity oriented toward developing study competences and becoming more academic literate?

The background for this research is a project of development and designing an ICT based learning application for supporting student's development of study skills. The project is supported by the Faculty of Humanities at University of Southern Denmark and is organized in a project group related to department of Design and Communication. The purpose of the learning application is that it: 1) shall supports students in developing and enhancing study skills, 2) that it is relevant and motivating for users to use, 3) that it a new proposal in relation to existing solutions.

The study is based on Leontiev's theory of activity and its three levels - activities, actions and operations - which provide a systematic insight into the interaction of learners with a learning technology in order to develop their study skills. The paper examines here various learning contexts that are defined as central to study skills and which learning technology seeks to support: a general study competence, a concrete study competence and a link between study and future work. Furthermore, the learning theory on which learning technologies are designed is also examined. The paper concludes with a discussion of technology enhanced learning and which type of enhancement of learning that can be supported by learning technology.

Keywords

Learning application, technology enhanced learning, affordance, activity theory, academic literacy

Academic literacy

The background for this research is a project of development and designing an ICT based learning application for supporting student's development of study skills. The project is supported by the Faculty of Humanities at University of Southern Denmark and is organized in a project group related to department of Design and Communication. The purpose of the learning application is that it: 1) shall supports students in developing and enhancing study skills, 2) that it is relevant and motivating for users to use, 3) that it a new proposal in relation to existing solutions.

Study skills is related to academic literacy and is important skills for students in order to participate and succeed at university. Academic literacy can be defined as "the ability to communicate competently in an academic discourse community" (Wingate, 2015, p. 6). This definition points out that academic literacy is a way of using language in a certain social group, which Gee defines as a discourse: "a socially accepted association among ways of using language, other symbolic expressions, and artefacts, of thinking, feeling, believing, valuing and acting that can be used to identify oneself as a member of a socially meaningful group or 'social network'" (Gee, 2014, p. 158). Academic literacy is about using language, artefacts and develop familiarity with the academic way of thinking, valuing and acting both in a general perspective as a student at a university and in a disciplinary perspective where students participate in disciplines and subject courses (Airey & Linder, 2009). This paper focus on how the design of learning technology can support development of academic literacy.

Students developing of academic literacy is important according to several reasons. One is that students are characterized by diversity (Wingate, 2015) and that many students represent a generation of first-time academics and therefore not familiar with working academic (Lillis, 1999). Another reason is that learning at a university is

different from previous education as Lea & Street points out: "Learning in higher education involves adapting to new ways of knowing: new ways of understanding, interpreting and organising knowledge" (Lea & Street, 1998, p. 158). One example is that students are expected to manage their learning independently and develop skills for handling academic tasks and disciplinary orders. The students challenge is that university lectures in their teaching often take for granted that students can handle these tasks and orders (Airley & Linder, 2009). Therefore, it is important to bridge the student' transition into university (Leese, 2010) through different kinds of support. A typical approach for supporting and developing students' academic literacy is outlined in institutional programmes and courses that teach basic study skills often run by academic learning consultants. The student participating in the academic literacy courses is supposed to make a structural connection between the course and the student's own practice working with academic tasks (Hambro, Skillingstad, & Strøm, 2019). This paper will investigate another way of developing students' academic literacy and that is through technology enhanced learning. I will make an analyse of the possible affordances of the learning application Study App. The technology enhanced learning dimension of the Study App can be understood as "operational improvement" (Kirkwood & Price, 2013) because students with the learning application can experience a ubiquitous learning environment designed on basis of user studies that are designed to be integrated in students everyday life: "Interventions and approaches [to support students' development] should be embedded as far as possible in mainstream provision to ensure all students participate and benefit from them" (Thomas, 2012). The RQ is therefore: what are the affordances of the learning application "Study App" and its integrated design of learning tools in order to support student's development of academic literacy?

Theory on learning application

Dirckink-Holmfeld (2004) unfolds with inspiration of Koschmann (1996) 5 paradigms of instructional use of technology: computer-based training, intelligent computer-based training, microworlds, computer supported collaborative learning (CSCL) and virtual learning environment. The development of these paradigms has gone from the individual learning and stand-alone ICT-application to a collaborative aspects of learning processes as well as communication and collaboration tools. The latest generation of these paradigm - virtual learning environments - offers both teaching and training activities as well as access to resources, information and an informal learning network and builds a philosophy of "self-directed" learning and socialization as a means of learning. A typical design of virtual learning environment is that it offers different physical and intellectual tools that student can use to make experiences, gather information and collaborate with others (Säljö, 2001, p. 258). Design of learning application is related to the theory of design thinking, i.e. how interactive technologies can support ways of staging, accessing and addressing student learning (Dalsgaard, 2014). The design task involves designers both interpreting what needs to be learned, how to learn and reflecting a particular learning theoretical basis. Designers draw on theories and preconceptions of learning and knowledge in order to scaffold a learning practice. Theory and practice are thus closely interrelated in design, as discussed by, e.g., Buchanan (1992), who states that "Designers are exploring concrete integrations of knowledge that will combine theory with practice for new productive purposes" (p. 6). In relation to network learning theory the paradigm of CSCL is often used as a background for understanding network learning where technology can be used to make connections between people and supporting human-human interaction mediated through digital technologies:

> learning in which information and communication technology (C&IT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources (Goodyear et al., 2004, p.1).

This paper is interested in the last part of the quote: how technology can promote connections "between a learning community and its learning resources". A further development of this approach is how technology can promotive connection between learners and context in order support learning (Hansen & Dohn, 2019). This approach supports the paradigm "virtual learning environment" and the examination of how a learning application can support student's connection to different kinds of contexts made possible by a learning application as a mediating artefact. The question is how to analyse these affordances in a learning application?

Methods for analysis affordance of a learning application

Learning application can be seen in the context of a Sociocultural Learning Theory. Vygotsky (1978) points at a triadic relationship between the active subject, the object of cognition and the tool or artefact that mediate the interaction. The mediating artefact can be material tools (as a hammer) or psychological tools (as signs and language). Both tools can function as solving a given problem, but the psychological tools can support master psychological function as perception and intellectual problem solving. A learning application is typical an

umbrella for different learning tools that are integrated in a learning design in the form of an ICT-application based on different assumptions of learning and e-learning concepts.

A tool's affordance is about how it can support subjects' action in the environment (Gibson, 1979, p. 127). Affordances are thus not related to properties of the artefact alone, but properties seen in relation to the subject's possible activities. Designing for learning activities can be understood in light Leontiev's (1978) Activity Theory and his descriptions of human activity as a hierarchical structure of activities (Kaptelinin & Nardi, 2006). This hierarchical structure can describe an approach to exanimating affordances of a learning application (Bærentsen & Trettvik, 2002; Lauridsen & Hansen, 2016). The top layer describes a subject oriented towards an object that encompasses a process based on a specific need and motive. For example, studying at university can support the motive to acquire an education, become wiser and qualify for an exciting job. Studying is an activity organized as a multifaceted system of teaching and exams aimed at acquiring a university degree. The second layer describe how an activity is composed as a sequence of actions directed to certain goals. For example, actions in relation to studying at university are enrolling in a course, acquiring study skills, participating in courses and passing exams. These actions can also be described at the lower layer of the activity model as operations. Operations can be reading articles, taking notes, doing practical research and writing assignments.

The three-layered activity model can be used as a method to examine the affordance of a learning tool with a particular focus on how it supports motives for developing study skills through interaction with different activity situations. Relevant activity situations are:

- Activity where the motive is to develop skills for participating in a future and general study context
- Activity where the motive is to develop skills for participating in a current and concrete study context
- Activity where the motive is to develop skills for connection actual study context with a future work context.

Develop skills to participate in a future and general study context

A learning tool can support students in developing awareness and readiness to handle future academic challenges, such as academic reading and writing. The content is both knowledge of academic methods (what is academic reading and what types of reading are available?) and methods of dealing with academic working methods (which methods can be used in order to read academic texts?). The view of academic literacy is that there is a certain propositional knowledge that can be used across different contexts.

Develop skills to participate in a current and concrete study context

A learning tool can assist the student in dealing with a particular study situation, e.g. the situation where an academic text is to be read. The student can for example use a tool to focus his reading and scaffold the learning situation.

Develop skills for connection actual study context with a future work context.

A learning tools can support the student employability in order to bridge between actual study context and a future work context by visualising tracks of how the student's interests, courses and development can lead to future career path and employment opportunities.

Analyse of affordances of the Study App

The study app can be characterized as a learning platform integrated with a collection of interactive online features and tools designed to provide students with resources to support and enhance development of academic literacy. These tools are designed to tailor and scaffold the motive of students learning. In the following analyse I analyse three of the tools that support the three kinds of study contexts.

The Study Skills Wheel

The Study Skills Wheel is a tool for self-evaluation and mapping of the student's study skills. It is an example of a tool that can support student work in a future and general study context. By using the tool, the student gets a visual description of his or her actual skills in a diagram with six branches (reflecting different study skills) based on a test. The test is dynamic and is continuously adapted to the individual study stage. The tool works as a feedback tool, what Hattie & Timperley (2007) calls feedback About Self-regulation and addresses the way student monitor and regulate actions towards the learning goal of developing study skills (Hattie & Timperley, 2007, 93). The tool supports through feedback different goals and actions: what are important study skills? (feed up), how am I going in order to achieve these skills? (feedback) and where am I to go to next in order to develop my study skills (feed forward). Furthermore, the tool also can serve as a dialogue tool for tutorial meetings with teachers. The tool provides the student with an overview purpose of general study skills that the designers have

selected as the most central: academic reading, academic writing, academic presentation, academic collaboration, academic evaluation and research dissemination. The student gets feedback in relation to what extent the student has acquired these skills. This feedback is based on a five-level taxonomy, here exemplified by the skill academic reading:

- Knowledge of the purpose of academic reading and the two types of academic texts: the research article and the dissemination article
- Knowledge of reading strategies, both annotation reading and process reading
- Skills in using reading strategies
- Skills in using reading strategies as an integral part of your academic reading
- Competence in flexibly selecting a reading strategy in relation to the situation in which you read academic texts.

The Study Skills Wheel is connected to another tool in the learning application: The Handbook of Study Skills. This handbook outline in six articles the basic academic skills structured by the following themes: definition, content, methods, how to learn (the skill) and a taxonomy of 5 different taxonomic ranks of the skill.
The student's interaction with the Study Skills Wheel (the operational layer) consist of the three operations:

- Testing existing skills by doing a questionnaire. The wheel shows, as a starting point, an empty diagram that is not yet active. By clicking "START" the student is guided through the test, after which the student is presented with the result. The wheel will then be active.
- Get visualized feedback on the student skills. Hovering over the chart highlights the personal result.
- Compare the development and progression of skills to former test. Clicking on a result brings up a window that shows a detailed overview of results and developments in relation to previous self-evaluation sessions. The student will receive reminders to regularly carry out new self-evaluations.

The Focus Timer

The Focus Timer is a tool for supporting a focused work process and is an example of tool that can support participating in a current and concrete study context. It is basically a timer where the user can manage time spend and set intervals on relevant study activities (e.g. reading, writing). This interval-based method of time management is inspired by the Pomodoro technique (Cirillo, 2006). The motive for student to use the timer is related to an actual study situation, where some student can experience a need for structure and scaffolding in order to create and maintain focus doing a study activity, e.g. reading an article. The goals for the student doing his actions is to create awareness, structure and reflection in his daily study work. The tool also functions as a feedback-tool because the students focus session is registered and visualized as a weekly and monthly overview. The documentation of activity can create awareness and reflection about the user's productivity.

On the operational layer the student's operations consists of
- Accessing the tool by pressing the tool and create a focus session.
- The user selects / adds a study activity (e.g. a reading activity) and then sets a time interval (e.g. 20 min) and starts the countdown.
- After the 20 minutes have elapsed, the user will be encouraged to take a short break and then continue with a new focus session.

The Study Portfolio

The study portfolio is a tool that can support students preparing and participating in a future work context. The tool shows the student's "efforts, progress, and achievements in one or more areas" and "evidence of student self-reflection" (Paulson, Paulson & Meyer, 1991, p.60). The portfolio is a collection of the student's choice of education, courses and personal documentation on choices, challenges and further study goals. The tool consists of several functions. The overall feature is a timeline that shows the students participation in Education, Subjects, Courses and Projects. Furthermore the student can create a semester log, where the student's with own words can evaluate their progression in the study and e.g. describe what have been challenges, what kind of progress they have achieved, what project they have been working on and make reflections on next semesters work and goals. The tool supports the students in order to make connection to actual study contents, future study context and also future work context. In that sense the tool supports the student's employability (Yorke & Knight, 2006). The overall motive for students using the tool is to develop awareness of study choices and possibilities for future employability opportunities. In this sense the tool can empower the student to control their study progression and take confident and reflective decisions in future study choices. The study portfolio

supports the student's metacognition as an ability to reflects on own learning and study choices. Klenowksy defines that metacognition involves "active monitoring", "consequent regulation" and "orchestration of cognitive processes" (Klenowski, 2002, 33). The essential is not just the study portfolio as a product bud also the process that leads to it (Hansen & Dohn, 2017). On the action layer the Study Portfolio 1) support the students goal of getting a visualisation of progress in the education and choices of subjects and courses, and 2) offers a space for reflection on challenges, results and further goals and at the same time reflects on the pattern of study that the students want to create. On the operation layer the tools support operations through different steps:

- The first is that the tool automatic create an overview over the students Education, Subjects and Courses.
- The second is that the tool offers opportunities for students to create their own input to the system through the semester log. The student has to point at a semester, e.g. "4. Semester" and fill out information in the field that pops up in the system.
- The third step is that student afterwards gets a visualization of the timeline and the content of the study portfolio.

In this last part of the analysis I will analyse what kind of learning theoretical assumptions that is the basis for the design of the learning application (Jones, 2015). Overall the Study App is a mix of cognitive learning and socio-cultural learning theory. The cognitive aspect, that understands learning as an individual cognitive phenomenon, lies in the way that the application supports the student metacognition, i.e. the ability to relate to own learning and approaches to learning. The focus here is that the application supports student's reflection on his own learning strategies and development of study skills. Besides of supporting students' development of study skills, the tool also supports a developing of awareness of how and why these skills developed. Fundamentally the study application can be used as a basis for reflection on learning development.

The other influential learning theory in the design is a sociocultural theory that sees learning as social, both in the sense that it takes place in interaction with other people and in the sense that it is determined by the sociocultural concepts, insights and behaviours that apply in the contexts that the interaction takes place in (Dysthe, 2005; Hansen & Dohn, 2017). The Study App supports the student's appropriation of concepts and methods of academic literacy and participation in the practice of learning at a university. The three tools all support different kind of learning situations that are relevant for studying at a university. The actual design of the learning application does not strongly support learning with others, but the different feedback tools can be used as a tool for meeting with teacher or learning staff in order to guide the students learning and as an anchoring point for meaning negotiation.

Overall the design seems at a first sight to be closely related to an individual cognitive activity and development of academic learning strategies and to a lesser extent support the student's interaction and dialogical negotiation of meaning and collaborative knowledge-building. But examined more closely the design also has a strong notion on the community aspect of learning. The sociocultural perspective can both be seen in the connection to different kinds of learning situations and the support of the student development of an academic study identity and development of membership to an academic community of practice (Lave & Wenger, 1991; Lea, 2005). In this sense Jones (2015) points out that all communities of practice are networked and state his argument by referring to Wenger et. all (2011): "The community aspect refers to the development of a shared identity around a topic or set of challenges. It represents a collective intention – however tacit and distributed – to steward a domain of knowledge and to sustain learning about it" (Wenger et. all, 2011, 9). In this perspective the Study App present academic literacy as a domain and sustain learning about this domain and at the same time develop the student's identity as part of an academic community.

Concluding remarks

This paper has examined the designed affordance of the Study App design based on Leontiev's (1978) Activity Theory and his descriptions of human activity described as a three-layered activity model. This model is used to examine the affordance of the Study App with a particular focus on how it supports motives for developing academic literacy. The analysis has unfolded how the learning application supports possible actions users can take in order to interact with the learning application in order to develop academic literacy. The analyses are not based on students' empirical interactions with the application, what Norman defines as "the perceived or actual properties of the thing" (Norman, 1988, p. 9) but on the designed affordance. The affordances are analysed in three different aspect of the learning application, that represent different activities where students are learning to participate in different study context that reflects different ways of developing academic literacy: Activities where the motive is to develop skills for participating in a future and general study context, for participating in a current and concrete study context and for connection actual study context with a future work context.

The paper can expand the understanding of how student can develop academic literacy. Academic literacy is just not about developing general study skills that can be used in a future study context, but also skills that can support specific learning activities in a current study context and activities that can support student's connection between study life and future work life. All three types of activities can support the main goal of developing academic literacy as "the ability to communicate competently in an academic discourse community" (Wingate 2015).

Finally, I will discuss how the analyse of the Study App relates to technology enhanced learning. Bayne (2015) discus the understanding of technology enhanced learning and point out that technology can be described in instrumental terms that either "subordinate social practice to technology or subordinate technology to social practice" (Bayne, 2015, p. 17). In this study technology has be considered as a mediating artefact that can support students' motives of developing academic skills and participating in an academic community of practice. My analyses show that technology is not just an instrument for operations, but a mediated artefact integrated in an activity with the goal to accomplish tasks and fulfil motives. The quality aspect of the Study App is that it is designed to support top level user activity and connect this activity with actions and operations. Further empirical analyses will show if this also are true in their practice.

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A more-than-human approach to researching AI at work: Alternative narratives for AI and networked learning

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Abstract

Artificial intelligence (AI) is increasingly manifest in everyday work, learning, and living. Reports attempting to gauge public perception suggest that amidst exaggerated expectations and fears about AI, citizens are sceptical and lack understanding of what AI is and does (Archer et al., 2018). Professional workers practice at the intersection of such public perceptions, the AI industry, and regulatory frameworks. Yet, there is limited understanding of the day-to-day interactions and predicaments between workers, AI systems, and the publics they serve. This includes how these interactions and predicaments generate opportunities for learning and highlight new digital fluencies needed. We bring social and computing science perspectives to begin to examine the prevailing AI narratives in professional work and learning practices. Some AIs (such as deep machine learning systems) are so sophisticated that a human-understandable explanation of how it works may not be possible. This raises questions about what professional practitioners are able to know about the AI systems they use: their new digital co-workers. We argue that a co-constitutive human-AI perspective could provide useful insights on questions such as: (1) How is professional expertise and judgment re-distributed as workers negotiate and learn with AI systems? (2) What trust and confidence in new AI-infused work practices is needed or possible and how is this mediated? (3) What are the implications for professional learning: both learning within work and the workplace and more formal curriculum? Given the early stages of this field of inquiry, our aim is to evoke discussion of alternative human-AI narratives suited for the messy—and often unseen—realities of everyday practices.

Keywords

artificial intelligence, professional learning, professional work, ethics of technology, public understanding of technologies

Introduction

As artificial intelligence (AI) weaves its way into everyday work, learning and living, labour is being re-distributed between workers and their new digital counterparts. National policies globally present ambitious aspirations for rapid uptake of AI, positioned as a key driver of innovation, labour productivity, and economic growth that needs to be advanced swiftly in order to attain global competitiveness and leadership. AI is also seen as key to finding solutions for critical societal challenges including the UN Sustainable Development Goals.

However, it is not clear what impact AI has, and should have, on workers, particularly professional workers. Or what work-related policies and organizational practices are needed to address these changes. Largely thought to be immune from automation, professional work is now challenged as AI increasingly adds advanced data analytics to augment complex professional decisions and automates tasks (Susskind & Susskind, 2015). Following other approaches (European Commission (EC), 2019; Nilsson, 2010), our working definition of AI is any computational system that carries out a task that is normally associated with a degree of intelligence when performed by humans. The rising prominence of complex AI systems in the workplace challenge roles and skills as new decision-making processes distribute professional judgment and responsibility across AI-human systems. Coming to the fore is the trustworthiness of AI outputs, as emphasized in recent policy recommendations by The High-Level Expert Group on Artificial Intelligence of the European Commission (2019).

Increased use of AI to deliver professional services depends on an informed, critical, and willing public. However, the escalating debate about the incursion of AI into the workplace remains stubbornly polarized. Recent reports attempting to gauge public perception suggest that amidst exaggerated expectations and fears about AI, citizens are sceptical, believe "it won't happen to me", and lack understanding of what AI is and does (Archer et al., 2018). Others point to the divergence between the AI hype and the views of experts (e.g., Bristows, 2018). AI narratives have long been influenced by fiction, which fan the fear of robots replacing humans and depict versions of AI that are well beyond current or even near future reality. These narratives are important (The Royal Society (RS), 2018). Informed and positive, they drive investment and innovation at all stages of development from research to commercialization and inspire a future generation of students to become creators of AI. However, negative perceptions fuelled by spurious narratives could lead to public backlash that curtails AI development.

Professional workers practice at the intersection of such public perceptions and prevailing narratives about AI, professional regulatory frameworks, the fast-paced AI industry, and their own competencies and degree of trust regarding AI systems. We take a broad view of the professional worker: a member of an occupational group "that defines itself as collectively sharing particular knowledges and practices, and that is publicly accountable for its service" (Fenwick & Nerland, 2014, p. 2). Although the impact of AI on work is far-reaching, much of the current focus is on macro-employment trends: jobs gained/lost, what work can be automated, and re-skilling the workforce for the "jobs of tomorrow". In this paper, we argue the importance of attending to professional workers' day-to-day experiences and interactions with AI systems to provide the urgently needed fine-grained analysis to study what trust and confidence in new AI-infused work practices is required and how this can be generated in new arrangements of work and work-related learning. This evidence will allay concerns that designers and policy makers often make interventions for change in everyday contexts with little understanding of how people produce and experience such algorithmic systems (Pink et al., 2017).

Because work and work-based learning are often inextricably linked it is generative to look at both in order to understand the implications of these technology-mediated practices for workers and their networked ways of learning and working. We begin with an initial exploration of issues around how professional expertise and judgment is re-distributed as workers negotiate and learn with AI systems. We raise questions about what trust and confidence in new AI-infused work practices is needed (or possible) and how is this mediated. Finally, given the early stages of this field of inquiry, our aim is to evoke discussion of alternative human-AI narratives suited for the messy—and often unseen—realities of everyday practices and consider implications for researching these practices.

Negotiating with AI: Re-distribution of professional work-learning

The rapid pace of recent AI advances is driven by machine-learning algorithms including deep learning; exponential increase in computing capacity which can train larger and more complex models much faster; and vast amounts of data (Manyika et al., 2017). Such shifts are shaping assertions that "we are on the cusp of a new automation age in which technologies not only do things we thought only humans could do, but can increasingly do them at a superhuman level" (Manyika et al., 2017, p. 24). However, current discourse on AI and its impact on provision of professional services suggest that AI debate and research is in the early stages and does not yet untangle important distinctions and complexities. For example, much of the rhetoric focuses on the broad trope of jobs lost or gained through automation. Necessary to inform next steps in AI-related development and policy is an understanding of the significant changes in work itself and the learning opportunities inherent in arrangements of work.

Given the range of tasks AI can do (intelligent decision support, classification, prediction, visual object recognition and image processing, speech recognition, natural language processing, and natural language generation) changes to work are complex. There is limited evidence of how AI is being used now and how workers' tasks have changed where this has happened (Frontier Economics, 2018). Professional bodies responsible for profession-specific regulations and codes of conduct, within workplaces and at the national level, are grappling with drastically changing professional work landscapes, ethical dilemmas, and a desire to seize opportunities afforded by AI while also minimizing risk.

Edwards and Fenwick (2016) ask how we think about professional responsibility and accountability when decisions are delegated to complex digital systems or what it means to consider a professional as a responsible agent when capability is distributed across human and digital actors. Evidence is needed of how AI-mediated

work practices are changing decision-making processes, the valuing of professional judgment, and newly distributed responsibilities for algorithmic-influenced decisions. Allert and Richter (2018) highlight a profound shift: as automation and algorithmitization of knowledge work turn data into a resource for, and product of, computation, certain regimes of knowledge that replace subjective experience with objectified data come to the fore. In addition to delegating routine tasks to AI, complex decisions are increasingly based on computational analysis of big data raising questions about the capacity and need for human judgment. Although decision makers may be reluctant to depart from algorithmic recommendations (thus further undermining individual judgment and discretion), others argue that not all decisions can be coded (Agrawal et al., 2019).

As professionals undertake new and different responsibilities for knowledge, understandings of where "expert" knowledge resides becomes blurred. The outsourcing of work activities to, and with, algorithms is leading to new forms of "algorithmic management": prolific data collection and surveillance, transfer of performance evaluations to rating systems or other metrics, and the use of "nudges" and penalties to indirectly incentivize worker behaviors (Kolbjørnsrud et al., 2016; Mateescu & Nguyen, 2019). The following examples highlight some of the complexity of these shifts in responsibility and control.

As reported by Tromans (2019), the recent ban obtained by France's judges on the use of public court data for the statistical analysis and prediction of their decisions in court (i.e., legal predictive analytics) has led the French National Bar Council to demand that lawyers should also be excluded from statistical analysis of their actions in court. France may be the "first country in the world where litigation analysis and predictive modelling face such a comprehensive ban" (para 6). In light of France's "Open Data" movement, intended to make all public data available online, Tromans (2019) points to contradictions in the emergence of a "two-tier" public data system: "citizens can know some things, but not others, even when the underlying information is public" (para 13); and the work of legal professionals and court practices are further obscured with some lawyers claiming this move as "irreconcilable with their mission to represent and defend their clients" (para 15).

The tensions evident in the French court system relate to the openness of AI systems and the data upon which they build. Further concerns arise when AI systems move from merely informing to prescribing professional decisions and actions. In the case reported by the AI Now Institute, the use of student test data to make teacher employment decisions including promotions and terminations revealed, in a subsequent law suit, that no one in the school district could explain or even replicate the determinations made by the system even though the district had access to all the underlying data (Whittaker et al., 2018). The teachers who contested the AI outputs were told that system was simply to be believed and could not be questioned. After the vendor fought against providing access to detailed information on how its system worked, and a ruling that such an AI system could contravene constitutional due process protections, the school district eventually abandoned the third-party AI system in question.

The private-public partnerships that often sustain extensive use of AI systems in the provision of professional service are potentially problematic as decision-making, responsibility, accountability, and the underlying data are not only increasingly distributed across a range of actors but sometimes "black boxed". Predictive algorithms are often used in advanced in criminal justice systems to inform decision-making in policing patterns as well as bail and sentencing decisions. Described in a recent Council of Europe (2018) motion as effective systems valued by the authorities that use them, they nevertheless urge attention to: (1) how such systems are usually provided by private companies and not subject to public scrutiny; and (2) how police departments may lose control over their own data and become dependent on the private companies that have acquired this data.

Our recent work has highlighted contradictions in the current rhetoric about AI and its actual level of uptake in provision of professional work and services. This is consistent with an ethnographic study on the use of AI-mediated risk-assessment tools in the USA criminal court system. Christin's (2017) analysis suggests that such AI systems are often actively resisted in criminal courts and far less powerful and persuasive than suggested in the current narratives extolling widespread AI deployment. She notes that because the judges and prosecutors in her study did not trust the algorithms (they did not know the companies they come from, they did not understand their methods, and often found them useless), the AI outputs often went unused (para 12). Christin (2017) describes how the software was used, score sheets printed out and added to the defendants' files, after which the "scores then seemed to disappear and were rarely mentioned during hearings" (para 12). Christin's (2017) study foregrounds the importance of attending to actual everyday practices: she found that the issue creating resistance was not the transition to complex AI risk-assessment tools per se but rather the more basic transition to paperless case-management systems.

Perhaps the best way to describe the current situation is an uneasy alliance: there are many aspects of work that can be done better and in ways that do not minimize or devalue the human but there are also many potential uncertainties and dilemmas. It is possible to build on the opportunities created by the current wave of AI systems. Polonski (2018) provides examples of how police forces use AI to map when and where crime is likely to occur and how doctors can use it to predict when a patient is most likely to have a heart attack or stroke. There is evidence of significant economic benefits when AI is used to optimize production processes, especially when coupled with suitable workforce retraining in the AI technologies to avoid staff layoffs (PAI, 2018). Image processing by deep neural networks (Le Cun, Bengio & Hinton, 2015) is a strong success story for AI and promises to at least take the drudgery out of examining large volumes of medical imaging data for signs of disease. And it shows promise to be able to find disease indicators in such data that are not evident to human experts. AI developed in-house by Zymergen, a start-up company in the USA to automate laboratory services, found that close collaboration with laboratory scientists during the AI development was crucial to establishing trust in the end systems (PAI, 2018).

Such collaboration between AI developers and workers is extremely important. Deepening involvement with AI systems not only distributes, but also amplifies, workers' implicatedness (Thiele, 2014) and thus expands their ethical responsibilities. Questions of how professional work is valued within the new algorithmic culture (Bayne, 2015) are extremely timely. Workers therefore need to be part of the design and development of responsible human-AI interaction in ways that do not minimize human intelligence. Research evidence is needed to inform how workers can be more purposefully and thoughtfully implicated, valued, and involved in the development of AI systems.

Trusting AI co-workers

Setting out a framework for achieving trustworthy AI, the EC (2019) identifies trustworthy AI as a foundational ambition: not only the technology's inherent properties, but adopting a socio-technical approach that attends to both human and technology actors throughout the AI ecosystem and life cycle. There are good reasons for caution. Bias and lack of transparency in how algorithms work are shortcomings in current AI systems and an active area of research. The AI Now Institute point to widespread testing of AI systems "in the wild" in which AI systems with significant decision making are tested on live populations, often with little oversight (Whittaker et al., 2018). Addressing these issues is crucial for developing AI systems that workers and the public trust.

If people do not know how AI arrives at decisions, they will not trust it; an issue attributed to the failure of IBM Watson for Oncology, an AI system designed to assist doctors with cancer diagnoses. Polonski (2018) highlights the tensions that emerged in the deployment of IBM's AI system:

> If Watson provided guidance about a treatment that coincided with their own opinions, physicians did not see much value in Watson's recommendations. The supercomputer was simply telling them what they already know, and these recommendations did not change the actual treatment. … [If] Watson generated a recommendation that contradicted the experts' opinion, doctors would typically conclude that Watson wasn't competent. And the machine wouldn't be able to explain why its treatment was plausible because its machine learning algorithms were simply too complex to be fully understood by humans. Consequently, this has caused even more mistrust and disbelief, leading many doctors to ignore the seemingly outlandish AI recommendations and stick to their own expertise. (paras 5-6)

Adding to the challenge of understanding how this trust develops is that AI is often invisible, making it difficult for people to understand how and when they interact with it (Bristows, 2018). The problem is exacerbated by the increasing availability of (relatively) easy-to-use software tools for creating data-trained AI systems (e.g., deep neural networks), enabling AI systems to be built by people who have little or no understanding of the inner workings of such systems and their limitations.

Nevertheless, Bunz (2017) states that if we do not want to live with blackboxed technologies, it is essential to learn how to interact with them more attentively (p. 253). Without this attentiveness, there will be repercussions. For example, consider Uber's deliberate obscuring of the algorithms that determine demand and supply pricing of fares, which led to drivers to "game the system" in order to control and create price surges (Rosenblat & Stark, 2015). The efforts of these workers to address information asymmetries highlight the consequences of imposed algorithms that are not transparent or trusted by workers.

Explainable AI (XAI) is seen as essential if workers are to "understand, appropriately trust, and effectively manage an emerging generation of artificially intelligent machine partners" (Gunning, 2017) and is meant to afford humans a degree of functional understanding of AI outputs. However, a fundamental question arises about worker and public expectations of an AI system: Is the expectation to replicate human expertise and/or to improve upon it? If it is the former, then we would likely expect to be able to interrogate the AI to understand how it has arrived at an output, in the same way we could ask a human expert. That said, if we can accept that the AI system may work differently from human reasoning and potentially with higher performance, could workers and the broader publics accept that a human-understandable explanation of how the AI works may not be possible?

The operation of many AI technologies, such as rule-based systems, case-based reasoning, and decision trees, is transparent to humans. An approach to XAI is to try to use these technologies to model the performance of non-transparent AI systems, such as deep neural networks (Ribeiro, Singh & Guestrin, 2016). The downside is that any "explanation" that arises is still only an approximation to what the AI is really doing (though the same may be true for a human expert asked to give an explanation of how they reached a conclusion). At best, the explanation such an approach provides may, to a degree, match the way the neural network has arrived at a decision.

In this situation, the important factor in deploying AI in the workplace is whether adding such a level of explanation provides increased and necessary trust in the AI, whether or not the explanation is strictly accurate. Ultimately, truly powerful AI systems may not be understandable and therefore the entire AI ecosystem (which includes designers, industry, policy makers, workers, researchers, and the public) needs to find other ways of establishing trust in such systems. This could include continual monitoring of the utility of the outcomes produced by the AI so that trust is established via increasing confidence in the robustness and performance of the AI. Deployed AI systems should come under critical performance appraisal in the same way as a human employee. For example, a recent large-scale study of existing published research concludes that current AI systems perform only as well as humans (Liu et al., 2019). However, Liu et al. (2019) add a caveat that the quality of most of these studies is still poor, with only 14 of 82 providing a robust comparison between the AI and human doctors.

One challenge to the development of trustworthy AI is built-in bias. Because humans exhibit bias in decision-making either consciously or unconsciously, a potential selling point for AI decision support systems is their lack of bias. Unfortunately, this is difficult to achieve in practice, as it requires large and truly representative data sets to underpin the training of the AI. For example, Hao (2019) explains how risk assessment tools used in the justice system are designed to generate a recidivism score (a single number estimating the likelihood that a person will reoffend) that is then used by a judge to help determine what type of rehabilitation services particular defendants should receive. However, Hao (2019) points out that such tools are often driven by algorithms trained on historical crime data, which means that populations that are historically disproportionately targeted by law enforcement (e.g., low-income and minority communities) are at risk of high recidivism scores. These algorithms may in fact "amplify and perpetuate embedded biases and generate even more bias-tainted data to feed a vicious cycle" (Hao, 2019, para 10).

The issue of bias in datasets and algorithms is now widely recognised by AI developers and is rightly part of the public AI narrative on the limitations of AI systems. The onus is therefore on a the range of actors involved in the AI ecosystem to understand and to identify—in practice—the limitations and biases of the system and to work towards generating genuinely unbiased—trustworthy—datasets for use in training AI. This is a hidden unappreciated cost in AI deployment.

More-than-human sensibilities

Bucher (2016) asks: "When confronted with the seemingly obscure and hidden, what are our methodological options?" (p. 82). Sociomaterial and more-than-human sensibilities provide a way to conceptualize and study the complex interactions that unfold between AI systems, workers, ways of working, workplaces, policies, and public discourse in the delivery of professional services. Work practices are seen as distributed across a network and changes to work and professionalism as a series of complex social and material (digital) relations. Such distinctions have long been the hallmark of networked learning theorizing and research. Taking a relational view of learning, networked learning focuses on connections among learners, other people, learning resources and

technologies (Goodyear et al., 2004). AI systems introduce a myriad of new actors and connections into these networks.

This more co-constitutive perspective helps to avoid over-simplistic deterministic stances and instead brings complex objects (such as AI) out of the background and into critical inquiry, thus offering more inclusive accounts of what it means to be human in an increasingly technologized world (Barad, 2003). Much of the current discourse around AI systems reinforces the binary of human-machine, worker-AI, and human vs. artificial intelligence. Workers and AI systems are often described and portrayed as somehow connected, yet separate, entities. And yet, many current and promising uses of AI systems in professional work and provision of professional services seem to be about how AI systems and humans work together (i.e., AI co-workers and job sharing) and less so on outright replacement by robots or algorithms.

Understanding the larger social changes and the ethical implications around work and workers demands sensibilities, theory, and methodologies to look beyond the human vs. technology by seeing the human-technology together as the phenomena of interest. AI-mediated work practices are not one thing performed by two actors but rather redolent with what Mol (2002) describes as manyfoldedness: "different versions, different performances, different realities, that co-exist in the present" (p. 79). More-than-human perspectives acknowledge the performativity of AI systems and take into account the myriad of foldings and unfoldings between human and nonhuman actors: meshworks (e.g., Ingold, 2005) which are both performed into being and performative.

Ingold (2005) writes that people increasingly find themselves in environments "built as assemblies of connected elements" (p. 46). Yet in practice they continue to thread their own ways through these environments, tracing paths as they go. Ingold (2012) writes about improvising passages: as beings thread their way through and among the ways of others (human and material), they must "improvise a passage" (p. 49). Each new passage lays a new line in the meshwork: "the trails along which a life is lived" (Ingold, 2005, p. 47). Considering the intra-actions (Barad, 2003) between AI system, professional workers, and work could be considered a way of improvising passages through the AI-mediated work landscape: the laying of lines. In so doing, human beings do not merely interact with their materials (aka data and outputs of AI systems) in pre-determined ways but rather co-respond with them in creative and improvisational modes.

Indeed, this is a very important contribution to be made by social sciences within interdisciplinary research endeavours. The emphasis on a socio-technical approach that attends to both human and technology actors advocated by the EC (2019) and its work on trustworthy AI is a promising beginning, although it too seems to still place human and AI actors in separate camps. Bucher (2016) advises that the uptake of algorithms as a field of research within the social science and humanities is very recent, which creates openings for innovative ways to conceptualize and undertake this research.

Changing AI narratives

One challenge is the small number of similar and potentially misleading narratives that dominate public debate, in part generated by a global confluence of powerful AI knowledge brokers and mediators that include government, industry, research institutions, the media, and the 3rd sector. The narratives about AI prevalent in public discourse inevitably shape the deployment of AI in the workplace.

Public perception of AI is shaped by hundreds of years of stories that people have told about humans and machines, often of a dystopian nature. In these stories, AI is embodied (a robot) and super-intelligent, a trope that leads to inflated expectations and fears about the technology and influences the way the technology is portrayed in popular culture and the media. It is important to recognize that AI deployment in various work sectors is currently performed in the context of workers and publics who bring expectations and beliefs about AI: accurate or not. A recent report by the Royal Society (RS, 2018) summarises the common narratives and their drivers. As an easy target for sensationalism and hype, stories about AI often reinforce fears and/or hope for its future potential of AI and muddy the waters as to its immediate possibilities (e.g., if and when the "AI singularity" will happen). Understanding, acknowledging, and then pedagogically addressing these perceptions in order to clarify and educate workers and the publics they serve about the realistic nature of AI in the provision of professional services is vital to successful deployment.

There is an urgent need to utilize more innovative participatory research methods to enable new AI narratives to emerge through two-way public dialogues. Hauert (2015), robotics researcher and co-founder of Robohub (https://robohub.org/), an online community of robotics experts dedicated to connecting the robotics community to the public in order to demystify robotic technologies, spur innovation, and raise ethical and legal questions that require discussion, writes:

> Irked by hyped headlines that foster fear or overinflate expectations of robotics and artificial intelligence (AI), some researchers have stopped communicating with the media or the public altogether. But we must not disengage. The public includes taxpayers, policy-makers, investors and those who could benefit from the technology. They hear a mostly one-sided discussion that leaves them worried that robots will take their jobs, fearful that AI poses an existential threat, and wondering whether laws should be passed to keep hypothetical technology 'under control'. My colleagues and I spend dinner parties explaining that we are not evil but instead have been working for years to develop systems that could help the elderly, improve health care, make jobs safer and more efficient, and allow us to explore space or beneath the oceans. (paras 15-16).

It is possible to re-craft compelling narratives about AI that accurately reflect, as emphasized by the RS (2018), "the underlying science and its possibilities while acknowledging scientific and social uncertainties" (p. 20). In this paper, we hope to have sparked discussion and thinking about alternative human-AI narratives and ways of conceptualizing research suited for the messy—and often unseen—realities of everyday AI-mediated professional work practices.

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Methodological considerations for research on networked learning

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Introduction

In one of the earliest collective writings on networked learning, Goodyear et al (2004) introduces networked learning as an area of both practical and theoretical importance which is said to offer a site for advancing research in the learning sciences. This has indeed proved to be an introduction that has come to be a fact. Over the years the collective writings in the area has increased substantially, and today the Research in Networked Learning series of Springer is a key publication in the area.

In 2004, one of the chapter (Levy, 2004) provided a methodological framework specifically addressing research that was practice-based, and the framework rested on theoretical assumptions of constructivist nature and implications that led into an action research approach. The other chapters did not explicitly deal with issues of methodology, rather they gave accounts of research into different fields that can be said to belong to networked learning. In 2014, the first issue in the above mentioned book series on Springer was issued as a collection of papers selected and re-written from the 2012 Networked Learning Conference. The first chapter (Hogdson et al, 2014), is an introduction to the researching design, experience and practice of networked learning. This overview gives both theories and methods used in the research on networked learning present in the book, showing a variety of theories informing the choice of methods used and thus also a variety of methods. Theories range from phenomenology and phenomenography through different constructivist theories to ANT, and methods include ethnography and action research as well as design based research. There are no chapters in the 2014 issue dealing as explicitly with methodological issues such as Levy (2004) does.

In the 2019 issue of the series, Littlejohn et al, (2019), introduces the field of networked professional learning as a starting point to move beyond professional development as a base to frame global challenges into learning that is rather networked and informal. Goodyear (2019) positions the chapters in a framework of design for social innovation. Design, as it is described, becomes a methodology for researching the field of networked learning operating on two levels, an object level where the current problem is set and a meta level aimed at future improvements. What is interesting is to further the discussion on what these problems are, and thus what the methodological considerations they give rise to might be. In this symposium, we approach the idea of designing research into networked learning by taking our point of departure from the methodology section of six forthcoming phd-thesis's written within the framework of the Swedish National Graduate School for Digital Technologies in Education (GRADE). Each paper presented in this symposium is a timestamp, a snapshot of where these doctoral students are today in their respective thinking. The papers stem from a course given in the graduate school on methodology, and should be seen as examples of the diversity that may be present in a graduate school in which doctoral students are admitted to at least seven different disciplines or subject areas and at six different Swedish universities. The intention is that these variations and differences will feed into productive discussion on the boundaries of networked learning, on research as practice and stakeholders' positions, and on problems to be solved, wicked or not.

The first presenter reports on the theoretical framework and methodology of an empirical study of work-based training for cashier work - a study of instructional videos for cashier work spanning over a century. The three studies build on the theory of practice architectures (Kemmis et al., 2014; Mahon, Francisco, & Kemmis, 2017) and assumes that social reality consists of a variety of practices that we daily engage in and take for granted.

The second presenter follows the recent trend of defending behaviorism, and explores the valuable and useful functions of behaviorist philosophy that are integral to research associated with design, teacher professional development, and digital ubiquitous technology. The paper aims to provide a philosophical foundation for further discussion of a scientific methodology by relating basic conceptual underpinnings of behaviorism to different domains and levels of analysis integral to the networked sociocultural perspective.

The third presenter explores what the methodological considerations are for a study of educational practice and networked learning in technologically dense classrooms. The approach of the discussed study is informed by Actor-Network Theory (ANT) (Latour, 2005) and the paper outlines the methodological consequences for adopting principles associated with ANT and post-humanist critiques of representational epistemology.

The forth presenter explores how philosophical ideas in an Indigenous research paradigm serve as relational 'spaces' for a boundary-crossing Strategy of Inquiry and how these underpinnings align with Wenger's expanded theory of Communities of Practice? By looking for relational 'spaces' between an Indigenous research paradigm and Networked Learning, this paper serves as a boundary-crossing object between different paradigms, providing an outline of an Indigenous Strategy of Inquiry for a research study on remote, 1-9, Sami language education where networked learning is promoted.

The fifth presenter particularly intends to discuss how a multimodal methodology can explain important parts of networked learning settings using multimodal layers. As such, the multimodal perspective includes things-to-things, things-to-human and human-to-human connections (Bonderup Dohn, Cranmer, Sime, de Laat, and Ryberg, 2018; Jones, 2015) and focus on the technologies and their functions.

The sixth and final presenter closes the symposium by outlining two pedagogical principles that carry specific weight into research aimed at understanding digital competence in schools in general. Networked learning is exemplified in terms of connecting teachers and learners through remote teaching in rural municipalities.

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Theoretical Framework and Methodology for Exploring Instructional Videos for Cashier Work

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Abstract

The study described in this paper is part of a thesis project consisting of three empirical studies researching work and work-based training and learning in connected workplaces. The specific case is sales assistants' work and skills in connected stores, focusing personal customer meeting practices on the sales floor and at the checkout. The first study explores work-based training for cashier work through instructional videos. In the second study, the focus shifts to explore work-based learning through apprenticeships education in the connected checkout. The third study explores sales assistants' work in connected stores focusing on the personal customer meeting on the sales floor and at the checkout. Theoretical framework and analytical tool in all of the three studies is the theory of practice architectures(Kemmis et al., 2014; Mahon, Francisco, & Kemmis, 2017). This recently developed practice theory builds on Schatzki's (2001) concepts of practice and the critical insights of Habermas (1974) and assumes that social reality consists of a variety of practices that we daily, without further reflection, engage in and take for granted.

This paper reports on the theoretical framework and methodology of the first empirical study, work-based training for cashier work through instructional videos. Instructional videos and film are since long an educational resource used in both workplace education and formal education (Spector, 2015; Wiatr, 2002). In the first half of the 20th century, pictures were considered more accessible than written text. They were therefore used as a resource for transference, for example, information, workplace norms, values and processes more rapidly and thoroughly. In the 21st century, video lectures are used in, for instance, Massive Open Online Courses for delivering lecture content (e.g.Johnston, 2015). In health care educations medical television programs, such as Grey's Anatomy are popular among health profession trainees communicating typical work situations in advance of workplace learning (Hoffman et al., 2018; Jubas & Knutson, 2013)2015). Winch and Cahn (2015) report on a study implementing supplementary online video tutorials to improve student performance in a management science course. In the context of this paper, instructional (including, presentation, lecture, training, tutorial, screencast) videos are understood as part of many pedagogical practices within networked learning..

Instructional videos for cashier work in checkout practices have been used since the 1910s as a technological resource in workplace training. The study described in this paper explores, among other things, the relationship between technology evolution and the formation of checkout practices and the cashier profession over time. The study was conducted between 2018-2019 using online video research in combination with a literature study of retail technology evolution. The data material consists of 50 instructional videos for cashier work produced between 1917 and 2010 and published on YouTube. The analysis was conducted in five steps, "zooming in" and "zooming out" (Nicolini, 2012) the checkout practices demonstrated in the videos using the theory of practice architectures as a theoretical lens and analytical tool.

Keywords

Instructional videos, online video research, work-based education, pedagogical practices, cash register, information technology, POS systems, cashier vocation.

Introduction

The increasing pace of technology evolution in the 21st century has raised issues about the relevance of vocational education and training and how to ensure the skills requirements of the labour market (e.g. Hiebert & Borgen, 2002). The retail sector is one of the industries fundamentally transforming due to the ongoing digitalisation in society. The research on the consequences of technology evolution for sales assistants' work, competencies and work-based training and learning, however, is still limited. Technology evolution changing workplaces, work and skills requirements is not new. Ever since the beginning of the 1900s, the checkout in brick-and-mortar stores has been the site for monetary transactions in connection with customers' purchase

completion. Just as long, the cash register, invented in 1879, and information systems for handling money, transactions and merchandise have been the hub in checkout practices and sales assistants' work (Basker, 2016; Crandall, 1997). Against this background, the evolution of technology and information systems in the 20th and 21st century may be believed to have contributed to shape, reshape and change sales assistants' competencies and work in checkout practices. Almost as long, instructional videos have been a means for training sales assistants and cashiers for work in checkout practices. The instructional videos were and still are regarded as a resource-efficient way of transferring values, norms, ideas and working methods to employées, learners and students.

Developing vocational education and training for an increasingly connected work-life requires a look back on the development of specific professions and pedagogical practices such as instructional videos (e.g.Grossman, Hammerness, & McDonald, 2009; Mahon, Francisco, & Kemmis, 2017). To enable such a look back of the sales assistant profession, and training for cashier work, 50 instructional videos for cashier work produced between 1917 and 2019 and published on YouTube are used as the data source. The theory of practice architectures (Kemmis et al., 2014; Mahon, Francisco, & Kemmis, 2017) is used as a theoretical lens and analysis tool to answer the following research questions:
- What role has the technology evolution, e.g. the cash register and point of sale (POS) systems, played in work-based training for cashier work over time?
- What relationship exists (or not) between technology evolution and the formation of the sales assistant profession and cashier practices?
- How has instructional video practices for cashier work changed over time?

This paper gives a short introduction to instructional videos in workplace education and training, followed by a description of the study's theoretical framework and methodology.

Technology and instructional videos in work-based education and training

Technology evolution and the development of professions and education have since long been intertwined. At the same time, new technology has also been contested, sometimes perceived as a threat to professions and formal education(Autor, 2015; Hrastinski et al., 2019; Michalik, 1996). The increasing availability and use of information technology (ICT) and mobile devices in the 21 century are changing all aspects of life. In vocational education and training, ICT and mobile devices have opened doors to new forms of learning and teaching, flexible in time and space. Educational concepts such as e-learning, "flipped instruction" and "flipped learning" have emerged as popular approaches in workplace education by its availability, just-in-time delivery, and cost-effectiveness (Nederveld & Berge, 2015; Tynjälä & Häkkinen, 2005; Wang, 2011). E-learning, as understood by the author of this paper, is an umbrella term that describes education using electronic devices and digital media. Examples of E-learning is trainees or employees participating in online courses, webinars or virtual reality (VR) simulations of specific work activities. They can view or interact with instructional videos and participate in digital learning communities. The concept "flipped" refers, but is not restricted to viewing instructional videos in advance of participating in a seminar, lesson or work activity. The intention with flipped instruction is to actively maximise learning and retention by considering the best way to use the time in the classroom or work-based training (Nederveld & Berge, 2015). Instructional videos are forwarded as a promising resource to support learning, development and performance in workplaces. In an increasingly connected work and social life, instructional videos can deliver knowledge to employees in small portions exactly when they need it. As "flipped instructions", instructional videos are a means of reducing time spent on traditional workplace training of new employees and trainees.

Instructional videos are not a new phenomenon in workplace education (Wiatr, 2002). Already in 1913, Thomas Edison foretold "It is possible to teach every branch of human knowledge with the motion picture" (F. J. Smith, 2013). The National Cash Register Corporation, NCR, was quick to use this new medium and produced the silent film "The Troubles of a Merchant and How to Stop Them" in 1917. The aim with NCRs instructional film, also the empirical starting point of this study, was to teach the functions, benefits and consequences of implementing their cash register and mechanical point of sale system (M-POS) in stores. Since then, instructional films, followed by instructional videos, have been part of workplace and vocational education and training. In the 1990s, the comedian Lily Tomlin combined her perspectives on acting and business to produce the new medium, training videos. Tomlins training videos aimed to look at a critical business issue, customer service (B. Smith, 1994). In the 2000s, it was envisaged that shared online video increasingly would find a role in teaching and learning. Another trend forwarded was that the content available for learning would be designed by learners or trainees, instead of being formally authored by an organisation or institution to that designed by learners or trainees (Bonk, 2013).

In the 2010s, the video-sharing platform YouTube, launched in 2005, has emerged as a growing platform for publishing instructional videos produced by technology innovators, vendors, individuals, educational providers and organisations(Lee, Osop, Goh, & Kelni, 2017). In February 2020, YouTube is the second most popular video-sharing site; every day, people watch 1 billion hours of videos (Statista, 2019) and 62 per cent of businesses use YouTube as a channel to post video content (Buffer, 2019). The easy access and availability to produce and publish instructional videos on YouTube have enabled individuals, small businesses, as well as organisations and educational providers to start video channels with specific interests. Such an interest is to convert and publish instructional films produced in the 20th-century long before the Era of the Internet, YouTube and smartphones.

Theoretical Framework

The theoretical standpoint and analysis tool for this study is the theory of practice architectures (Kemmis & Grootenboer, 2008; Kemmis et al., 2014; Mahon, Francisco, & Kemmis, 2017). The theory of practice architectures builds on Schatzki's (2001) concepts of practice and the critical insights of Habermas (1974) and assumes that social reality consists of a variety of practices that we daily, without further reflection, engage in and take for granted. A practice, according to the theory, is understood "as a socially established cooperative human activity involving utterances and forms of understanding (sayings), modes of action (doings), and ways in which people relate to one another and the world (relatings) that 'hang together' in characteristic ways in a distinctive 'project'" (Mahon, Francisco, & Kemmis, 2017, p. 7). Instructional videos can be comprehended as conditions, 'practice architectures', which are intended to re-shape trainee's and employees practices at the workplace, so they can (learn to) practise differently. Instructional videos can also be designed to be 'teaching practices' intended to supplement or replace traditional workplace training such as for example cashier and customer service training. When viewed by a trainee or learner, the instructional video become part of 'pedagogical practices'. This study builds on the latter understanding, viewing instructional videos as pedagogical practices.

Figure 1: Instructional video practices are composed of sayings, doings and relatings that hang together in a project. (developed by author from Mahon, Francisco, Kemmis, & Lloyd, 2017, p. 11)

The storyline in the instructional videos for cashier work is communicated by practitioners, that is, a narrator and or actors, representing cashier (also sales assistant, clerk, teller) practices situated in checkouts (Fig. 1). The videos show what to say (sayings), what to do (doings) and how to relate (relatings) to colleagues, customers and company, and to objects such as the cash register and POS systems. The project or purpose with the instructional video practices is to teach and mediate expected characteristics of the cashier profession and cashier practices. Analytically, the theory of practice architectures sees practices as existing in three dimensions (Fig. 2). The participants' (narrator, actors) 'sayings' and thinking, are realised through language in the semantic dimension, "semantic space", and evident in their cognitive understandings. In the instructional videos for cashiers' work, the vocabulary used demonstrating interactions with customers or POS systems are examples of the vocational language characterising cashier practices. The participants' 'doings' are realised through activity and work in the physical dimension, "physical space-time", and evident in their skills and capabilities. For example, in the videos, skilled cashiers demonstrate the right methods for handling money and situations in cashier practices. The participants' 'relatings' are realised in the social dimension, "social space", and are evident in their values, feelings and emotions. In the instructional videos, relatings can emerge as demonstrations of the right cashier values such as what it means to be friendly.
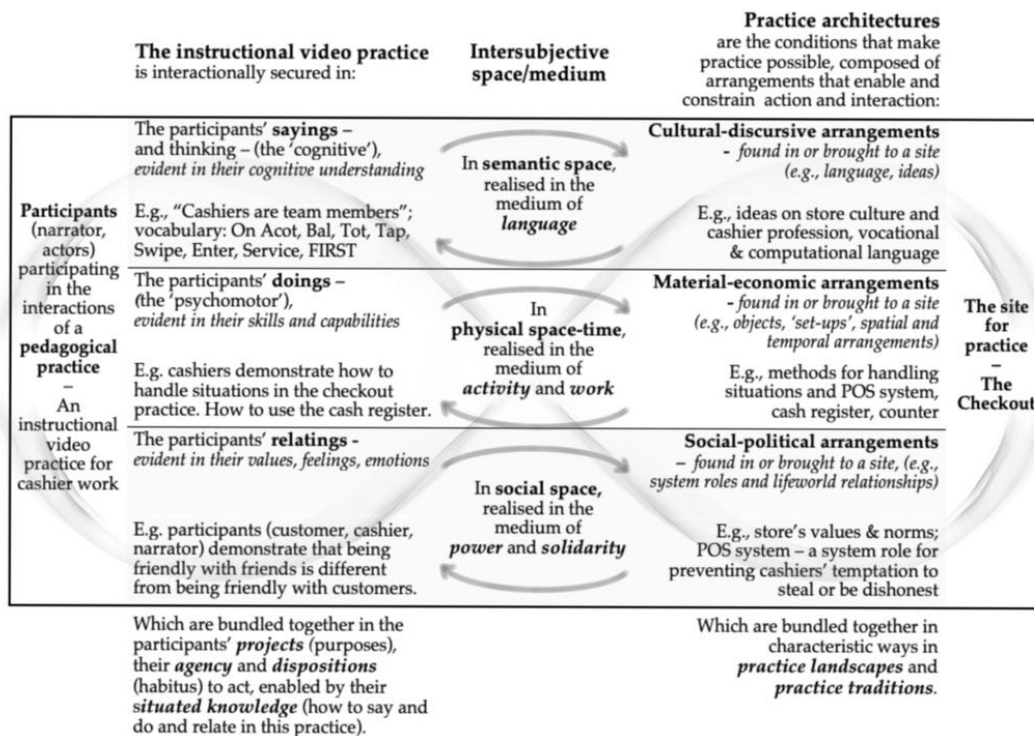
Figure 2: Theory of practice architectures, theoretical lens and analytical tool for exploring instructional video practices for cashier work, adopted from Kemmis, S (February 18, 2020) personal communication.

In reality, however, the sayings, doings and relatings in a practice are not separable. They are bundled together in the happening-ness of the practice, and guided by the participants' projects, that is, the purpose of the cashier practice as demonstrated in the instructional videos. The videos also aim to show the kinds of agency cashiers make evident in their practice, and their dispositions to act in the ways they do as they enact the cashier practice. The participants' projects, agency and dispositions are enabled by their situated knowledge (how to say and do and relate in the cashier practice). According to the theory of practice architectures, practitioners' 'sayings', 'doings' and 'relatings' in pedagogical practices are enabled and constrained – as, indeed, made possible – by the conditions present in the site of practice (or brought to the site by participants). Analytically, the practice architectures are composed of arrangements corresponding to the three dimensions of practices.

"Cultural-discursive arrangements" in instructional video practices prefigure and shape what the participants say and think in the semantic space of practice. For example, ideas on the cashier profession and how to organize the store, the business and work (part of the store culture) shape how cashiers, customers and narrators talk and what they say in the instructional videos. "Material-economic arrangements", prefigure and shape what the participants do in the physical space-time occupied by a practice. Of specific interest in this study is in what ways technology, information systems and methods over time have supported, constrained or changed cashier practices and cashiers' skills and capabilities. "Social-political arrangements" prefigure and shape how the participants relate to each other, the environment, and technology in social space of practice. The store's policies, values, norms (e.g. how to behave, attitudes, relate to customers) and system roles (cashier, courtesy clerk, customer, manager, company, POS system) are examples of social-political arrangements shaping, enabling and constraining cashier practices. In reality, the cultural, the material and the social are not separable; these three types of arrangements are bundled together into "practice landscapes" and "practice traditions". Analyzing instructional video practices for cashier work produced during a larger time span (1917-2019) allows the researcher to highlight and describe not only the practice traditions of cashier practices but also instructional videos as pedagogical practices in work and workplace training.

As has been shown, the theory of practice architectures allows this researcher to gain knowledge of how instructional video practices for cashier work and how cashiers' skills and agency have changed over time. It also offers the possibility to understand and describe how the evolution of technologies is part of or connected to changes in cashiers' work practices. The findings of the analysis of instructional video practices for cashier

work have the potential to give directions for development of pedagogical practices such as workplace education, vocational education and instructional videos for work at increasingly connected workplaces.

Instructional videos

Instructional videos, as understood in the context of this study, involves different types of videos such as:

- Training videos: Training is the act, process, or method of one that trains. Training videos are designed to improve an employee's workplace skills and qualifications by teaching or instructing a specific content. They can also be designed to develop a trainee's or new employee's work skills and knowledge. Commonly, companies create training videos to cover interpersonal topics, such as service, compliance and harassment training, or job-related topics, such as hardware and software training. Training videos can be interactive and often use footage of real people to connect the trainer and trainee.
- Tutorial videos: A tutorial can be a paper, book, film, or computer program that provides practical information about a specific subject. The tutorial video is a "go-to" instructional method for teaching a work process or providing step-by-step instructions. They may leverage multiple instructional methods and are sometimes referred to as "how-to" videos, such as "how to scan" or "how to cashier work".
- Screencast videos: Digital video recordings of the computer screen that usually include audio narration. Screencasts tend to be short and informal (1 min-5 min), and the format lends itself to just-in-time teaching. For example, an instructor, colleague, or manager can quickly create a screencast to answer a question or clear up a challenging concept.

Methodology

In this study, public instructional videos for cashier work produced between 1917 and 2019 and uploaded to YouTube are used as empirical material to answer the research questions. While it is possible to find written documentation from ledgers from the early 1900s onwards concerning the introduction of cash registers and point of sale (POS) systems in stores, this early documentation did not record information about how work-based training for cashier work has been arranged over time (Crandall, 1997; Spellman, 2016). In addition, research on the consequences of the evolution of retail technologies has largely focused on the retailers, customers and marketing (e.g. Basker, 2016; Hagberg, Sundström, & Egels-Zanden, 2014; Hopping, 2000; Spellman, 2016). However, the increased availability and use of the Internet and digital technology have led to vocational educators, retail organisations along with innovators and vendors of retail technology publish instructional videos on YouTube to be viewed by existing and future employees or customers. During the 2010s, organisations and individuals interested in the history of retail have converted and increasingly published instructional videos on YouTube that were produced before the 2000s. YouTube can thus be considered a valuable online site for an empirical study of the relationship between technology evolution, the development of work-based training for cashier work and the formation of the sales assistant profession over time.

Video Methods

Online video ethnography research is an umbrella term for a growing research field where the main data material consists of videos or other visual data that have been collected from online sources (Legewie & Nassauer, 2018). Video recordings and analysis are increasingly used in educational, social and organisational science to replace or supplement observational studies and retrospective studies such as interviews and surveys (Lebaron, Jarzabkowski, Pratt, & Fetzer, 2018; Legewie & Nassauer, 2018). Video method enables dynamic audio-visual data that give a richer description of a practice or organisation compared to other qualitative methods (Lebaron et al., 2018). Video methods can help answer questions such as:

- How do sales assistants use mobile point of sale systems in the personal customer meeting?
- What is the role of technology in work-based training and learning?

Lebaron et al. (2018) describe that video methods have similarities with participatory observations in ethnography when studying an organisation or group such as the employees at workplace. It has also kinship with photographic methods, that are used in all of the three studies in the dissertation. Photographic methods emphasize the visual and perspectival aspects of organisations (Meyer, Höllerer, Jancsary, & van Leeuwen, 2013).

Searching for and selecting Instructional videos

The author of this paper searched for instructional videos for cashier training using Google's search engine displaying search hits with Safari as the web browser. The initial criteria for the search process were that the videos would: a) Involve interaction with cash registers or POS systems; b) Be produced for educational purposes; c) Be available to the public; d) Provide information about publishers and marketing year; and e) Be connected to work-based training for sales assistants. The following search words were used in different

combinations: retail; checkout; cash desk; work-based training; tutorials; cashier; sales assistant; clerk; teller; checker; salespersons; cash register; POS; and mobile POS. The first search (2018-06-07) was conducted with the aim of finding instructional videos involving cash registers and POS systems. However, the search terms emerged to be too general. For example, POS training generated 767 000 hits and cash register training 1 290 000. To narrow down the number of hits, the search words retail, training, sales assistant or cashier were added. However, the search hits on Google still remained very high (1900 to 1 290 000 hits), therefore, the search terms were combined with decades.

Another problem that arose in the effort to do a systematic search for instructional videos was that the search differed over time and could not be repeated. This can be explained by the fact that videos are continually uploaded, removed or renamed on YouTube. The phrase "cash register training" was the only combination where the search hits decreased between June 2018 (1 290 000 hits) and December 2019 (783 000 hits). In total, the least number of hits for instructional videos for cashier work were generated in the timespan 1970s to early in the 2000s. While it was difficult to find instructional videos for cashier work it also emerged that the concept "customer service" was increasingly used in the retrieved videos from the 1970s onwards. Therefore, "customer service" was added as a search term with the intention to find more instructional videos for cashier work produced between the 1970s and 2000s. This also meant that the videos had to be viewed in their entirety to determine if they involved cashier work or interaction with PC POS systems.

Another discovery was that there were significantly more search hits for "sales assistant" than for "cashier" and other denominations for work in the checkout. One explanation for this can be that sales assistant is a term used more widely, another is that cashier due to automatization of checkout activities receive less training in the 2000s, hence the need for instructional videos for cashier work is small (Andrews, 2014). Henceforth, in this study we refer to all staff working at the checkout, despite other denominations in the videos, as cashiers. It is important to be aware, however, that cashier work often is one of many tasks in sales assistants' work practices in retail stores. The final data material (see Tab. 1) consisted of 50 instructional videos. The videos, targeting a variety of industries and professions, were produced by retail chains, technology vendors, employment agencies, universities and vocational training providers.

Table 1: The empirical data material – Instructional videos for cashier work

Period	Number	Country
1910s - 1920s	2	US, SE
1930s - 1940s	3	US, SE
1950s - 1960s	8	US, GB, SE
1970s	3	US
1980s	2	US
1990s	2	US
2000s	3	US, NZ
2010s	27	US, GB, SE, NZ, IN, DE

Ethical considerations

Bringing digitalisation in social practices into focus for research also brings new ethical issues to handle when producing and analyzing data (GDPR, 2018). For example, how to handle personal information, published online as texts, photos, images and videos. Personal information is, according to the GDPR legislation, any information that can be directly or indirectly linked to a person who is alive. Typical personal information is a personal identification number, credit card, email address, name and address. The ethical concerns that apply for off-line research, such as for instance, informed consent, privacy, transparency, and minimizing harm, holds for online research as well (Legewie & Nassauer, 2018). Therefore, the ethical considerations were brought into focus before, during and after the empirical process following the requirements present in both international guidelines and the ethical guidelines of the Swedish Ethical Review Act (SFS, 2003:460).

The underlying notion, according to Legewie and Nassauer (2018), is that data available online does not give researchers free rein in its use. The online context in which the data has been posted, the total number of views, the purpose of the post or video should impact the assessment of confidentiality and contextual integrity. Therefore, the selection of videos for this study is based on the following criteria: they are public, accessible on YouTube, with many views, and published with an educational or informative purpose. However, it turned out to be a difficult and time-consuming process to find, get in contact, and get written consent from the producers

of the instructional videos. Only five producers in total responded and accepted our request, in some cases after a year. On the other hand, following Legewie´s and Nassauer´s (2018) ethical recommendations, the videos are public on YouTube with an educational or informative purpose. To open up for a discussion concerning the findings, we have therefore chosen to connect quotations to the title and production year/period of the video. Photos illustrating situations from instructional videos produced before the 1970s have been assessed not to cause harm for the participants, while photos from more recent instructional videos are presented as sketches in the findings. The app Procreate and an iPad Pro enabled for example to remove background that was not of interest for the situation and to change the shape, skin, hair, and clothes of participants on the photo. Digital drawing compared with computer-manipulated photos generate more vivid images while keeping the privacy of the participants.

Analysis process

1 The analysis process was initiated by viewing the chosen 50 instructional videos 2-3 times focusing on what was "happening" in the videos (Nicolini, 2012). In this step: type of instructional video (training, tutorial, screencast), title, production year, a short summary of the storyline, technology involved, URL, and number of views were documented. In parallel, a literature study was conducted to connect the instructional videos to the evolution of retail technology (POS, RMS, CRM systems).

2 For this study, 27 of the 50 instructional videos were selected so as to represent the time span of the videos (1917-2019) in order to capture the technological changes and how such changes are addressed in the instructional videos in terms of what skills are stressed, the purpose of cashier practices and cashiers' agency. The videos were watched in sequences iteratively on YouTube or in iMovie. The verbal dialogues

3 As already discussed, the theory of practice architectures provided analytical tools for exploring the instructional videos as part of pedagogical practices in workplace education. The data (transcripts, video sequences, snapshots) about cashiers' practices was analytically separated into 'sayings' (ideas on organization of the store, work, cashier profession), 'doings' (skills and capabilities), and 'relatings' (values, feelings, emotions) (Tab. 2).

Title:	1945 - You Can Tell by the Teller, 18.42 min
URL	https://youtu.be/TbdClADAJw0

'Sayings' In semantic space
"stub and bill"; "arranging her tools in the most convenient positions"; "To learn the correct ways of"; "with a ready smile"; "Establish a personal relationship"; "maintain good overtones"; "to learn the correct way to do each item, lets follow a skillful girl as she does her job pleasantly and effectively"

'Doings' In physical space-time
Do's and Don'ts - video describe and demonstrates the right and wrong actions for handling money, equipment and situations. 12 steps to master in customer interaction: 1. Greet customer. 2. Receive bill and money. 3. Separate stub from bill. 4.Verify with customer money received and amount to be paid. 5. Stamp stub and bill. 6. Make correct change. 7. Place change in customer's hand. 8. Hand customer receipt, noting name. 9. Thank customer by name. 10. File the receipted stub. 11. Place money in cash box. 12. Be alert to greet next customer.

'Relatings' In social space
"We met her for only a few seconds, but that was time enough for her to impress us with her friendliness, ability and accuracy. She made us feel good toward herself and her company"; "The actual mechanics of taking the money, stamping the receipt, and returning the change can be done as effortlessly as a hostess serving her guests, and like her, you can make that act seem personal to the one you are serving"

Table 2. Excerpt from an analyze table of an instructional video from 1945

4 The fourth step in the analysis process was to zoom out of the video practices by analysing the practice architectures prefiguring and shaping them. That is, the researcher examined how cultural-discursive arrangements shaped the sayings of the cashier-practices being demonstrated, including ideas on how to organize the store, the checkout and work, and ideas on the cashier profession. This allowed the researchers to reach initial findings about the discourses that shape the vocabulary ('sayings') expressed in the videos. The researcher also examined how material-economic arrangements shaped the doings of the cashier-practices being demonstrated, including such things as how methods, technology and information systems enable or constrain the activities ('doings') in the videos. Furthermore, the researcher examined how social-political arrangements shaped the relatings of the cashier-practices being demonstrated, including such things as how norms and values enable and/or constrain the relationships visible in the instructional video practices. Of specific interest was to explore technology and information systems as cultural-discursive, material-economic and social-political arrangements in the cashier practices demonstrated in the videos.

5 In the final step, the researcher moved between zooming in and zooming out to explore the practice traditions, and cashiers' projects, agency, dispositions and situated knowledge as manifested in the instructional video practices (Kemmis et al., 2014, p 27). That is, we looked for relationships between the evolution of technologies and the corresponding evolution of cashiers' work practices, and what these changes indicated about the expected practices and projects of cashiers, and their expected sense of agency, their expected dispositions, and their situated knowledge

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Exploring Behaviorism: A Networked (Re)integration

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Abstract

Skinner claimed when outlining his behaviorist philosophy, that concepts exist in the world before anyone identifies them, yet that they are inherently linked to social and cultural descriptions and predictions. The perspective has been dismissed by many researchers in the learning sciences as an important but obsolete relic in origin narratives introducing perspectives. In such a narrative, behaviorism is portrayed ontologically as incompatible with complex domains related to agency, emotion and engagement. However, researchers have started to consider its relevancy to clearly specify sequential learning tasks on a materialistic level integral to a networked sociocultural perspective.

Following the recent trend of defending behaviorism, the presented paper creatively explores the valuable and useful functions of behaviorist philosophy that are integral to research associated with design, teacher professional development, and digital ubiquitous technology. The paper aims to provide a philosophical foundation for further discussion of a scientific methodology by relating basic conceptual underpinnings of behaviorism to different domains and levels of analysis integral to the networked sociocultural perspective.

The networked sociocultural perspective concerns the organization of knowledge. This organization functions to link different practices, perspectives and theories without reducing one to another. This organization of knowledge is very similar to the way individuals are conceptualized in a behavioral analysis, constituted and reinforced by different processes of successful behavior, allowing individuals to integrate the successes of a particular organized domain into other knowledge domains and instances of emotion. Following this logic, organizations and professions linked to them depend on an integration of multiple domains, forming complex networked learning amplified at a rapid rate by technological developments since the beginning of the 21st century.

Linking practices, settings, perspectives and theories by an established alignment constitutes scientific rigor and a valid methodology. The behavioristic methodology assumes value to prediction and systematic, creative explorations of complex domains at the level of observable material events. From a networked sociocultural perspective, behaviorism may guide researchers to take the necessary and required steps to provide a clear analysis of sequential learning task outcomes at the level of observable material events. Further, these predictions should be formulated in such a way that as a great amount of networked practices, perspectives and theories can integrate as possible, without reducing one to another.

Keywords

Behaviorism, Design, Network Learning, Philosophy of Science, Philosophy of Education, Community of Practice, Pragmatism, Linguistics, Communication, Creativity

Amplifying Professional Networked Design

Learning, according to Laurillard (2012) and Gee (2008), is intrinsically bound to the notion of design. In the knowledge domain of architecture, design emphasizes the application of aesthetics and functional creativity in practice (Dohn & Hansen, 2016). Similar to this emphasis, design can represent a process of forming and may refer to one or several parts which it consists of. The process of forming consists of giving form in a knowledge domain to what previously has manifested as the result of a concept, or even a preliminary sketch related to a concept (Konnerup, Ryberg, & Sørensen, 2019). Viewing knowledge and concepts as linked to the capacity to engage in and affect the environment, the conceptual underpinnings of design can be related to antique ideas from Greece about learning, inherently cultural and social and still relevant today (Carr, 2010; Goldstein, 2014; Luckin, Holmes, Griffiths, & Forcier, 2016; Selander, 2008).

Some of these knowledge domains aim to link different practices, concepts, perspectives and theories without reducing one to another, such as the networked sociocultural perspective (Bakhtin, 1981; Daniels, 2017;

Wertsch, 1998). These notions can be related to foundational concepts residing in the philosophical knowledge domain of pragmatism, where theories serve to be used as instruments in different instances of emotions that greatly vary (James, 1884, 1907). In this way, the networked sociocultural perspective shares similarities with design, which transacts practices "such that the design, the problem, and even the theory are fused […] in ways that are not easy to disentangle" (Barab, 2014, p. 156). The environment emphasizes informal learning and its impact on professional work life, which cannot be understood without consideration for designs across multiple domains (Jaldemark, 2018).

From a networked sociocultural perspective, different theories "acts as a guide about what to pay attention to, what difficulties to expect, and how to approach problems" (Wenger, 1999, p. 9). This sets design limits to the development of professions, as it ultimately belongs to the practical domain with instances of emotion and engagement. The practical domain affects the likelihood that the concepts of the design will be manifested and integrated (James, 1884, 1907; Papert, 1980; Skinner, 1953; Wenger, 1999). Digital ubiquitous technology provides further complexity to the formal designing of professions (Wang, 2018).

Technological devices, networks, and software today are often referred to as digital. The digital can be understood as mainly characterized by a ubiquitous quality, providing access to different services anytime and anywhere (Wang, 2018). Technological developments since the beginning of the 21st century have amplified this ubiquitous quality drastically (Moebert, Zender, & Lucke, 2016). In short, the ubiquitous quality of digital technology affects communication processes anytime anywhere. Smartphones and similar digital ubiquitous devices are not only resources but in this way intrinsically linked to practices across multiple domains (Luckin et al., 2016). This affects professions and their increasing ability to integrate professional experiences across knowledge domains, forming networked learning effects (Littlejohn, Jaldemark, Vrieling-Teunter, & Nijland, 2019; Wang, 2018).

One example of how the ubiquitous quality of the digital technology affects networked practices across multiple domains is the boundary line between what is considered to be public practice and what is considered to be private practice (Lindell & Hrastinski, 2018). This boundary may shift "with every discovery of a technique for making private events public. Behavior which is of such small magnitude that it is not ordinarily observed may be amplified" (Skinner, 1953, p. 282).

Historically, three main perspectives have been used in the design of digital ubiquitous technology in relation to the professional work of teachers and its development. Behaviorism and cognitivism are two of them (Selander, 2008), where behaviorism often is notoriously associated with the "teaching machine" (Sawyer, 2014). Previously these perspectives were considered incompatible, but recently, this has shifted in networked sociocultural research to the notion of approaching different levels of analysis. This might enable the use of traditional philosophy of science and relate it to current teacher professional development and digital ubiquitous technology (Crook & Sutherland, 2017).

Inseparable Sequences of Environmental Knowledge

Technology tends to develop quickly over time. This is especially true for digital ubiquitous technology, constantly evolving at a rapid pace (Zbick, Vogel, Spikol, Jansen, & Milrad, 2016). Teachers face challenges adapting to these changes when constructing sequences of learning tasks (Luckin et al., 2016). These sequential learning tasks are assumed to have learning outcomes of knowledge relevant to the needs of local communities and are a core part of what defines the profession of teachers (Mølstad, Petterson, & Prøitz, 2018).

The scientific relevancy of sequential learning tasks bound to the practice in which teachers work is by researchers approached from different perspectives and methodologies (Lai & Bower, 2019). Recent literature reviews have outlined evidence for motivational influences relating to sequential learning tasks that involve digital ubiquitous technology (Granić & Marangunić, 2019; Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). These reviews outline the motivation for sequential learning tasks but does not analyze task outcomes. However, they explicitly emphasize the need for further research on task outcomes. Some perspectives and methodologies may be considered as more suitable when researching task outcomes.

Broad theoretical approaches may be relevant to educational practice but, according to Andersson & Shattuck (2012) and Michos & Hernández-Leo (2018), insufficient to clearly specify and analyze sequential learning tasks. Instead, a perspective that has a foundational emphasis on observed materialistic complexity and the prediction of sequential learning tasks may be more suitable (Crook & Sutherland, 2017). The learning sciences

were dominated by such a perspective for most of the 20th century. Nowadays considered traditional and foundational, this perspective is referred to as behaviorism (Sawyer, 2014).

Behaviorism is often misconstrued as functionally outdated and dismissed to only serve as part of origin narratives presenting and introducing learning theories (Saari, 2019). The ontological basis for behaviorism is notorious with associations to conceptualizations that replace complex emotional experiences with reductionist learning such as the skinner-box (Barrett, 2017). This may be considered as odd or surprising, as the historical-cultural effects and potential benefits of behaviorism in the field can by no means be regarded as trivial (Bosseldal, 2019). Even researchers with antagonistic approaches to behaviorism admit its relevance to the field (Laurillard, 2012). Despite all of this, elements of behaviorism are clearly visible in the learning sciences to this day, particularly in the design development of sequential learning tasks (Crook & Sutherland, 2017).

According to Skinner (1953), the basic assumption of behaviorism is one of science. While the everyday practice may consist of a way of thinking that assumes value to description, science confines itself to the aim of prediction based upon observable events. This prediction requires identification of independent variables that serve as necessary constituents to the events, forming a relation (Skinner, 1953). As in research associated with design (Mor & Winters, 2007), this relation is referred to as a function.

Learning can be understood as the endowment of knowledge. This knowledge can function as a special repertoire to the process of forming. Knowledge is linked to cultural ideas and concepts of appropriately navigating the environment. This involves a certain organization of relevant materials by means of control (Skinner, 1953). In this way, both the professional work of teachers and the networked sociocultural research on teacher professional development share the goal of shaping a new way of thinking about the environment through a sequential process of forming (Konnerup et al., 2019; Littlejohn et al., 2019). They both share the assumption that theories affect practices, and that learning affects human behavior. Behaviorism assumes that knowledge is maximized by education and that its value can be derived by its efficacy towards encouraging the appearance of solutions or tentative solutions to problems (Skinner, 1953).

As the environment develops, so will notions of appropriate behavior. While the neurons in muscles work in a fashion of passive reactive reflex behavior controlled by an external agent (stimulus-response), in most cases the neurons and synapses in human brains do not (Skinner, 1953). Historically this distinction has not always been made, which has led to exaggerated claims that ignore the fact that "the greater part of the behavior of the intact organism is not under this primitive sort of stimulus control" (Skinner, 1953, pp. 49–50). At the same time, however, brains operate under certain physical limitations, which cannot be avoided by just denying them. As such, ignoring the principle of the reflex entirely would be equally unwarranted (Skinner, 1953).

Many important discoveries have been made since Skinner's contributions. His ideas were permeated by pragmatic notions of exploratory research. He saw great resources being wasted on theories that would inevitably be overthrown along with the associated research. His solution was to emphasize the environment (Skinner, 1974). This has also been done by pragmatists or curriculum theorists such as Dewey, Englund, and Schwab to predict how education can supply meanings to social practice from past collective or political developments (Uljens & Ylimaki, 2017). Not unlike these theorists, Skinner wanted to affect what he referred to as the "cultural design" (Skinner, 1953, p. 419). Interpreting this term networked and socioculturally might entail the organization of knowledge domains (Wenger, 1987; Wenger-Trayner & Wenger-Trayner, 2015), and its practical use in professional communities to explore "how to design the world as a learning system" (Wenger, McDermott, & Snyder, 2002, p. 232).

Giving Form to Contingencies of Association

Teaching may involve taking a central role in the process of designing sequential learning tasks (Laurillard, 2012). Sequential learning tasks may aim towards guiding the students and assisting their performance in a variety of ways, dedicated to different processes, such as modeling, feedback, questioning and cognitive structuring (Forman, Minick, & Stone, 1996). Analyzing some of the processes from a networked sociocultural perspective requires the integration of additional levels of analysis other than the behavioristic (Bergner, 2017; Van den Akker, Gravemeijer, McKenney, & Nieveen, 2006; Van Merriënboer & Kirschner, 2018).

One example of such a level is the cognitive one, emphasizing experiential aspects of behavior. Crook and Sutherland (2017) claim that cognitivism allows narrow focus on the limiting of clutter in terms of input, emphasizing the impact of memory to experience and ways of boosting memory storage through coherent mental representations.

Behaviorism may also be reduced to a similar level of concept depth to ease the integration into a networked sociocultural perspective. At this level, behaviorism can establish a focus on knowledge through behavior, as a matter of attaining complex response capability through contingencies of association. These contingencies of association consist of a bottom-up of sequential construction involving simple task constituents, where success in each step is reinforced with suitable contingent feedback (Crook & Sutherland, 2017).

Crook & Sutherland (2017) claim that if done correctly, these sets of features from the perspectives of behaviorism and cognitivism can without problematic implications be integrated into a networked sociocultural perspective that may concern a variety of ways teacher assist performance and guide the students. Such a perspective must, according to Crook & Sutherland (2017), maintain the emphasis on learners' engagement.

Integrating Ontological Speech

To use multiple theories or concepts on different levels of analysis, they must be aligned in some way to ensure compatibility. Some might argue that emphasizing learners' agency, instances of emotion and engagement or other related issues are incompatible with behaviorism (Barrett, 2017), as a control upon individuals may demotivate or demoralize them (Vansteenkiste, Niemiec, & Soenens, 2010). If one were to exclude the possibility to analyze different levels later to be integrated into a networked sociocultural perspective, this is certainly the case. Below, I will argue that Skinner intended to allow such integration in his version of behaviorism. The allowance in the theory can be illustrated through the function of language and ontology.

According to Skinner, words communicate nothing: they simply have an effect. Grammar is shaped by reinforced practice. Language is verbal behavior: speech acts that require no environmental support yet are acts within it. All verbal behavior in a society is at least indirectly related to systematic power issues (Skinner, 1974). The individual who is performing the behavior is in a behavioral analysis viewed as a concept related to an adaptive process pervaded by judging of what will occur in a variety of practices (Skinner, 1974). The sentiment that grammar is shaped by a reinforced practice of verbal behavior is, according to Givón (1979) agreed upon by many branches of linguistics.

While referring to engagement in a behavioral analysis might not be appropriate as it detracts environmental emphasis and highlights so-called inner influences, it is nonetheless possible to address related issues. One can refer to behavior that has momentary positive consequences that is unrelated to the task at hand (Skinner, 1974; Skinner & Vaughan, 1997). The task behavior are culturally impacted by language and concepts across different networked domains. The individual cannot be separated from the environment as they are viewed as concepts that "exist in the world before anyone identifies them" (Skinner, 1974, p. 105).

What is key, then, is integrating different practices and domains of successfully learned behavior to new domains through positive reinforcements. As verbal behavior is at least indirectly related to systematic power issues and characterized as acts that require no environmental support yet are acts within it, the same reinforcements can be used as tools for control (Skinner, 1974). Butler (1999, p. 187) refers to this phenomenon from an identical ontological standpoint as "politically enforced performativity", where "the possibility for the speech act [...] to function in contexts where it has not belonged, is precisely the political promise of the performative" (Butler, 1997, p. 161).

Verbal behavior can in this way be integrated into a process of forming to "re-represent—that is, to present again—the social to all its participants, to perform it, to give it a form" (Latour, 2005, p. 139). In the same way, non-verbal behavior consists of communicative aspects. Concepts and emotions can socially be communicated through different means of behavior that has integrative regulatory effects related to emotions and systematic power issues (Barrett, 2017; Roth, Vansteenkiste, & Ryan, 2019).

This does not by default exclude theories that make claims on a level of universality, rather, it places them as something useful and valuable in certain practices, highlighted by what kind of knowledge is adapted and manifested. Scientific history has provided us with a certain way of approaching the environment which has been useful (Skinner, 1953). Proof of this is the production of technology that mimics a certain logic from social aspects of these practices: digital ubiquitous devices, software, and networks but also developments in modern astronomy, mechanic chemistry, electrodynamics, atomic nuclear physics, genetics, and physiological psychology are examples of its usefulness (Bunge, 1996).

Methodological Functions of Networked Behaviorism

Bunge claims that the presupposition of science is rigorous theory testing and theory steered explanations through empirical data, in which we can in some cases completely identify fiction, social power struggles, fantasy, and magical thinking to separate them from fact (Bunge, 1996). With these facts, Bunge claims that we can reach an objective level of knowledge about the environment that is, at least in part "suprabiological (in particular, suprapsychological)" (Bunge, 1996, p. 44). This entails a level of universality of knowledge that from a networked sociocultural perspective would be considered as outside the practice of science, containing a dualism of experiential instances of emotion with so-called inner processes that are characterized differently and separate from the adaptive processes of behavior and the environment.

Behaviorism is today often misattributed to similar claims as outlined above (Bosseldal, 2019; Saari, 2019). Rather than reducing the valuable scientific functions of behaviorism, it might better be understood through the notion that "science is not concerned just with 'getting the facts' […] Science not only describes, it predicts. It deals not only with the past but with the future. Nor is the prediction the last word" (Skinner, 1953, p. 6). By establishing that the prediction is not the last word, behaviorism can scientifically function similarly as pragmatism and design in research related to networked professional learning. The definition of knowledge that Skinner presents as "not only a repertoire as such, but all the effects which the repertoire may have upon other behavior" (Skinner, 1953, p. 410) can in this way be elevated beyond facts with its reliance on environmental concerns. This reliance on environmental concerns may highlight informal aspects of networked professional learning (Littlejohn et al., 2019).

Assuming adaptive experiences have developed practically against a set of background constituents that enable them to function by the utilization of certain behavior, the environment and individuals within become fundamentally inseparable. This ontological position entails an allowance of the comparison and integration of multiple perspectives and their history to form a sociocultural network. The building blocks used in the production of knowledge is the environment itself. In the same way, experiential instances of emotion and engagement have not emerged into the environment from a void, implying a dualism, but are instead assembled as concepts from already existing parts, giving form to behavior (including verbal behavior).

The alignment of different theories according to an established standard constitutes scientific rigor and a valid methodology. Part of such an alignment may be according to the standards of the networked sociocultural perspective that require findings to be formulated in such a way that as great amount of practices, perspectives and theories can integrate it as possible, without reducing one to another (Bergner, 2017; Van den Akker et al., 2006; Van Merriënboer & Kirschner, 2018). The behavioristic methodology assumes value to prediction and systematic, creative explorations of complex domains at the level of observable material events. From a networked sociocultural perspective, the integration of behaviorism may be useful as a guiding instrument for researchers to take the necessary and required steps to clearly specify sequential learning task outcomes at the level of observable material events (Crook & Sutherland, 2017; Skinner, 1953). However, even if a scientific community of practice has agreed upon a set of methodological principles that generate research, this "does not prove its value unless the research is valueable" (Skinner, 1950, p. 194).

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Actor-Network theory and a methodology for inquiring the online/offline of education

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Keywords

Actor-Network Theory, Ethnography, Digital dualism, Sociomateriality, Post-humanism, Educational practice

Abstract

The paper explores what the methodological considerations are for a study of educational practice and networked learning in technologically dense classrooms. The approach of the discussed study is informed by Actor-Network Theory (ANT) (Latour, 2005) and the paper outlines the methodological consequences for adopting principles associated with ANT and post-humanist critiques of representational epistemology. The discussion is organised around overcoming an offline/online binary of educational practice and the use of screen recording software for data collection in ethnographic fieldwork in upper secondary classrooms. In this example, ethical ramifications are brought to the fore in relation to post-humanist traditions (Barad, 2003). The paper argues that the uncertainties exposed by troubling the two categories of human and language, by way of ethno-graphy, can serve as resource for a research practice informed by ANT.

Introduction

This paper is a discussion on methodological considerations for inquiring into digital components of educational practices in upper secondary classrooms which are enacted simultaneously with aspects of online and offline. The overall aim of the PhD research that is discussed is to account for the entangled character of teaching and technology in contemporary educational practice by paying attention to software and web technologies in the everyday schooling situation. In this setting, as with forms of networked learning in general, the physical occurs with the digital, and vice versa, and sociomateriality is an umbrella term suggested for a range of emergent approaches to the entangled practice associated with education (Fenwick, Edwards, & Sawchuk, 2011). Particularly, the sociomaterial approach of Actor-Network Theory (ANT) (Latour, 2005) is informing the study that the paper has emerged from.

A premise of the paper is the observations made by Fenwick and Edwards (2019) in their recent review of ANT-studies in educational research. They notice that methodological dilemmas have yet to be more fully explored in these approaches. With this in mind, the paper is guided by the question: What might the methodological concerns and dilemmas be for an ANT-study of the online/offline of education? Grounded in the decision to use ethnography with ANT, the paper discusses qualitative research methodology for an inquiry of digital engagements in classroom settings to emphasise some of the methodological considerations. Insights are most notably drawn from the post-humanist tenet of (some of) post-structuralism (Barad, 2003; Latour, 2005; MacLure, 2013) and examples are illustrated by ANT-scholars in educational research (Fenwick & Edwards, 2019) and specifically a selection of ANT-studies on digital education (Decuypere, 2019; Decuypere & Simons, 2014; Gourlay & Oliver, 2018; Sørensen, 2009).

The arguments for a rethinking of ethnography with ANT in the context of networked learning are framed by and developed over two troubled categories; (1) "ethno-" unsettled by the decentring of human subjectivity and (2) "-graphy" troubled by non-representational epistemology and the diminished role of language. Furthermore, it will be made clear that both feed into ethical and practical considerations for a research practice and how an

interrogation of "digital dualism" demands of an ANT-methodology to take seriously the notion that the digital is never alone.

Actor-Network Theory as methodology

Methodology is here understood as how an inquiry approaches theory, method and analysis in order to at the end of the day claim contributions. Methodology is in that way not detached from the purpose of a given study. Biesta et al. (2019) comment in a recent editorial that a contribution from educational research does not have to be confined to finding useful and applicable solutions to the problems of education, teaching or learning. Instead they call for educational research to identify problems and in a sense create and cause problems about education. In relation to methodology, I take this as a reminder for qualitative researchers to trouble what the research process has to offer and in a deliberate manner resist instant ordering and accommodating solutions.

A methodology is closely linked to what kinds of research questions can and might be articulated or even imagined. A methodology is already at play when questions emerge, rather than following in a linear sequence of first asking the questions and then applying the methods. The research questions of the project tended to in this paper are ANT-informed and made possible because of how agency is understood relationally, instead of confined to human subjectivity. The set of questions is directed at digital engagements and networked learning in classrooms; how does digital technology act in teaching? Which alliances and relations do they form in education and what do they produce? How do these relations stretch and reach in a collapsed separation of local and global? Who/what is teaching? The research topic identified by these kinds of questions connects to current debates such as algorithmic education and accountability (Perrotta & Williamson, 2018) and data-driven change in "backstaging the teacher" (Macgilchrist, 2017). Two areas of interest are reflected by this set of questions. The first is in examining a particular discourse which has claimed transformation to be brought about by digital technology and the second interest is in investigating pedagogic practice and the ways it unfolds in technologically dense schools (Fenwick & Edwards, 2019). There is nothing remarkable in pointing out that different questions can be asked in different methodological traditions. It is merely to demonstrate how an ANT methodology can make possible a turn to materiality of educational practice and describe the intricacy of how and where digital technologies, such as platform and algorithmic logics, become tangled up with the teachers, the students and the pedagogies performed in the classroom practices.

General descriptions of digital education as technically and socially connected, e.g. of involving internet connectivity, social media networks, Learning management systems and abundant online resources, holds connotations to the network metaphor of everyday language. However, what may look like a kinship and potential alignment between concepts such as "networked learning" and "actor-network theory" is, I suggest, a false association. The use of the word "network" may mistakenly appeal to applying the latter as a framework for understanding the former, a misreading not unheard of. The mistake, says Latour (2005, p. 142), lays in confusing "the network that is drawn by the description and the network that is used to make the description". In Latour's (1999) proposition of ANT, a (actor-)network denotes a method and not a stabilized object, such as a technical network (of school computers) or a social network (of students across chat groups). The phenomena under ANT-investigation may display networking qualities and shape, or it may not. Though it is beyond the scope of this paper to give a detailed account of why this is, the aim is to illustrate that asking ANT-questions require dealing with core epistemological and methodological assumptions. Next section discusses this in terms of representation in traditional ethnography before turning to some rethinking offered by critics of representational research.

Ethno-graphy and representation

A complex history, including a problematic application by Western anthropology, has left ethnography without a standardized meaning (Hammersley & Atkinson, 2007). Nevertheless, it is possible to etymologically derive that it concerns "ethno-", the social lives of a group of people, and "-graphy", a written account of those people. For the purpose of this paper, these two elements translated into the categories of humans and language will serve as frames for methodological considerations starting with representational epistemology.

A representational epistemology is one where knowledge about the world relies on access to its representations. It is in other words a commonsensical and intelligible way of conceiving what qualitative research method, including ethnographic, is about. In this paradigm, research questions into meaning appeal particularly to a representational logic. One such question might be for example, what does it mean (for students or other social groups) to be educated with digital technology? The following, somewhat simplified, handbook example is illustrative of how representational epistemology may align with research method. Emerson et al. (2011) explain

in their handbook on how to write ethnographic field notes that their view of the social world as that it is an interpreted reality. The underlying assumption here is the unmarked position of the human as the interpreting agent in understanding and making sense of the social world. Representation is operating in the notion that language (i.e. representations/knowledge) is how the world (represented/known) is accessed (by humans). Emerson et al (2011) go on to base their advice for writing field notes firmly on a system of representation when they suggest the ethnographer puts personal impressions aside and instead makes sure to note what the informants find meaningful and significant in their social world. This, they suggest, are some of the important details to capture in the ethnographer's field work. The particular kind of field work endorsed by this view is one where face-to-face interaction is privileged and achieving deep (rich) descriptions of the lives under investigation is a main focus. The researcher role is positioned as a separate observer whose task is to avoid contaminating data yet fully capable of accurately ordering the lives of others. Lather (2013) identifies this particular movement in qualitative research as one under the heading of liberal humanism, concerned with authentic voice as a measure for getting as close to the truth as possible. Next some of the counterarguments posited by critics of representational epistemology will be outlined and position ANT with post-humanist critiques of representational thinking.

Non-representation as post-humanist critique

The post-structuralist critique of representation, explains MacLure (2013), holds that it manifests a discursive/material binary which privilege language over matter in a rather contradictory and imperial position outside of the world and the entities it represents. The representational system comes with order, structure, and hierarchy. At the same time critics recognise value in studying what a practice of representation "does" and the critique does not equate with denying that representation regularly occurs (MacLure, 2013). Feminist and post-humanist scholar Karen Barad states that representation between knowledge and the known inevitably leads to questions about the accuracy of representations and more importantly what account for its operations, "If words are untethered from the material world, how do representations gain a foothold?" (Barad, 2003, p. 811). A humanist move to insert a third part, a knower, into this bipartite system of knowledge and known does not resolve the issue since the post-humanist strategy seeks to decentre human subjectivity rather than elevate it as it is elevated in representational epistemology. The metaphysics that critics of representational epistemology have responded with makes possible the tethering of social and material in proliferating hybrids in what Barad (2003) calls "agential realism" and in Latour's (2005) terminology is "actor-network" and, more rarely, sociology of associations. The Deleuzian concept of "assemblage" is also a materialist response to representational epistemology (MacLure, 2013).

Asking ANT-questions of about materiality of digital education and networked learning requires therefore a decentring of the human subjectivity that is associated with representational epistemology. This move interrupts the category of human from being the taken for granted locus of knowledge, agency or ethicality. A question like "What is teaching?" can suddenly take on different meanings. And new questions can begin to trouble the methodology. What about the participants, the "ethno-" /people, in ethnography? And what about another central subjectivity - the researcher's? Furthermore, a non-representational approach to research brings into question the prominent role of language, the "-graphy". Where does that leave the written account of the ethnographic field work? The practical implications of questions like these are very real when it comes to entering the field.

Entering the fields of online/offline education

Turning to more practical issues of methodology, the matter of how to access the relevant field has been one of the corner stones in ethnographic research and certainly not one easily settled in the context of networked learning. The methodological question to consider for the ethnographer, ANT or otherwise, has to be where "to go" in order to account for digital engagements and networked learning in classrooms. A classic locality of educational ethnography is the classroom where human actors and face-to-face interactions can be privileged. Landri (2013) problematizes ethnographic investigations of education and technology and notes that this locality is rendered problematic from the point of view of sociomateriality given that digital technology is not necessarily confined to the walls of the classroom. This second part of the paper will review a small selection of ANT-studies in digital education and attend specifically at how multiple ethnographic sites have been used and also how the offline/online binary may be overcome by reconsidering the category of digital.

Actor-Network Theory with ethnography

Sørensen (2009) uses a multi-sited ethnography with an ANT informed methodology to study materiality in educational practice. Her work shows some of the shifts that traditional ethnography needs to undergo when

ANT is used as the sensitizing device regarding post-humanist assumptions of e.g. non-representation. What this shift holds is for example that binary categories and the hierarchies they uphold need to be reconsidered, such as the split between human/non-human but also subject/object, social/material etc. The category of "digital" can also be added to this lists and deserve some extra attention given the topic of the paper. In general, ANT-studies move away from a privilege of human interactions to a generalized symmetry, which means acknowledging the potential for humans and non-humans to have equal importance for the empirical inquiry aligned with non-representational ontology. The ANT principle of symmetry suggests that an actor can be human, non-human or more-than-human. For Latour (2005, p. 46) an actor is not the source of action but made to act by other actors, and it is an entirely empirical question of who or what is an actor in any given inquiry, not a decision based on identity. Under these assumptions, objects too can have agency. It follows then that in interest of finding out what actors do and how they assemble in actor-networks requires tracing them in the field, once they have been identified (Decuypere, 2019; Latour, 2005).

A related way of thinking about how to do ethnography with ANT is that following actors in the field is to gather "flat descriptions" rather than in-depth explanation (Latour, 2005). A set of inquiry strategies is proposed by Latour (2005) in order for the researcher to keep the field flat and gather descriptions of the actors and group of actors and the relations they achieve and dissolve. Here, Latour emphasizes the importance of observation in conducting an ANT-inspired inquiry and methodologically minded scholars have added to what these observations may entail in practice, e.g. observation protocols, to avoid the risk of otherwise unmediated observations (Decuypere, 2019). One of the ethnographic sites in Sørensen (2009) is how her research team assemble the 3D computer program that they then use as study object in two primary schools. This move shows that when flat descriptions are unfolded and objects followed, the ethnographic site becomes multiple and some of them are located with the inquiry itself. The research project, such as Sørensen's (2009) research design, is not detached from, our outside of, what is being studied.

Collecting data of online/offline education

The issue of an online/offline binary with implications for educational research is raised by Gourlay and Oliver (2018) with regards to student engagement in higher education. Their study is guided by ANT principles such as those outlined in the previous section, e.g. general symmetry and flat descriptions. They take issue with a dominant view of "digital dualism":

> […] 'digital dualism' - the tendency to posit the analogue and the digital as a clearly observable binary. A feature which characterises this dualism is the tendency to present the digital alone as technology, implicitly excluding the non-digital from the category. As a result, the technological status of print-based practices and artefacts is rendered invisible, arguably leading to a view that these come to be seen as 'given' elements of education, which is portrayed as an entity standing somehow outside of technology. (Gourlay & Oliver, 2018, p. 23)

The issue raised here translates to some interesting and important methodological challenges of how to overcome the digital as a separate domain harnessing more impact and potential for educational practice, than that which is non-digital. How can continuities of print-based and digital practices be captured empirically? Gourlay and Oliver (2018) opt for an interview method where informants take photos and produce graphics of how, where and with what they study and these students' accounts of digital engagement are core part of the data collection (Gourlay & Oliver, 2018).

Another related example is a study reported by Decuypere and Simons (2014) who examine academic practice and the role of digitization for the daily lives at universities. They engage with questions about the sociomaterial composition of academic activities such as using software programs, e-mail correspondence etc. They adopt an interview technique where participants in great detail recount the activities from the previous day in a manner where "[…] feelings or meaning-giving of the respondent were of no primary concern" (Decuypere & Simons, 2014). Decuypere (2019) comments that the interview technique was born out of an awareness of the intrusion and ethical ramifications that observing the personal screens of these academics would entail. There was considerable doubts that respondents would be at all willing to take part in having their personal and professional screen activities recorded, a reason for designing the interviews the way Decuypere and Simons (2014) did.

The studies by Gourlay and Edwards (2018) and Decuypere and Simons (2014) are particularly relevant as they use an open design and ask what students' and academics' practices are composed of with a sensitivity to include, i.e. follow, digital components on the screens of personal devices in educational and physical setting.

They do not enter the examination with a fixed interest on a specific app, program or platform. A concept like digital dualism can be helpful to take seriously the argument that the digital is never alone. The digital/analogue binary needs to be collapsed if practices are to be traced across these domains as ANT suggests. This small body of literature has emphasised the ethical considerations, e.g. privacy, that are involved with researching how the digital come to act in different educational practices.

Ethical considerations with screen recordings

The PhD thesis that this paper is organised around is facing similar issues to that of Gourlay and Edwards (2018) and Decuypere and Simons (2014) of how to ethnographically study education and teaching practices in what is simultaneously in online and offline modes of upper secondary education. Inspired by their arguments, one of the ethnographic sites of the project will be student and teacher screen activities. To this end, screen recording software will be installed on student and teacher devices in a smaller selection of the informants who have been and continue to be involved in the ethnographic study. The recordings are accompanied by classroom observations and other ethnographic field work, so that the digital is not alone in making up the ethnographic site in this subcomponent of the research project. The standpoint is not that recordings are used to come closer to a true representation of screen activity. There are several technical but mainly ethical issues with this design that deserve some considerations in this paper.

Technically, the software chosen must not require emails of participants to be registered upon installation and not share recorded data with any other parties. The screen recording technique relies on not only informed consent from students and teachers but a willing cooperation on their part to engage at several occasions such as during installation, launching, controlling the program and recording classroom sessions. The recorded files need to be manually shared with the researcher to avoid cloud storage for data security reasons. These technical and practical matters should not however be allowed to eclipse the much more important ethical issues. The ethical considerations of regulatory nature are about weighing risk of personal harm against scientific contribution. However beyond such regulatory frameworks, an ANT informed methodology invokes ethics with regards to data analysis and even beginning in ontological assumptions, both outlined next.

Ethics and data analysis

The post-humanist strategy of decentring human subjectivity, discussed in the first part of this paper, need to be taken into account for ethical considerations. This strategy shifts and destabilises participation as the main and sole qualifier for conventional research ethics regulations and brings data into the ethical conversation. Research data from human activities, for example screen recordings from classrooms, come with sets of ethical entanglements of their own, rather than just being residues to be harvested for research purposes. Markham (2018) argues data use is one of several specific impact arenas for researchers to consider. Data is generalized, categorized and put to use for a variety of purposes to impose and shape society, such as predicting group and individual behaviour, particularly with large datasets. Small and qualitative data also have an impact arena and the ethics concern how data is coded and how exclusions are made. From the point of view of ANT-research and the topic of this paper, boundaries between subject and object are broken down with implications for how the researcher and the research data can be understood. MacLure turns to this issue of data in non-representational qualitative research. Notions of "interpretation" connote meaning and meaning-making which "is in the compass of representation" (MacLure, 2013, p. 664). Her observation highlights that data and data analysis is not so straightforward but rather caught up in the ethics that follow from non-representational methodology, such as ANT.

Ethics and ontology

This elaboration on the ethics and data of recording screen activities thereby brings us back to methodological implications of non-representational and post-human critiques. When Barad (2003) introduces "agential realism" as a critique of representational epistemology discussed above, she identifies that ethics is tied to ontology, the becoming together. Ethics then is perceived as preceding epistemology, since ethical responsibility is established before language and before anything is known about the other. There are no relations where ethical responsibility for the other can be avoided or opted out of, and there is no coming together without relations. It is quite different from the alternative view of taking ethics to be about linear consequence of human action, knowledge or intention. Neither agency nor ethics can under the assumptions posited by Barad (2003) be confined or located to any one individual. They are instead the effect of the human and non-human relations on which they are (per)formed. This tradition of thinking about ethical responsibility, inspired by ethics philosopher Lévinas, sheds light on the post-humanist move as an ontological turn taken in the name of ethics.

The ethical responsibility of the PhD project for participants, the ethnographic data and prospect of modest contribution began when the project first started. The field is in this regard already entered.

A summary of methodological concerns

The topic of this paper is to explore what some of the potential methodological concerns are in studying sociomateriality of education and technology, here pinned down by classroom practices which can considered to be in both online and offline modes. The purpose has not been to solve problems but rather to flesh them out and examine how uncertainties feed into research practice with ANT and ethnography. This concluding summary will revisit the frame of "ethno-" and "-graphy".

Ethno-

First a consideration of the humans involved in ethnography, the researcher and the participants, the "-ethno" if you like. That the gap between the researcher and those researched is not an innocent one without contamination is widely recognised in ethnographic research, even though Emerson et al. (2011), who were cited in this paper, made it out to be a straightforward and unmessy researcher position. Reflexivity is a significant feature for dealing with the consequences of the researcher belonging to the social domain that is interrogated (Hammersley & Atkinson, 2007). The meaning that Davies (1999, p. 4) gives to reflexivity is that it entails a "turning back on oneself". Reflexivity is complex and based on a post-humanist critique it is possible to make it even more problematic as it appeals to the essence and knowledge associated with researcher subjectivity, "oneself". If reflexivity can be understood as a humanist strategy of locating a solution in the individual agent – what option is there for a post-humanist ethnography? A dilemma appears to be how to decentre researcher subjectivity in ethnographic work, while not becoming detaching from it as detachment is not possible. It would suggest that the researcher is not operating freely under rationality or intention, the common-sense of qualitative research is troubled.

An important realization that this paper has surfaced in response to a decentred human subjectivity is that it is not sufficient to limit an ANT informed ethnography to the classroom and the material devices of the classrooms, even if they include screen activities. The ethnographic sites cannot be separated from the inquiry itself. Sørensen's (2009) response is to include the very construction of the research design as one of the sites in her multi-sited ethnography. I take her response to be a "second experiment" that Latour (2005, p. 135) says must be undertaken to account for the performative action of the inquiry itself. With the assistance of feminist scholar Donna Haraway (1988), I understand the second account to be one of ethics and taking responsibility, in terms of being answerable to the situated knowledge of the inquiry.

-graphy

A critique of language as representation has been another theme, framed here by "-graphy". Language is by all accounts involved in qualitative research, this one is no exception. The empirical data from an ethnographic classroom study is largely made up of written descriptions taking into account the actors and how they connect and disconnect etc. Additionally, screen recorded data as instances of material enactments must be translated into written descriptions. Latour (2005) argues as that a well written description does not need explanation, as long as descriptions remain flat, as one of the ANT principles. Language is part in achieving that description. Given this, what status can be given to the ethnography if it is deployed without representation? For ethnographic research not adhering to representation, the claim of the written account is not about accurate representation. Latour says that there is a fine line between on the one hand to look for acceptance for a description by those involved and to impose meaning onto them on the other. He demonstrates this by carefully separating "the two tasks of taking into account and putting into order" (Latour, 2005, p. 257). It seems to be a nuanced detail to take note of for non-representational research practice.

Then there are the categories that language makes available. The notion of digital dualism was brought into this paper to illustrate that language seems to uphold a dividing line (e.g. online/offline, digital/not-digital) rendering the very intersection masked and slippery. The digital as a defined domain and category carries a strong appeal, certainly in the context of networked learning. What can unseat it from this privileged position, is a delicate question bound to remain. It is a recognised and ongoing struggle for ANT-informed research to resist translating sociomaterial practice into symbolic representation, e.g. by relying on pre-given categories such as "digital" in the context of digital education (Fenwick & Edwards, 2019; Fenwick & Landri, 2012). The second experiment mentioned above, I suggest, may serve to enquire into such assumptions and what they achieve in terms of binaries and hierarchies etc. Likewise, the question "what is teaching" can help to interrogate another often taken for granted category in educational practice.

Conclusion

It has been a principal argument of this paper that in order to allow for the questions on materiality of education that ANT makes possible, the full artillery of non-representation and post-humanist thinking need to be deployed as methodology. This however does not translate to a readymade manual of how to deal with the various practicalities and issues they involve as outlined in this paper.

In conclusion, it is one thing to read literature on non-representational methodology and agree with the arguments – it is quite another to escape the common-sense of representational thinking. Uncertainties about what to do and how to do it remain largely unresolved. Latour (2005) insists that uncertainties, ambiguities and controversy should not be shunned or reduced but taken as resources for social inquiry and for methodology. The reported set of concerns and uncertainties that this paper has illustrated may serve as such a resource going forward.

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An Indigenous Strategy of Inquiry supporting Networked Learning

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Abstract

This paper answers two questions: What philosophical ideas in an Indigenous research paradigm serve as relational 'spaces' for a boundary-crossing Strategy of Inquiry? How do these underpinnings align with Wenger's expanded theory of Communities of Practice, a common theory within Networked Learning? Finding easily available guidance into theoretical frameworks and methods working from Indigenous philosophical underpinnings has proven to be a challenge. However, in Networked Learning there are several theories aligning well with Indigenous philosophy of which Wenger's expanded theory on Communities of Practice serves as one example highlighted in this paper. In finding relational 'spaces', ontological, epistemological and axiological underpinnings in an Indigenous research paradigm has been identified through Indigenous researchers' writings, relating those to Wenger's ideas. The findings in this paper are to be considered as a starting point for further discussions and investigations. They are not aimed at offering a complete picture, rather as something that can be widened as the boundaries between different paradigms are crossed. The readings show that an Indigenous research paradigm is called for when conducting research within an Indigenous context, especially as an Indigenous researcher, but can also inform other research paradigms, offering a boundary-crossing paradigm proliferation. Several relational 'spaces' are identified and accounted for. By looking for relational 'spaces' between an Indigenous research paradigm and Networked Learning, this paper serves as a boundary-crossing object between different paradigms, providing an outline of an Indigenous Strategy of Inquiry for a research study on remote, 1-9, Sami language education where networked learning is promoted.

Keywords

Indigenous research paradigm, Communities of Practice, relational accountability, boundary crossing, Strategy of Inquiry, Networked Learning.

Point of departure

In a similar way as Linda T. Smith describes her personal journey in the final concluding chapter of her book "Decolonizing Methodologies" (2012) and Wilson (2008) in his book Research Is Ceremony - Indigenous Research Methods, this is also a description of my personal journey into research. As a product of a Western school system, I have early on learned how scientific inquiry should be conducted. Consequently, the way I am writing this paper, as a visible author sometimes sharing personal anecdotes, is a decolonization process of my own mind. Maori scholar Smith (2012) provides a clear description of where an Indigenous researcher often departs from:

> From the vantage point of the colonized, a position from which I write and choose to privilege, the term 'research' is inextricably linked to European imperialism and colonialism. The word itself, 'research', is probably one of the dirtiest words in the Indigenous world's vocabulary (Smith, 2012, pp. 1).

This paper aims at answering two questions: What philosophical ideas in an Indigenous research paradigm serve as relational 'spaces' for a boundary-crossing Strategy of Inquiry for a PhD study on remote, 1-9 Sami language education? How do these underpinnings align with Wenger's expanded theory of Communities of Practice, a common theory within Networked Learning? To find answers I investigate the writings of, mainly, three respected Indigenous researchers; Wilson (2008), Smith (2012) and Kuokkanen (2000). Further, the findings are analysed in relation to aspects from the expanded theory on Communities of Practice (Wenger, 2010).

In this paper, I have chosen to be more visible throughout the text than writers of scientific papers mostly are. This is for you to be able to build a relationship both to me and the ideas I present, something very important

within an Indigenous research paradigm (Smith, 2012; Wilson, 2008; Kuokkanen, 2019). To stay accountable for the relationship I want to establish, the point of departure for this investigation starts in my lived experience and myself. Firstly, I argue for the importance of me as an Indigenous person to conduct research in a manner aligning with an Indigenous research paradigm and secondly, as an act of resilience, I do not to compare an Indigenous paradigm with dominant Western paradigms. Rather, I seek possible relational 'spaces' were common theories are informing or being informed by an Indigenous paradigm. In the pursuit of a suitable methodology when investigating remote, Sami, 1-9 language education, this kind of investigation is crucial.

Who am I?

You need to get to know me if I am to stay accountable for the content I am presenting in this paper. Both Wilson (2008) and Smith (2012) offers the readers rich opportunities to get to know them, as it is an important part of an Indigenous research paradigm. It has to do with relational accountability, which I will come back to later. Wilson (2008) points out the difficulty in presenting a circular reasoning in a linear written form. Neither a conversation nor a process of getting to know one another has a linear form, and additionally most Indigenous cultures are oral in character. However, to stimulate boundary-crossing between Indigenous philosophies and Academia, the written, linear form is the expected mode to use as a boundary-crossing practice.

I am Sami, which is the Indigenous peoples of Sweden, Norway, Finland and Russia. We are in minority in most of our traditional areas, not to mention the states we live in. On top of that, we have spread out and moved into towns and cities like most other people in the Western world, maybe to a larger extent, due to discrimination and assimilating politics and policies. "Subtle forms of colonialism", as commented by Kuokkanen (2000) "have made many Indigenous individuals devalue their own culture and anything that is connected to it" (ibid, pp. 412). The number of Sami is today unknown since the Nordic countries do not keep ethnical records. Besides that, an unknown number of Sami have hidden, and still hides their background (or are unaware of it) to avoid discrimination and racism. Even though my mother never hid her background or expressed any shame and I always have felt proud being Sami, I spent my first six years in school in a majority context without any Sami peers, surely 'colonizing' my mind in ways unknown to me.

As I became a teacher later on, I often started my lessons by writing 'Knowledge is power' on the white board. I never reflected any deeper on the philosophical underpinnings behind the concept, but rather thought of it as an instrumental thing. As a new doctoral student, you learn what it is to be a researcher through ontological, epistemological and axiological (the part within philosophy dealing with values), mainly ethical considerations, leading to methodological choices, finally creating a research design. All of these aspects have built-in power making some parts of the research appear and others to stay in the background. Methodological choices are therefore not neutral but loaded with power. Alternatively, as Lather (2006) puts it "science is not the same in all paradigms in terms of ontology, epistemology and methodology" (from the note to Table 1, pp 37, italics in original).

Aim of the paper

This paper is an outline of important findings concerning the philosophical underpinnings in an Indigenous research paradigm, with methodological implications for my PhD study on remote, 1-9 Sami language education. The findings are analysed in relation to concepts from the expanded theory on Communities of Practice (Wenger, 2010), aiming at creating a boundary-crossing Strategy of Inquiry. Remote here refers to education where the pupils and teacher are in different locations at the same time mediated through online devices and connections, i.e. synchronous online education. Examples presented within my doctorate programme and supporting research schools are scarce of what an Indigenous research design might look like, especially in an online/digital context. On top of that, as a Sami, to conduct research in a Sami context is not something addressed in most methodological handbooks, which is also noticed by Smith (2012) already in 1985 (pp. 228). Most handbooks that I have encountered hardly mention Indigenous, aboriginal, native or minority issues, let alone philosophical ones. The topic of the paper is also an attempt to deconstruct some parts of colonial thinking, aiming at intellectual self-determination (Kuokkanen, 2000, pp. 415) and decolonization through the process of theorising (Smith, 2012, pp. 39-41). By doing this, I am providing "a different kind of academic voice" as Lather (2006) summarizes Smith's endeavour to describe and develop a hybrid practice between Indigenous and Western ways of knowing (ibid, pp. 44).

Important theoretical distinctions

In the following, I will touch upon ontology, epistemology and axiology in an Indigenous research paradigm without separating them into different sections. Instead, I have identified some central aspects that keep

reoccurring, which sometimes are relating to both ontology and epistemology; sometimes ontology and axiology and sometimes they are impossible to separate from each other. However, first some things need to be said about paradigms and boundary-crossing.

On paradigms

According to Kuhn (1978), "A paradigm is what the members of a scientific community, and they alone, share" (ibid, pp. 294). Interestingly enough he continues with "/.../ it is their possession of a common paradigm that constitutes a scientific community of a group of otherwise disparate men" (ibid, pp. 294). By referring to scientists as men, Kuhn clearly shows that a lot has happened since he wrote this, somewhat 40 years ago and is in itself a valid argument against too solidified paradigms. More precisely, Wilson defines a paradigm as a set of beliefs about the world that guides one's actions and he is of the opinion that we have to move from talking about an Indigenous perspective to an Indigenous research paradigm. In Kuokkanen's (2000) words an Indigenous paradigm "would be a culturally specific discourse based on Indigenous peoples' premises, values and world views" (ibid, pp. 413) and she advocates a holistic perspective in research, as do Wilson (2008, pp. 32). A research paradigm would then be a set of beliefs about the world and how to gain knowledge about that world that in turn are guiding your actions as a researcher, i.e. ontological, epistemological and axiological beliefs that in turn lead to methodological choices.

However, Indigenous ways of gaining knowledge has been treated as naive, unsophisticated, primitive and inferior by Western scholars (Kailo, 1998, pp. 89, here cited in Kuokkanen, 2000, pp. 413-413). It is essential for an Indigenous paradigm to recognize other epistemologies as equal, Kuokkanen further argues. Balance is a key component in a holistic world-view, where aspects such as the spiritual and the material, body and mind are not separated into two different entities as in the traditional Cartesian dualistic approach (Kuokkanen, 2000). Digging deeper into what characterizes a Western, often Cartesian worldview, we find the fragmentation of human knowledge and the importance of distancing oneself from the research object, just to mention a couple of things (ibid, pp. 413). Paradigm proliferation has made academia more inclusive, representative and accessible, which is highlighted as a good thing by Lather (2006), who argues that it offers a "move away from narrow scientism and towards an expanded notion of scientificity more capable of sustaining the social sciences" (ibid, pp. 47). I propose that when planning and conducting research a paradigm proliferation would make it easier for doctoral students to "locate themselves in the tensions that characterize fields of knowledge" (Lather, 2006, pp. 47).

Boundary-crossing

When learning theory expands outside of specific domains and focus on the potential continuity across boundaries, the terms boundary-crossing and boundary objects have become central concepts (Akkerman & Bakker, 2011a; 2011b). Boundary-crossing as used in situated learning theories on communities of practice (Wenger, 2010) aims at the "delicate balancing act between honoring the history of the practice and shaking free from it. This is often only possible when communities interact with and explore other perspectives beyond their boundaries" (ibid, pp. 3). Both people and objects can cross boundaries, then referred to as boundary-crossers/brokers and boundary-objects.

Reoccurring concepts within an Indigenous research paradigm

Relations and relational accountability

In Wilson's research on Indigenous psychology, one of the major differences he found between some of the dominant research paradigms and an Indigenous one was the attitude towards knowledge. Knowledge is relational, Wilson (2001) claims. Knowledge itself is nothing without the relationship between myself, the researcher, and that knowledge, whether an object or something else (ibid, pp. 177). To extract knowledge and try to contain it in tables and bar charts will transform it into something different from the contextual knowledge it came from. From the perspective of an Indigenous epistemology, there is no such thing as objectivity. All kinds of relations can be a part an Indigenous relational epistemology: between people, people and history, people and ancestors, people and ideas, people and artefacts and so on.

Relations and relational accountability are two central aspects in an Indigenous research paradigm (Wilson, 2008, pp. 7; Hart, 2010, pp. 3; Kuokkanen, 2019). There are throughout history many examples of when relational accountability has been violated by researchers and those stories are part of Indigenous peoples' minds concerning research. In that sense, my journey into life as a researcher started already in childhood. My grandfather was a great storyteller and in the summer, he told all kinds of stories, in the light of the open fire. He then shared how he could never forgive himself for showing a sacred artefact, a Sieidi, to a travelling researcher

looking for the 'true' Sami culture. When the man left, he took the Sieidi with him, now probably placed in a dusty basement at some museum in the south of Sweden. Removing the sacred artefact from its original place, can be seen as a symbol of the kind of disrespect my relatives, myself and other Indigenous individuals and groups repeatedly have had to endure throughout history. There are more examples, both from my own family and other Indigenous contexts and this anecdote only serves as an example of the importance of relational accountability as a researcher in an Indigenous context, not to repeat historical atrocities. The challenge as an Indigenous researcher is about there being disconnections, as Smith (2012) talks about, between the community where lifelong relationships are shared, and demands from research (ibid, pp. 5). An example could be whether participants should be anonymous or not, which ethical guidelines stipulate. In an Indigenous context could this be perceived as an attempt to appropriate knowledge, i.e. a theft. In historical days, the research had not been asked for or had no use for the Indigenous community (Wilson, 2008, pp. 15), and maybe this is often still the case. To deal with demands and wishes from both sides is therefore the balance act of the Indigenous researcher.

Research as self-determination and decolonization

Kuokkanen (2000) talks about educational institutions as one of the major societal phenomena responsible for colonizing Indigenous peoples' minds throughout the world (ibid, pp. 412). Even though there are great differences among Indigenous peoples, which makes a joint definition hard to make, many experiences are the same. One such thing is the break of generational continuation through the practice of either removing Indigenous children from their parents by adoption or sending them to boarding schools (ibid, 2000: 413). To maintain cultural practices, such as spiritual and intellectual properties, when the main schooling is happening far away from your family and relatives is very difficult (ibid, pp. 412). My mother, who was sent away to boarding school at the age of seven used to refer to herself as belonging to 'the lost generation', which says something about how she experienced her childhood. One of my roles as an Indigenous researcher is to find the way back and forward at the same time. The described power abuse can also be seen as an example of why Indigenous research always ends up being political (Wilson, 2008; Kuokkanen, 2000, pp. 415).

According to Bernstein (2000) the role of description, is in the centre of research, where easily expressed there are two different languages interacting. In his words "a language of description is a translation device whereby one language is transformed into another" (ibid, pp. 132). The language of the researched is translated by the researcher into something, which should contain the power of redescription by the researched (ibid, pp. 139). This is closely linked to both history, writing and self-determination (Smith, 2012, pp. 29-41) as history most often has been written by researchers not being Indigenous themselves. The researcher is in this sense a translator, which is sometimes needed for relations to form, but also takes on the part of boundary-crosser or boundary-broker.

Methodology and method

Harding (1987) offers an important distinction between method and methodology and opposes that feminist research should be conceptualized as being about new research methods (ibid, pp. 2), neither is Indigenous research. Whereas methods aim at specific techniques to gather evidence, methodology is about strategies for how to proceed the research concerning theory and analysis (ibid, pp. 2), relating methodological issues to both epistemology and ontology. Methodology can also be explained as "providing the final destination in the research journey" (Wilson, 2008, pp. 39) or the process where the researchers" clarify and justify their intentions" (Smith, 2012, pp. 144).

For Indigenous research to be able to enrich social sciences, appreciating the differences Indigenous peoples have concerning not only methodology, epistemology and ontology, but also axiology is an important aspect. This can lead to research methods that align more to an Indigenous worldview (Wilson, 2008, pp. 20-21). The concept of worldview is defined as "cognitive, perceptual, and affective maps that people continuously use to make sense of the social landscape and to find their ways to whatever goals they seek" (Hart, 2010, pp. 2). The importance of creating a Strategy of Inquiry, rather than choosing methods and stick to them, is lifted by Wilson (2008) as a way of creating a flexible research design, which can adapt to contextual changes along the way (ibid, pp. 40).

For Hart (2010) Indigenous methodologies are "those that permit and enable Indigenous researchers to be who they are while they are actively engaged as participants in the research processes" (ibid, pp. 9). Instead of talking about methods, Smith uses the word 'projects', when giving 25 examples of what strategies of inquiry might look like in an Indigenous context (Smith, 2012, chapter 8). I will pick out some of them in my outline of a Strategy of Inquiry, present why they are of particular use for my study and what relational 'spaces' they share with Wenger's expanded theory on Communities of Practice.

Methodological implications

In this part of the text, methodological implications for my research design on remote, 1-9 Sami language education are presented as a Strategy of Inquiry. I have chosen from the 25 projects described by Smith (2012, elaborated explanations of them are found in chapter 8) and created a Strategy of Inquiry based on them. The projects are Storytelling, Reading, Writing, Reframing, Connecting, Networks, Sharing and Representing and I will also share how they relate to some ideas within Wenger's expanded theory on Communities of Practice.

Strategy of Inquiry

The basic assumption behind the strategy is that remote education is a realisation of a pedagogical practice (Bernstein, 2003), a practice produced by those engaged in it (Wenger, 2010), with the potential of working as a boundary-crossing practice. When reflecting on what strategy of inquiry to adopt, and aligning that with an Indigenous research paradigm, I am at least trying to minimize the risk of "/.../ unconsciously, perhaps consciously in some cases, leading other Indigenous peoples down the path of internalized oppression" (Hart, 2010, pp. 11). The theory on communities of practice (Wenger, 2010) align well with an Indigenous research paradigm. Wenger (2010) emphasises the relational and contextual aspects between the individual and the social community of practice, where learning is "becoming a certain person—a knower in a context" (ibid, 2010, pp.2). However, if emphasising "a social person in a social world" (ibid, pp 1), we end up moving away from an Indigenous worldview. In an Indigenous paradigm not only the social and the individual constitute each other, but all relationships. 'The World' constitutes of e.g. nature, ancestors and spirituality in addition to human beings. When learning e.g. handcrafting you are encouraged to consult, not only more experienced practitioners, but also the material, other similar objects and your own preferences. I.e. participation in a practice is important, but there are more aspects to take into consideration.

Information about Indigenous peoples have often been transferred through traveller's tales. Smith (2012) puts forward that Indigenous peoples themselves have other stories to tell. The strong oral tradition within many of the Indigenous groups around the world is of great importance in creating a certain epistemology. Today stories told by, especially elders and women is a common feature within Indigenous research (ibid, pp. 145). By telling stories, relationships are formed between e.g. the past and the future, people and nature and between one generation and the next (ibid, pp. 146).

The stakeholders in remote education are scattered all over Sweden, connected through online devices and tools. These tools can facilitate communication between them, with the possibility of connecting, sharing, discussing and building relationships without the constraints of time and distance (Embury, 2015, pp. 533-534). Shared documents such as wikis stretches Indigenous story telling from being mainly oral to also include reading and writing. Through happenings: writing sessions, talking circles, film making or where "the context is the self in connection with happenings, and the findings from such experience is knowledge" (Hart, 2010, pp. 8), a shared story about remote education can facilitate Networked Learning. Happenings can also tap into many of the projects suggested by Smith. A story about remote, Sami language education could bring the different stakeholders in remote education together in creating a shared understanding of the different aspects of this mode of education. By connecting people, allowing discussions and sharing that in turn forms new relationships, i.e. networks (ibid, pp. 534) new knowledge is gained. Networks in turn, are important in empowering Indigenous peoples. According to Smith, networks are "about building knowledge and data bases which are based on the principles of relationships and connections (Smith, 2012, pp. 157-158).

An important feature of an Indigenous epistemology and axiology is sharing (Smith, 2012, pp. 162), something also highlighted as an important aspect by Wilson (2008): "/.../ as I was listening I was learning, and as I was learning I was sharing" (ibid, pp. 131). The researcher is a part of a growing relationship, where relational accountability to what is being researched and to the community involved stipulates that findings should be continuously shared with the stakeholders. Smith (2012) claims that this is a responsibility researchers have towards Indigenous peoples due to the failure in providing proper education, a former hostile attitude towards Indigenous knowledge and keeping people informed properly (ibid, pp. 162). As an Indigenous researcher, I am also expected to demystify research. By working like this, I also assure that Indigenous peoples, in this case Sami, are represented with a true opportunity to offer solutions to possible dilemmas within remote Sami language education (ibid, pp. 152). By taking control over how Indigenous issues are presented, discussed and approached this study also contributes to a reframing of Indigenous matters. What is in the foreground, what

complexities exist and what parameters are to be considered (ibid, pp. 154)? The answers to these questions are preferably pursued together with the stakeholders.

Conclusions

When taking part of thoughts presented by other Indigenous, and in particular Sami researchers on the notion of ontology, epistemology, axiology and methodology, I finally understand where my strange "gut feeling", that has followed me throughout the first year of my doctoral studies, originates. As you probably know, gut feeling is not considered a reliable research method. However, within an Indigenous paradigm, this would rather be described in terms of intuition, which is part of an Indigenous epistemology (Cordero, 1995, cited in Wilson, 2008, p. 55). Graduate courses on the topic of ontology and epistemology have left me with questions and unease, rather than answers and confidence. Today I understand that I have not felt related to or represented in the content of those courses.

Within the field of Technologies in Education, the research rests on a technological optimism that seems to dominate the field (Player-Koro, 2016). There is no doubt digital technologies carry the potential of supporting learning, networking, collaborating and so much more. However, there are no guarantees that this actually happens without a strategy promoting these features. If a technological optimism together with a pragmatic approach form the basic assumptions in a research study on e.g. remote education, possible discriminatory practices or power imbalances are in turn hard to discover. These are areas where an Indigenous research paradigm and this kind of Strategy of Inquiry can proliferate the field. By creating a boundary-crossing Indigenous Strategy of Inquiry, the PhD study on remote, 1-9 Sami language education provides a boundary-crossing object to the field of Networked Learning, as well as Digital Technologies in Education.

This paper leaves the question of methods open, even though some are mentioned as examples in the Strategy of Inquiry. The reason for this is that the participants of the study have their saying on the matter. The important feature I want to carry with me, and try to find acceptance for, is storytelling as a Strategy of Inquiry to learn more about remote Sami language education. The story can be created through a series of happenings, such as writing sessions through shared documents, talking circles in Zoom or some other conference system. A survey answered by teachers, parents and pupils, where the results are analysed in one or more of these happenings is also a possible way of creating a shared story that strengthens the networks and relationships between the different stakeholders. What I propose here is absolutely found elsewhere and might go under different names depending on the paradigm framing the study. However, to be able to choose discursive framing of a research study is an important part of self-determination and decolonization within Indigenous research.

Due to the emphasis on accountability, identity and participation, Wenger offers interesting possibilities for further informing both this Strategy of Inquiry as well as my PhD study at large. Identification with a community of practice is highlighted as a key feature for accountability. "The regime of competence of a community of practice translates into a regime of accountability /.../ when you don't identify with a practice you don't feel accountable" (Wenger, 2010, pp. 6). This might serve as an explanation to why the sacred artefact, the Sieidi, has not been returned. Whoever is in the possession of it is unaware of the fact that people still miss it at its original site, a lack of relationality leading to a lack of accountability. Another aspect of particular interest is the notion on becoming a certain person where the practice has to enable such becoming (ibid, pp. 3). What kind of identities are the stakeholders involved in remote education developing and how does this mode of education enable that becoming? A reasonable assumption is that e.g. the pupils are expected to become active Sami language users outside of the educational practice, i.e. cross the boundaries created in this particular practice (Wenger, 2010, pp. 3), sometimes a conflicting process (ibid, pp. 4). Engagement, imagination and alignment are mentioned as working both inside the practice and across boundaries. There is, however, a risk of wasting time as competence is not well defined when working within boundaries (ibid, pp. 4-5).

Making sense of both the system and our position in it is necessary when broadening our perspective, a contribution my PhD study aims at offering.

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Understanding meaning-making through technology use—a multimodal layer perspective

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Abstract

Previous research has highlighted that technology implementation in schools may lead to increased complexity, as digital hardware and software offer a variety of possibilities for sign-making activities. Moreover, recent studies argue that since classroom practices are facilitated increasingly by screen-based activities, digital technology opens a multitude of ways to represent meaning, as an abundance of sign systems becomes available for communication through various digital visual user interfaces (DVUIs) (Jewitt, 2017). In addition, research indicates that technology implementation has a strong impact on school practice (Säljö, 2013) and that knowledge on how to take advantage of technology in learning settings from a more comprehensive perspective is needed (Bezemer & Kress, 2016). To gain a more comprehensive picture of technology use in educational environments, the main goal of the thesis is to explore the use of hardware and software by teachers and students in sign-making activities from a multimodal layer perspective. The main aim of this paper is, in particular, to discuss how multimodal methodology can be used to explain detailed aspects of technology use in networked learning (NL) settings. Concerning the various means used in school and their affordances in semiotic mediation (Norman, 2007; Wartofsky, 1979), all are considered in relation to the users and results of use. From a technology perspective, the multimodal layers, therefore, include things-to-things, things-to-human/human-to-things and human-to-human connections (Bonderup Dohn, Cranmer, Sime, de Laat and Ryberg, 2018; Goodyear, Carvalho & Bonderup Dohn, 2014) and focus on technologies, communication resources (i.e. sign systems), representations and activities. The technologies and their functions are therefore regarded as important. In addition, the multimodal layers relate to the semiotic properties of technology, how they inhere and prompt sign systems in different ways as interpreted by the actors and are reshaped into modes of representation in different activities. The conclusion is that multimodal methodology, particularly the multimodal layer approach, seems to be beneficial to unpack the relationships and connections between the means used and the actors in NL environments via its coherent approach. A greater understanding of the detailed aspects of technology use in teaching and learning may also be obtained if the existing multimodal layers are accounted for and connected. Insights can guide stakeholders on how to integrate technology in future practices and inform technology choices in relation to specific activities.

Introduction

This introductory part of the text will describe the theoretical frameworks that form the basis for the thesis. Thereafter, methodological considerations will be presented, as well as examples of data and results offered by the multimodal layer approach. The text ends with a discussion and conclusions.

The problem the author tries to find solutions to is the inattention in contemporary research to a comprehensive understanding of *meaning-making through technology use* needed to truly identify the many aspects that work together in a learning environment. Hence, the purpose of the thesis is to give detailed insights on the use of technology by teachers and students in sign-making activities in educational settings; or, more specifically, to provide information on technology use based on the development of a framework called multimodal layers that can provide insight into the complexity of networked learning (NL) settings and help inform stakeholders on how to choose and use technology for meaning-making. The research question that guides the thesis is: From a

multimodal layer perspective, how are digital hardware and software used by teachers and students in sign-making activities? The empirical studies are intended to inform and develop the framework of multimodal layers by applying it in investigations and by offering understandings of meaning-making through technology use by a comprehensive approach that encompasses all salient components in the use of DVUIs. This paper discusses some approaches that will be used in case study research strategies, such as data collection instruments and methods for analysis in relation to the proposed framework.

From these starting points, the project includes a meaning-making and a technology focus. The focus is on understanding meaning-making through the use of technologies by teachers and students to guide future strategies for technology selection and use. From an NL perspective, the multimodal layer approach is used to connect all components defined as salient in an NL setting by its comprehensive focus on things-to-things, things-to-human/human-to-things and human-to-human connections (Bonderup Dohn, Cranmer, Sime, de Laat & Ryberg, 2018). Hence, the multimodal layer framework will be used to understand the conflations between technologies and sign-systems (DVUIs) and between teachers and students and DVUIs (Bezemer & Kress, 2016), and add to existing NL understandings by illuminating the connections by focusing equally on meaning-making and technologies. The multimodal layer approach will contribute with a detailed perspective that considers not only how various components are connected, but also how differences between technologies encompassed by hardware and software are jointly configured in use from their functions and visual properties (such as sign systems) and how teachers and students make meaning in use from their features. From that point of view, and in line with NL research, *meaning-making through technology use* is regarded here as a circular activity—from the technologies' prompting of functions and sign systems conflated with humans' representations, to the signs of meaning made. These contributions to understanding the intricacy of NL settings will be further explained below.

Theoretical alignments
To illuminate the details connected to meaning-making through technology use, a set of theoretical frameworks will guide data collection and analysis and be briefly accounted for in this section.

The overall sociocultural ontology used in the thesis can explain the foundations of meaning-making through technology use in school settings. The initial ideas focus the intimacy between two focal components: humans and artifacts. Mainly from the philosophical idea that artifacts are vital to us—so important that they evoke emotions, memories and stories and are used as a means for work, thinking, communication and learning (Säljö, 2013; Vygotsky, 1978; Wartofsky, 1979). Following Wartofsky (1979), both physical (objects) and intellectual production (speech, writing and other sign systems) and the activities through which they come into life are examples of artifacts and how meaning is made in the world. Such ontological arguments can be applied when understanding technology use in today's educational environments, for instance, to view technologies as important objects, how they are important, and the multiple sign systems they bring about in meaning-making practices (Selander & Kress, 2017). On one hand, these claims emphasize the non-dualism between humans and the artifacts they use to make meaning. The claims also put the focus on technologies and sign systems as vital for human existence, both fixed into physical artifacts and communicated in real-time activities. Hence, both technologies and sign systems have major impacts on learning environments through their connections and conflations with humans and through their various affordances and constraints on meaning-making activities between people (Gibson, 1986; Norman, 2007; Kress, 2017; Selander & Kress, 2017).

Understanding the link to and importance of artifacts in human meaning-making as these theories emphasize is significant. The theories help us explain why instrumental technology use proven by recent studies to exist in school and associated with tech takeover (Kervin & Mantei, 2017) or gift wrapping (Fischer, 2018) might hinder meaningful technology use. Second, these pediments have implications for how technology implementation and use in learning settings must be understood, because the use of technologies and sign systems (DVUIs) is not a random enterprise. Choices based on understandings of which one, how they were manifested and designed and what limitations and possibilities humans find in them for sign-making activities is crucial for future successful use. Third, since technology use is not an arbitrary practice, and according to these founding arguments, all "artifacts" are regarded important and are connected within themselves and to humans, why has research to date partially regarded some technologies (e.g., software) and sign systems (e.g., language) as more important (Schnaider, Gu & Rantatalo, 2020, unpublished manuscript) and almost completely disregarded others? In particular, how are technologies and sign systems jointly configured in use? Hence, studies need to take all salient components into consideration when using DVUIs from a detailed and connected perspective, such as hardware and software and the sign systems they inhere and evoke in humans, represented in different activities. Stressed by, for instance, Ravelli & van Leeuwen (2018), it is vital to understand how various types of digital hardware function, how they prompt sign systems and how they configure the software and thereby change how

software is displayed. The impact is on the sign-making activities and what meaning can subsequently be made. From these starting points, an NL perspective that focuses on a non-dualistic view of meaning-making through technology use that includes all aspects that work together in and around DVUIs is important, here encompassed by the multimodal layer approach.

The multimodal layer approach

The thesis is intended to unravel detailed aspects of meaning-making through technology use, perspectives highly sought in research on IT and learning (The Swedish research council, 2019). In the epistemology of social semiotics and multimodality, various detailed aspects that integrate the non-dualism of humans and artifacts are taken seriously (Bezemer & Kress, 2016; Jewitt, 2017) and will be the theoretical lens though which knowledge can be gained in the thesis. The multimodal layer framework puts focus on the connection between technologies, sign systems and human's representations in activities, and relate technology landscapes to the adoption of strategies to access detailed components in meaning-making practices (Jewitt, 2008; 2009), highly needed to properly understand technology use in classroom settings. With the increasing entry of digital technologies in school, there have been a gradual replacement of books with digital technologies. This change means that the world went from being described (through language) to being visualized (by screens and other modes in combination) (Kress, 2010). As such, DVUIs are perceived and interpreted from their features, emphasizing the visual.

Although the aforementioned theories stemming from the sociocultural field of knowledge have the power to explain phenomena and properly illuminate the relevant object of knowledge—meaning-making through technology use—these theories lack insights on how to apply them easily in combination to comprehensively understand the technologies, prevailing sign systems and human representations in activities. These theories also fail to clarify how the components of DVUIs are linked and how they can be explained from their various connections in representations and activities. Hence, there is a knowledge gap in both research and practice on how to analyze technology use from a comprehensive perspective that encompass the technologies and the meaning-making practices, something that the multimodal layer perspective attempts to cover.

The concept of multimodal layers is derived from the notion that the digital world is multimodal per se (Jewitt, 2017) and gets extended to explain meaning-making through the use of technology by teachers and students, not only taking into account the many modes of representation (Kress, 2017). The framework is developed through and applied to empirical studies to provide a detailed perspective of these phenomena. At the same time, it is intended to unravel the complexity and existing opportunities that digital technologies bring to learning settings by connecting all salient components related to the specificity of the activity. As such, the multimodal layer approach strive to explain technology use by including five components for analysis; *technologies*, technologies' *functions*, technologies' *semiotic properties*, the *modes of representation* and *activities* (Bezemer & Kress, 2016; Ravelli & van Leeuwen, 2018), additionally explained below.

The layers

In this section, the five layers are briefly explained and exemplified:

- *Technologies*: As important objects (Wartofsky, 1979), all digital technologies, hardware and software together, compose the DVUI that teachers and students encounter in meaning-making practices. Based on things-to-things connections, hardware and software are important to regard both separately and jointly, especially from a visual point of view in relation to sign-systems. This means that the thesis is delimited to regard only visual entities in the use of hardware and software and does not consider the hardcore technical functions that work behind the scenes, or the fact that hardware also needs software to operate and vice versa. This delimitation is also of relevance to the division into hardware and software made in the thesis—they are visually separated and connected from how they display different functions and semiotic properties (sign systems see below), and the displaying of software changes with combinations of hardware devices (Bezemer & Kress, 2016; O'Halloran, 2013; Ravelli & van Leeuwen, 2018). A simple example of that is the visual difference between using a smartphone and a laptop with an Outlook calendar. Some of those differences exist in the visual functions of the hardware, such as the accessories, screen and physical/virtual keyboard, as well as their semiotic properties such as the size and shape. Regarding software, the functions for adding activities on a smartphone or a laptop address—for instance, the functions of touch and navigation with the cursor and semiotic properties of colors, lines, spaces and framing—are altered between and within these technologies, impinging on the interplay between them and, in the end, the meaning made (Ibid.) Meaning-making through technology use will, therefore, be investigated at the intersection of and configuration between hardware and software as constituitive of DVUIs from a visual point of view.

- *Functions*: This aspect is linked to technologies' technical functionalities as visually perceived. For instance, that the Enter key is used to confirm requests or to make spaces, a new post is added in an Outlook calendar by double clicking in the framed space of a specific date or that the slide bar zoom-function in a program can alter the size of what is displayed.
- *Semiotic:* These properties are related to technologies' inherent sign systems (modalities/semiotic resources, Kress, 2017) and are intimately, visually connected to the layer functions (cf. things-to-things). For instance, the function of the hardware screen to display simultaneously determines the size, framing and space of what is displayed, hence the semiotic properties.
- *Representations:* From a non-dualistic perspective, humans make representations from their various conflations with the world as signs of what kind of meaning is made. In technology use, these representations are made when prompted features gets interpreted by individuals and come about in activities, explicating the affordances of the technologies (Gibson, 1986; Norman, 2007; Kress, 2017). Hence, humans interpret what they experience and perceive as important in handling technology and sign systems, integrating these actions and impressions into cognitive processing (Kress, 2010). Some of the thoughts, emotions, etc. are expressed externally by different outputs that refers directly to the context in which the meaning was made (Kress, 2010; Vygotsky, 1978). Hence, to understand meaning-making through technology use, it is reasonable to ask which of these prompted features led to the specific representation. Representations are made visible to humans through actions and semiotic resources/modalities, such as colors, lines, spaces, shape and size, speech, gestures and images (Kress, 2017).
- *Activities:* Representations are arranged together with technologies and sign systems in higher-order actions, called activities, and configured in various ways depending on the context, subject and discourse (Norris, 2014). In terms of discourses, a math lesson would have a specific set of material and intellectual resources, while a lesson in physical education would involve others.

Methodological considerations—theoretical frameworks and case study strategies

This section of the paper provides a summary of research strategies, data collection instruments and methods linking them to theoretical frameworks in a coherent methodological structure. The description is intended to clarify how the detailed aspects of NL can be elucidated from multimodal strategies.

To get comprehensive insights on meaning-making through technology use from multimodal layers, the actors, technologies and contexts are of great importance. Since the main point of the thesis is to describe, explain and understand through in-depth investigation, the case study research strategy will inclusively approach the object of knowledge from two important case study ideas: the *contemporary phenomena* of technology use and *real-life settings,* such as school. Empirical studies will be focused on three cases constituted by different primary schools and several units of analysis—one student and one teacher in each school (Aspers, 2011).

Case study research consists of exploring *how* phenomena work*,* and the main focus of this thesis is to explore how technologies are used and form implications for the researcher during data gathering. Hence, the researcher does not set out to control or influence the object of knowledge but instead places the researchers in the study context with methodological tools, such as video recordings, observations and interviews (Norris, 2015); associating these aspects with a case study strategy allows the formation of comprehensive descriptions of people and objects in their settings (Aspers, 2011; Jensen & Sandström, 2016). Triangulation is common in a case study strategy, involving the use of several data sources, data collection methods and theoretical perspectives, here linked within the framework of multimodal layers.

The social semiotic multimodal approach emphasizes a range of factors, such as technologies, sign systems, representations and activities. Its methodology, therefore, extends and reshapes what is possible in retrieving and analyzing data, as it embraces all aspects (Jewitt, 2009). In line with case studies and research aims, the goal is to get a picture of the possible variations that exist at the intersection of various layers while developing the multimodal layer framework. In recognition of variations, it may be possible to detect trends in use; for example, if specific layers are addressed frequently or specific technologies or sign systems are present in particular activities and representations. Thus, from the notions of layers, the main focus of the case study approach is to gather qualitative data and, using mapping methods, pair teachers' and students' actions and activities in the use of technologies to the specificity of the technologies and sign systems used.

Sampling and data gathering instruments

For starters, something brief must be mentioned about the sampling procedure. Purposive sampling will be made from 1:1 classrooms and teachers and students who are experienced in managing digital technology on a daily basis. From the idea that various types of hardware matter and to get a broad representation of different technologies, classrooms that are representative of different types of 1:1 technology (hardware) are important. This means that data collection is based on the use of hardware (laptops, tablets and smartphones) as an independent variable and on different settings and subjects. Due to the huge amount of data that the proposed research strategy can provide, three students and three teachers will be selected as representative users of the appointed hardware technology.

Video recording will be used as a data collection instrument because it can capture detailed aspects associated with NL environments. The visual mode of video recording can depict interplay with technology and, together with the functions that allow the viewer to review the material repeatedly, allow the researcher to obtain multimodal data. It is important to make decisions on whether to use two or more cameras before the actual recording; for example, one that takes in the whole environment and one that targets something specific—the placing of the cameras is of great importance (Jewitt, 2009; Kress, Jewitt, Ogborn & Tsatsarelis, 2014; Norris, Geenen, Metten & Matelau, 2015).

Video recordings can be linked to other data successfully from observations and interviews (Bezemer, 2015). Although everything that happens in a classroom cannot be captured, transcribed or analyzed, systematic observation notes from multimodal layers can be used to clarify and add information to the video recordings. In addition, semi-structured interviews can establish teachers' and students' thoughts on the specificity of the used technologies in relation to what representations are made in activities (Aspers, 2011). The interviews can be done individually with informants while video recordings are reviewed. This method requires several pre-selected episodes from which the interview guide can identify the use of technologies based on multimodal layers. For example, how are the technologies in use configured based on the goals of the activity? What functions of the technologies (hardware and software) were important and how did they support the user? What role did the semiotic property of ... play in representation ...?

Data analysis

In line with the case study strategy, data analysis will focus on how technologies are used by teachers and students from the theoretical framework of multimodal layers and through methods for mapping and pairing data from the content of the text-based transcripts (Silverman, 2006). From a parallel coding process of data obtained from the three cases, transcripts of video recordings with recorded sequences, transcribed observation notes and interviews will be analyzed in qualitative data analysis software from the following categories: settings, users, hardware/software, technologies' functions, technologies' semiotic properties, representations and activities. The advantage of such a procedure would be a comprehensive recognition of detailed aspects salient in technology-rich educational settings.

The following concepts can shed light on the categories for analysis:
- Configuration, foregrounding and backgrounding in interplay (Norris, 2014, adapted to technology use) can help analyze the importance of the technologies, their functions and semiotic properties and how they come about in interplay in specific representations and activities.
- Semiotic resources and modalities (Björkvall, 2009; Kress, 2017; van Leeuwen, 2005) help analyze the semiotic properties of technologies as well as the representations made by individuals.
- Production and consumption (Kress & van Leeuwen, 2001; Kress, 2010) help analyze overall activities in learning design and sign-making activities.

Expected findings

This section exemplifies how a mapping method could be used to analyze data and how data can be paired based on the idea of multimodal layers (see table 1 below). Fictitious data exemplifies the layers, the mapping and pairing research design and data-gathering instruments based on an image, connecting two students' uses of technologies in an NL environment.

Table 1: Example of multimodal mapping

Transcriptions:	Snapshot:	Video recording:	Observation notes:	Interviews:
	Picture retrieved from: https://pxhere.com/en/photo/619706	Students talking about the story while pointing at the screen while inserting an image into the essay.	Students used the semiotic property (the size of the screen) and the zoom function to highlight a part of the essay while connecting it to the image.	Students particularly emphasized that the actions that took place in discussions involved the screen display. The colors were important in highlighting parts of the text to get a cohesive story.
Multimodal layers:	**Participants/ actors:** Student to student.	**Technologies:** Desktop computer, animation software.	**Functions and semiotic properties:** Using the screen to display joint content, keyboard for typing of text/navigation with hotkeys and zoom. Inserting and drawing functions in software, such as the toolbar, to change colors and layout. Semiotic properties: Size (screen), framing and lines (software).	**Activities and representations:** Production of a multimodal essay in sign-making activities. Modalities: Speech, gestures, images, layout and text. Semiotic resources: colors, framing and space.

Results

The goal of mapping data and pairing the multimodal layers that are salient in NL settings is to understand meaning-making through technology use by teachers and students from a comprehensive, detailed perspective. Hypothetically and with a little imagination, mapping from a video-recorded snapshot of interplay in a specific learning environment can illuminate a collaborative activity involving students' coproduction of a multimodal essay. The students engage with DVUIs from the functional advantages of the desktop computer screen and a software animation program to display shared representations, especially with the help of the zoom function. These functions are foregrounded in use with the software insertion functions. The semiotic properties connect the hardware and the software in use, such as the screen's framing properties and the zoom function that resizes what is displayed, to the other semiotic properties of the software, such as lines and spaces. To represent their thinking in signs, students used the modalities of speech and gestures to negotiate the visual semiotic resources represented in the layout, such as colors and text. These functions/properties and representations can be seen as a higher level of configuration and are therefore more important in relation to this specific activity.

Discussion and conclusions

The case study research strategy and the data collection instruments described above enable in-depth, detailed data on multimodal layers. Proposed strategies and instruments will most likely render an enormous amount of data that is difficult to handle, therefore, making the research difficult to manage from time to time. On the other hand, the limited number of participating informants can resolve this challenge to a certain extent. Due to small sample sizes and the situated nature of the obtained data, the generalizability and transferability will be

deliberately downplayed (Aspers, 2011; Jensen & Sandström, 2016). By selecting appropriate data collection instruments, such approaches can still affect reliability, even if they are considered and built into the research through the development of detailed data coding schemes and categories for analysis based on multimodal layers. Validity can, on the other hand, be discussed in terms of a coherent methodological approach offered by theoretical frameworks, strategies, instruments and methods tried and frequently used in multimodal research and renewed in this research by the multimodal layer approach. Suggested methods can also help the researchers stay close to the goals of the research in data processing through iterative processes (Cutajar, 2018). However, as the multimodal layer approach is used to clarify the complexity of NL settings, a strong focus on a specific set of theoretical perspectives may prevent or restrict a researcher from thinking differently and lead to a one-sided focus on certain starting points (Eriksson Barajas, Forsberg & Wengström, 2013).

From the above mapping method, it becomes apparent that by mapping and pairing the multimodal layers in analysis, one can gain a comprehensive understanding of things-to-things, things-to-human/human-to-things and human-to-human connections in activities from a visual point of view (Bonderup Dohn, Cranmer, Sime, de Laat and Ryberg, 2018; Goodyear, Carvalho & Bonderup Dohn, 2014). This would be a contribution to NL research and a perspective sought in the thesis in order to understand meaning-making through technology use. By paying equal attention to both meaning-making and technologies, as portrayed in the example above, details are unraveled and connected by focus on students' choices regarding technologies and sign systems constituitive of DVUIs based on their need to represent meaning in sign-making activities (Jewitt, 2009). From a non-dualistic perspective that regard all "artifacts" as equally important, it becomes apparent that by mapping and pairing layers, certain functions and semiotic properties in these specific technologies supports and is considered more important in relation to certain representations and activities (Norris, 2014). Moreover, there will probably be a rich variety of combinations when technology use is mapped and paired in the proposed way. The multimodal layer perspective will undoubtedly also highlight certain patterns or trends in use. On the other hand, how the detailed aspects provided by this framework through combinations of pairing can provide a clearer understanding of technology use remains to be elaborated and developed, one aim of the thesis. Hence, further investigation is needed into how new knowledge can be obtained on meaning-making through technology use by teachers and students in sign-making activities from a multimodal layer perspective and how such a framework can be used more successfully. New knowledge might also be able to guide the future use of technologies in NL settings. If these insights reach stakeholders, they may also prompt questions, such as: If other technologies and functions had been used instead, how would they support representations and activities differently? From these ideas, sign-making activities can benefit from a learning design in which the multimodal layers are considered initially and throughout the process in relation to desirable results. Hence, increased awareness of the importance of various technologies and sign systems to meaning-making processes can guide choices of which to use and how to use them.

The author of this paper suggests that there is no middle way to fully understand the interconnected nature of meaning-making through technology use and the intricacy of the rhizomatic networks that educational environments entail. Therefore, if a multimodal layer approach is applied in research and practice, new and comprehensive findings can be made and new strategies for use can be applied in education, insights that can possibly also inform design of new technologies.

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Researching adequate digital competence for school leaders from a perspective of pedagogy

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Abstract

The paper is begun with an outlining of two pedagogical principles that carry specific weight into research aimed at understanding digital competence in schools in general. Networked learning is exemplified in terms of connecting teachers and learners through remote teaching in rural municipalities. The specific research focus of the PhD project is on the knowing that individuals in schools need to facilitate digitalization. After the pedagogical principles are described, their weight is then considered in regard to research on digital competence and school leadership. A particularly complex issue discussed in the paper is that digital competence is in substantial ways a politically driven concept, rather than primarily pedagogical. A reconceptualization of digital competence for school leaders is suggested for pedagogical research: focus on knowing when it happens on pedagogical terms, rather than on knowing about implementation in schools. Remote teaching in rural municipalities is argued to carry pedagogical objects of specific relevance for pedagogical research, where the focus need not be on implementing, or effects of implementation. Rather, the knowing that is argued to be required to make remote teaching happen in rural municipalities may have pedagogical knowing of digitalization in schools as a foundation.

The paper is concluded, firstly, with a section reflecting on what the pedagogical objects suggests for research design. Secondly, with what the pedagogical principles suggests for methods and methodology, specifically regarding politically charged concepts such as digital competence. To the former, a case study research design is suggested to find difference and variance in the knowing of making remote teaching happen. To the latter, reflection about the process of bringing theory and frameworks into practice (methodology) is suggested as one key in relation to the principles. Another key point of reflection is on the assumptions that specific methods, theories and frameworks themselves carry.

The relevance of the pedagogical principles in relation to networked learning, and research focusing on digitalization in schools in general, is primarily as a reflective communicative tool. By bringing to the front basic values on which knowledge ought to be built on, in a research discipline such as pedagogy, other values are made invalid. One effect implied through present paper is that, In a PhD research project such as the one presented, research discipline disciplines. Both concerning research subject, as well as bringing assumptions into practice in research design and methodology.

Keywords

Pedagogy, digital competence, school leadership, research design, methodology

Starting with pedagogy

A perspective of pedagogy has some pre-existing approaches to research. First, in terms of power, steering, governing, and other interrelated (democratic) concepts, pedagogy is on the side of the individual with little power rather than the individual with much power; on the side of the individual rather than on the side of the system. Research aiming to understand democratic concepts, however, needs to focus on both, because to change relationships between individual and system, or powerful and powerless, happens from both ends. Second, and interconnected, is that, ultimately, pedagogy is about understanding things so that bad things can be changed for the better, whether in schools, families, professions, and so on. These two points are inherently normative, principal, historical, traditional, and not subject to revision or change. If research claims a perspective of pedagogy but does not do this, it is the research that is revised or changed, not pedagogy. We can call this approach the first pedagogical principle, and it is a democratic principle.

The – here argued to be – second pedagogical principle concerns on what ground change itself should be built on. A perspective of pedagogy, being unavoidably normative, assumes that the ground of any change is an understanding of the first principle. Pedagogy, however, being carried out by different systems of individuals – groups of researchers – has different theoretical tools associated with them that are anchored in the history and culture of the particular system. As long as these tools are based on the first principle, everyone should get along. This is not the case, of course, since there are other things than principles involved with human living in general, and work relationships, perhaps, in particular (e.g. prestige). This complexity aside, when those of pedagogical perspective argue for a specific change, they have to argue for the change based on some specific theoretical understanding that substantially coheres with some pre-existing system (cf. coherence justification in Lammenranta, 2004). For example, Peirce, James, and Dewey can be seen as representing a pragmatic system (cf. Barrow, 2010) that those of pragmatic pedagogic persuasion may want to refer (cohere) to (with) when arguing about teaching and learning based on experience, or why their particular pragmatic persuasion is a development to the system.

There is much left unsaid about pedagogy as a research discipline (not to mention democracy) but these two principles alone carry very specific implications in research design and methods. The first principle implies a critical approach to democratic values when conducting empirical research, the second implies that concepts that are shared by many, such as digital competence, should, really, be understood from a perspective of pedagogy when in practice. I have introduced these principles here to explain the normative base that feeds into my decisions concerning why some research design and methodological considerations are taken rather than others; why some things cannot be considered valid from a perspective of pedagogy.

Research project description

The collaborative research project wherein I am a PhD student has a frame. The project is called *Adequate digital competence for school leaders*, and what I am supposed to research, or in the end have something knowledgeable to communicate about, is just that. In terms of collaboration, one party is a university, one a private company. In terms of research design and methods, this carries no specific weight. In terms of direction of my research, however, it carries much weight. A general assumption about adequate digital competence for school leaders that influences collaboration within the project is that a) digital competence is something that can be implemented on school leaders and their organizations, and b) the school leader role entails the strategic leadership of school organizations by use of digitalization.

On the one hand, however fuzzy the concepts of digitalization and digital competence may be, and the instrumentality of approach to school leaders is in such assumptions, they reflect very well many contemporary thoughts about digital competence and school leaders (The Swedish Ministry of Education, 2017). As a frame for a research project in pedagogy such assumptions holds many potential pitfalls. However, since this is a *collaborative* research project, both parties should end up somewhat satisfied in the end, since they have equal stakes in the project. This is not an easy balance to maintain. On the other hand, given that such assumptions do exist in policy, practice and research, the need for research with a perspective of pedagogy is all the more important.

Researching adequate digital competence for school leaders

The concept of digital competence is today in many ways not understood from a perspective of pedagogy. One way is that digital competence is itself in substantial ways a politically driven concept (cf. Søby, 2012; From, 2017), which of course collides with the first and second pedagogical principle if not scrutinized. For example,

one important actor that influences Swedish school politics is the European Commission, that has its own framework for digital competence in education (https://ec.europa.eu/jrc/en/digcompedu). Seen this way, digital competence can be a policy tool that steers individuals in schools, clearly against the first principle if not critically reflected. Another way to see such a framework is in terms of implementation of digital technologies in educational organizations, and what skills and knowledge educators are said to need to do this. Here, what is important is that the technologies 'permeate' classrooms and school organizations on the whole, argued in terms of the pressing need for them to reflect a 'digital age' and not lag behind. In such cases, implementation is more important than whether digital technologies can support pedagogical perspectives on teaching and learning, clearly against the second principle.

When it comes to school leadership, there is a wealth of educational research (cf. Day & Leithwood, 2007; Moos, Nihlfors & Paulsen, 2016) and pedagogical perspectives (cf. Törnsén & Ärlestig, 2014; Svedberg, 2019). Here, the complexities regarding the second principle are in effect, and a careful navigation is important. However, in order to not break the first principle, careful attention is needed regarding what is assumed in leadership research and how it is used when researching the actions of individuals. For example, one framework for understanding school leadership could be prescriptive – in terms of what individual school leaders ought to do – and as such the framework itself, used unreflectively, could break the first principle. Another framework – like in the case of digital competence – could be first and foremost political assumptions of what school leaders ought to be doing, breaking both principles if used unreflectively.

So, where do the pedagogical principles lead methodology and research design in terms of adequate digital competence for school leaders? One consideration, so far, is that:

- Since the concept of digital competence in schools in particular carries assumptions about implementing digital technologies for the sake of digitalization/the digital age/future economic-competitive skills of people in schools in general - which breaks the second principle - a focus on what people actually do when they digitalize schools, seen from a perspective of pedagogy, seems fruitful.

In the coming section, the point above is considered in relation how to – from a perspective of pedagogy – argue for adequate digital competence for school leaders as pedagogical objects of knowledge, as well as how to empirically approach said objects in research design and methods.

The pedagogical objects

In some rural schools in Sweden, digitalization – understood as social interaction between individuals by use of digital technologies – is an essential social mechanism[1]: as remote teaching[2]. This can be viewed as a clear case of networked learning (Hodgson, de Laat, McConnell & Ryberg, 2014). In these schools, remote teaching has the possibility to bridge the challenge of long distances through connecting teacher and learner wherever they spatially may be. This challenge involves rural municipalities having long travel distances, and small populations and number of pupils. Not digitalizing teaching and learning in such cases means that teachers and learners in some subjects spend time traveling instead of teaching and learning. Moreover, for school leaders, such challenges make even more difficult recruitment of qualified personnel.

The aim of my research is to explain a type of knowing in contexts where digitalization is an essential social mechanism. In contemporary research (cf. Pettersson, 2018), policy (cf. The Swedish Ministry of Education, 2017), and practice (cf. Eriksson & Rännar, 2020) this type of knowing is called digital competence. Continuing, the aim of my research is to contribute to a more qualified understanding of this knowing for school leadership. In the case of school leader digital competence, more research is needed (cf. The Swedish Ministry of Education, 2017; Pettersson, 2018), not least with the perspective of the school leader as a facilitator of networked learning in schools.

Bringing the concept of knowing to the front, rather than that of digital competence, is one way to maintain the pedagogical principles. The assumption here being that such a knowing exists to a large extent independent of frameworks that focuses on implementation and different implementable levels of competence in individuals. In fact, the knowing of individuals may hold both pedagogical principles prior to implementing digital technologies

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[1] Collections of social processes that explain a substantial part of the activities in social systems, such as teaching and learning and leadership in schools.

[2] Digitalized teaching where teachers and pupils are separated in space but not time.

in schools, as well as qualitatively distinguishable properties in what can be framed as digital competence for school leaders (if one wishes) that are not now assumed in contemporary frameworks of digital competence. This is a serious argument for adequate digital competence for school leaders in coherence with the pedagogical principles: some knowing of individuals is independent of steering, and this knowing is pedagogical. This knowing, moreover, exists in practice. As researchers interested in digital competence, and critical to the steering aspects of implementation, we ought to research the knowing where it happens as openly as we can.

Methods and research design

The preceding considerations of pedagogical principles led to a formulation of pedagogical objects when researching adequate digital competence for school leaders. As previously mentioned, such considerations steer methods and research design.

Hence, actions taken, and beliefs about them, that make remote teaching happen in rural municipalities is of particular interest to research in relation to school leaders' digital competence. For example, individuals that are taking actions to initiate, maintain and evaluate remote teaching in rural municipalities can be assumed to have knowing specific to digitalization as an essential social mechanism in schools, and thus digital competence. Depending on which stage of initiation, maintenance or evaluation, it is reasonable to expect the knowing to vary. Also, individuals that make remote teaching happen are taking action so that activities change intentionally, rather than unintentionally, and can thus also be assumed to have knowing of organizing relevant for school leadership. As such, making remote teaching happen is a pedagogical case of digital competence for school leaders. A case study approach to research design is therefore my primary consideration at this stage. In my study, the research problem is digital competence for school leaders where making remote teaching happen in rural municipalities is one case of the problem.

Creswell (2013) approaches case studies as a methodology with a definition of

> Case study research is a qualitative approach in which the investigator explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information (e.g., observations, interviews, audiovisual material, and documents and reports), and reports a case description and case themes. The unit of analysis in the case study might be multiple cases (a multisite study) or a single case (a within-site study) (p. 97).

My approach is that making remote teaching happen in rural municipalities carries several qualitative cases in the form of different schools. Depending on the unique context of individual schools, there may be variances important to include and/or be responsive to. For example, there may be different motives why remote teaching is needed, which feeds into the way remote teaching is initiated, maintained and evaluated, which in turn could entail qualitative differences in the knowing needed to make it happen. Moreover, it is reasonable to assume that what is needed to know when initiating remote teaching is different from what is needed when evaluating. Also, that this knowing develops over time depending on how long a school has made remote teaching happen. As such, a variety of cases where the variety is different stages of making remote teaching happen seems reasonable.

Participant selection following the multiple case reasoning entails finding individuals that are at different stages of making remote teaching happen. It entails, moreover, some difficulties regarding the depth of the cases. Should as many individuals as possible in a particular school be interviewed and observed? The depth of the case would increase, but the necessary variety might be missed. Should as many different cases as possible be strived for? The depth of the case descriptions may then suffer. My plan is to start with a few principals (the formal school leader role) that are in different stages in terms of how long (in time) their school has made remote teaching happen, and develop the sampling in response to the data collected. If they are doing the same thing, more cases may be needed. If they are doing widely different things, a few cases may say much. Moreover, teachers are likely to do much to make remote teaching happen. This may be more so in small municipalities where much responsibility – not just in regard to the teaching practice – of making this form of teaching happen falls on the teacher. Hence, teachers as well as principals in rural municipalities are expected to have a knowing that can be translated into adequate digital competence for school leaders, in the case(s) of remote teaching in rural municipalities. So much for research design.

In terms of methods, I concluded the previous section with suggesting that researching 'knowing where it happens' ought to be researched 'as openly as we can'. This is a consideration necessary in terms of what theories,

frameworks – and more generally, assumptions – are *brought* into practice (methodology). Such things causes effects in terms of influence, which is problematic in relation to the two principles, and in terms of getting answers that are reliable. On a general level, this cannot be avoided at all, perhaps. If we consider the questionnaire, as in an interview guide for example, as a learning device (cf. Peterson, 2013), influence is a rule rather than an exception. As researchers, we aim to ask questions whereby we learn something qualitative from our participants. These questions, however, also effect learning the other way around. Participants learn something from the questions researchers ask, both in terms of answers somehow expected, as well as how to behave (ibid., p. 8-9). Hence, building a questionnaire upon certain assumptions will bring those assumptions into practice. A questionnaire that is based on assumptions of implementation, for example, will at best not be understood in pedagogical practice, at worst influence practice in ways that are not pedagogically principled. There are no easy solutions to this. Reflecting through the process as well as on assumptions is a method for not being accused of naiveté, at least.

In conclusion, bringing the first pedagogical principle into considerations regarding methods and methodology means that theories and frameworks in practice ought to focus both individual and system, be critical to powerful and sensitive to powerless. Bringing the second pedagogical principle into such considerations means that the theories and frameworks accord with history and culture that is pedagogical. Again, as long as the second principle builds on the first, all is well in theory.

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Round-tables

Round table title: Can Networked Learning be defined - and should it be?

Host names: Nina Bonderup Dohn, Vivien Hodgson and David McConnell

Topic and questions to discuss at round table:

A recurrent question in the context of the Networked Learning Conference (NLC) is "what do we mean by 'networked learning'?" This question is raised not only before the conference, by potential submitters of papers to it, but is often discussed during the conferences, too. Several answers have been provided in the literature, and though they do not exactly collide, they do seem to vary somewhat on what they emphasize. A common outset is the early, often-quoted definition of Networked Learning by Goodyear, Banks, Hodgson, and McConnell (2004, p. 1) which stresses connections - between people, and between people and resources - as the defining characteristic of Networked Learning, and ICT as the medium that provides these connections. In later years, however, some researchers have focused more on persons and less on ICT as the loci of connections, understanding a person as networked to others, e.g. in the workplace (De Laat, 2012). Others have viewed the defining point of networked learning as the sociomaterial entanglement of physical, virtual, human, organizational "actants" (Fox, 2005; Wright & Parchoma, 2014), in effect arguing that all learning is networked learning and placing no priority on ICT-mediation.

Conversely, from early on, pedagogical characteristics supported through ICT-mediation of connections were seen as essential to networked learning, even if not represented in the name. A significant contribution was made in the Manifesto on Networked Learning (E-QualityNetwork, 2002) which stresses values of inclusivity, democratic processes, and critical inquiry and points out a pedagogical attitude towards learning as fostered through participation, collaboration and co-construction of knowledge. This characterization is echoed in later works (Dohn, Cranmer, Sime, Ryberg, & De Laat, 2018; McConnell, Hodgson, & Dirckinck-Holmfeld, 2012). Further, in a recent survey among delegates of the NLC underscores that the values and the pedagogical approach are indeed viewed by both long-time insiders and newcomers to the conference as essential aspects of networked learning, as well as to the community researching the field (Hodgson & McConnell, 2020, in press). However, these values and pedagogical approach are not exclusive to Networked Learning, but are found in other approaches to learning, too, such as Problem-Oriented Project Pedagogy (Illeris, 2004), some forms of Reflective Learning (Brockbank, McGill, & Beech, 2002), and variants of learning-oriented Action Research such as Co-operative Inquiry (Heron & Reason, 2001). Not to forget in the work of critical pedagogues of the likes of Stephen Brookfield, Henry Giroux and critical pedagogic feminist writers Elizabeth Ellsworth and Jennifer Gore (Brookfield, 2004; Giroux, 1992; Luke & Gore, 2014).

In this round table we shall take up the question of what defines Networked Learning - in all senses of 'defines':

- What is *characteristic* of Networked Learning?
- Are these characteristics (jointly) exclusive to Networked learning so that they serve to *distinguish* this field from other approaches to learning
- What *decides* what is characteristic of Networked Learning - e.g. an explicit definition such as the one from Goodyear et al. (2004); a characterization such as the Manifesto; or the actual practice (i.e. research focus) of researchers who recognize themselves and are recognized by others as "Networked Learning researchers".

- How can we define "networked" and "learning" to cover all focus areas currently recognized in practice (e.g. through acceptance to NLC 2020) as Networked Learning?

Goal of the round table

The goal of the round table is to develop clearer explications of what Networked Learning is today and to consider how it has changed and developed over the years. This will assist us explore whether a common ground may be established between participants on

1) The complexity of the field today
2) Overarching characteristics that apply across the complexity
3) Different emphases placed by different researchers within the overarching characteristics (leading to the complexity)

Engagement of participants

The round table will be kicked off by each of the hosts presenting a 5 minutes' "provocative pitch" of what - in their view - is characteristic of Networked Learning. The "provocative pitch" will be provocative in the sense that the hosts will formulate their pitch so as to clearly indicate differences in their perceptions, as well as similarities.

After the 5 minutes' pitch by each host, participants will be asked to briefly discuss (5 minutes) with their neighbor how they see their own view of Networked Learning reflected (or not) in the pitches. Following this, we shall have a general plenum discussion with participants and hosts. The session will end with each host doing a 2 minutes' sum up of what they have learned from the discussion.

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Host name: Greta Goetz, Assistant Professor, Faculty of Philology, Belgrade University
(Host emails: gretzuni@protonmail.com; greta.goetz@fil.bg.ac.rs)

Round Table Title: Building UX design for "cognitive democracy"

Elevator Pitch:
We benefit so much from technology but technoscientific infrastructure can also be seen to threaten the complexity of mutual relations, interactions, etc. that are features of democratic society.

It is common today to speak of the "tragedy of the commons", the "unusable" internet – even finding a battery charger on Amazon requires a degree in investigative journalism (Gross), machines that compromise our ability to function without them or that replace us (ML, RBA), epistemic bubbles and echo chambers (Nguyen).

Is our technoscientific information age a poison or a cure? It is up to us.

Goal: Co-creating strategies for cognitive democracy in our own contexts

Engagement:
(Fifteen minute *Icebreaker*: attendees choose/think of term related to their reason for attending the session, explaining why;
Warm-up: UX design requires digital literacy. Are we digitally literate? Q. followed by reflective analysis of use of digital tech, how often, for what purpose);
* Brief definition of Morin's "cognitive democracy"
= potentially antagonistic mutual relations, interactions, implications that at once nourish democracy while it regulates them
= multidimensional, complex features;
* Concerns of attendees: their wants and needs
– if none are forthcoming, a dilemma will be provided (from Jungk)
* Brainstorm solutions: approaching design by "taking things apart"
– idea map of attendee concerns, knowns/unknowns, causes, symptoms, actors, places, information, etc. followed by solutions;

Resources to be used to prompt discussion, if needed:
* 3 bullet points of examples from the industry (brief descriptions of e.g. Pivot for Humanity, Mandeville's "The Future Will Be Technical");
* 5 bullet points of theories that can be applied to real life situations (e.g. Stiegler's *pharmakon*; Hadot's hiding/revealing of technology; Ricoeur's "open" questions; Trocme-Fabre's rich/poor contextualization);
* Technical vs. moral knowledge
* Professional excellence (Gardner), ethics, values, norms
* Culture as machine for increasing our intelligence and sensitivity? (Krakauer)
* Moving fast and fixing things (Abu-Ghazaleh)

Round Table

Host Name: Felicity Healey-Benson (doctoral student, UWTSD)

Round Table Title:

Navigating the phenomenological and phenomenographic terrain as a doctoral student in a

Networked Learning context

Elevator pitch

Whilst recognising "*there is no such thing as one phenomenology, and if there could be such a thing it would never become anything like a philosophical technique'* (Heidegger, 1982, p328), the proliferation of various strains of phenomenological and phenomenographic research has resulted in misunderstandings and poor practises, with some authors contradicting each other (Groenewald, 2004). De-mystification of the choices and their implication across the various approaches and techniques is needed. An improved clarity would potentially motivate a more confident and robust application of phenomenology, to the advantage of the networked learning research community and its' research benefactors. This round-table will provide an opportunity for researchers to advance the understanding of the potential variants of design, results and value between different phenomenological and phenomenographic approaches adopted in a networked learning context.

Background

Engaging in phenomenological research is challenging (Caelli, 2001). Despite common roots in the philosophical works of Husserl (1931), Heidegger (1927/1962), and Merleau-Ponty (1945/1962), methodologically, phenomenology has evolved in many ways. Many novice researchers, even once over the hurdle of a comfortable alignment to a philosophical movement must then further negotiate many permutations of research design to garner insight on the practicalities and rewards of a phenomenological research study. Despite techniques and approaches published by heavy-weight practitioners such as van Manen (1990) and Moustakas (1994), it remains a tall order to clearly distinguish between different phenomenological research study designs or identify whether a phenomenological study has been run badly or not. Problems are exacerbated when attempting to align a phenomenological attitude to networked learning. In contrast, as a second-order research perspective, with a focus on the experience of learning as opposed to learning itself (Marton et al., 1993), phenomenography is more prevalent than phenomenology in a networked learning context (Dohn, 2006, Oberg & Bell 2012). Analysis of papers submitted to the Networked Learning Conference from 1998-2018 (11 conferences) reveals only made use of phenomenological methodology, twelve phenomenographic. Discussion of why selected methods were employed was limited or not documented. Part of the weaker interest in the use of phenomenology in a networked learning context may lie in the aforementioned issues. Possibly this pattern is set to change, with the more recent post-

intentional phenomenology offering by Vagle (2016). Underpinned by deleuzoguattarian thinking (Deleuze & Guattari, 2004), the latest phenomenological evolution concentrates on the 'variant' features of a phenomenon, offering the potential *to 'join the conversation about multiplicity, difference and particularity'* (Vagle, 2014)

The goal of the discussion is to surface, in an open and pragmatic way, whether phenomenology is deemed less valuable than phenomenography, or just more difficult or confusing to administer, and if so, what can be done to encourage its more active employ in networked learning research.

Examples of Questions

1.   For what purposes can phenomenological and phenomenographic research design be employed in a networked learning context?

2.   What are the issues and challenges presented by the adoption of phenomenological research design in a networked learning context?

3.   Compare and contrast various methods and data instruments within a **phenomenology** and **phenomenography** study

4.   What are the key differences between the results from phenomenographic and the phenomenological analysis?

5.   Can or should **phenomenology** and **phenomenography** be used together for triangulation purposes?

6.   Is there a networked learning research context where a specific phenomenological or phenomenographic approach provides more use or utility than another?

7.   How could the networked learning community promote more phenomenological study?

Goal: Illustrate what you would like to achieve as a collective outcome:

Discussions are targeted primarily at doctoral students and novice researchers deliberating between or avoiding phenomenology and phenomenography. The goal is to surface the issues/challenges behind the weaker interest in phenomenology in a learning network context. It is an opportunity for researchers to advance the understanding of novice researchers on the benefits and value of different phenomenological and phenomenographic approaches adopted within a networked learning context.

How to engage the participants into the discussion:

Discussions are targeted primarily at doctoral students and novice researchers deliberating over phenomenological research strategy yet experienced practitioners are equally valid.

Questions will be worked through in order.

In addition, one slide/poster of boxed text prompts will be projected/displayed to stimulate threads of discussion

- Phenomenological philosophies e.g. HUSSERL, HEIDEGGER, MARTON et Al,
- Names of high amplitude phenomenological and phenomenographic researchers e.g. VAN MANEN, MOUSTAKAS, VAGLE etc.
- Researcher positionality, reflection activities (BRACKETING, BRIDLING etc.), data reduction and analysis (THEME ANALYSIS, CONCEPTUAL ANALYSIS) and use of theory

These words can be used as a quick reference point to stimulate discussion around the points of contention within and between phenomenological and phenomenographic research, for application within a networked learning context.

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FELICITY HEALEY-BENSON
DOCTORAL STUDENT, DBA, UWTSD

REFLECTIONS & MAPPING OUTPUTS FROM NAVIGATING THE PHENOMENOLOGICAL AND PHENOMENOGRAPHIC TERRAIN AS A DOCTORAL STUDENT IN A NETWORKED LEARNING CONTEXT

Networked Learning Conference, 18-20 May 2020

Background to the paper

A collation of my doctoral student's reflections and mapping outputs when tracing phenomenology & its variants in preparation for a round-table discussion at NLC 2020 which aims to surface, in an open and pragmatic way, whether phenomenology is deemed less valuable than phenomenography, or just more difficult or confusing to administer in a networked learning research context.

As a doctoral student and newcomer to the NL community, the aim is to document and share interpretation, to link to researcher and practitioner experience, to augment understanding and invite challenge to ongoing interpretation and application of phenomenology in a NL context, for use also by other novice researchers.

Author: Felicity Healey-Benson

Lecturer in Leadership & HRM: both F2F & online at the University of Wales Trinity St. David
Doctoral Student (DBA): A phenomenological study of educators' lived experience of nurturing the development of Higher Order Thinking Skills, specifically Creative & Critical Thinking skills. Sub-themes include use of networks and technology

https://www.uwtsd.ac.uk/felicity-healey-benson/   https://emergentthinkers.com/

Husserl 1859-1938

Heidegger 1889-1976

Merleau-Ponty 1908-1961   Sartre 1905-1980   Gadamer 1900-2002

Arendt (politics), Levinas (ethics), Derrida (semiotic analysis/deconstruction)

de Beauvoir (gender), Ricoeur (critical theory), Idhe (Post-modernity & tech)..

Engaging in phenomenological thinking & research is challenging (Caelli, 2001) & has evolved in many ways

Felicity Healey-Benson,
DBA research, UWTSD,
NLC, 18-20 May 2020

SNAPSHOT ONLY

IPA   Phenomenography

Giorgi   Moustakas   Van Manen   Dahlberg   Smith   Marton

For the novice researcher it remains a tall order to clearly distinguish between different phenomenological research study designs... & follow hypbrids/offshoots...

or even further complicated to identify whether a phenomenological study has been run badly or not.

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Proceedings for the 12th International Conference on Networked Learning 2020,
Edited by: Hansen, S.B.; Hansen, J.J.; Dohn, N.B.; de Laat, M. & Ryberg, T.

- **is a philosophical discipline, strategy or attitude, not one specific methodology or research design**

- **is an encounter (Vagle, 2018)**

- *"is looking at what we usually look through"* **(Sokolowski, 2000)**

- *"Neither phenomenology nor swimming can be learnt in a purely vicarious way. 'We shall never learn what "is called" swimming … or what it "calls for," by reading a treatise on swimming. Only the leap into the river tells us what is called swimming' (Heidegger, 1968, p. 21".* **(Quay, 2016, p486)**

- *"While it is possible for reading to support the learning of phenomenology, if this reading remains detached from actually doing phenomenology, then the phenomenological starting point is never achieved"* **(Quay, 2016, p486)**

- **phenomenologists are reluctant to prescribe techniques (Holloway, 1997)**

- **to impose a method on a phenomenon** *"…would do a great injustice to the integrity of that phenomenon"* **(Hycner (1999, p. 144)**

- **is a craft;** *"a creative act that cannot be mapped out in a once-and-for-all sort of way"* **(Vagle, 2018, xiii)**; *"methods "need to be discovered/invented as a response to the question at hand"* **(Van Manen, 1990, p.29)**

Yet some **guidelines** may be necessary, especially for novice researchers **(Hycner, 1999)**

My key takes on Phenomenology

Felicity Healey-Benson,
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ONE SLICE ON PHENOMENOLOGICAL DIFFERENCES

"To truly understand phenomenology requires developing an appreciation for the philosophies that underpin it"
(Neubauer et al, 2019, p91)

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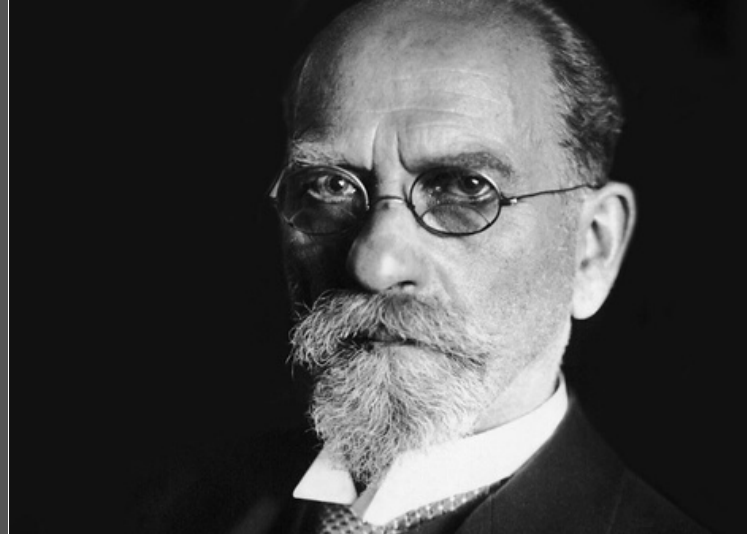
TRANSCENDENTAL/DESCRIPTIVE

determine the essential/core/invariant structure/features a phenomenon has (HUSSERL)

INTERPRETATIVE/ HERMENEUTIC

interpret phenomena as they are 'consciously' experienced in lived experiences, identify experiential themes, converging patterns of meaning or meaning structure (HEIDEGGER)

POST

to empirically analyze how particular technologies as "the things themselves" mediate the relation between humans and their world - '*the human experience is to be oufnd ontologically related to an environment or a world, but the interrelation is such that both are transformed within this relationality*' (IDHE)

POST-INTENTIONAL

Reconceives post-structurally using Deleuzeoguattarian ideas that phenomenon are fluid, shape-shifting assemblages continually on the move in interacting with the world, capture the essence of variant structures, what it might become; values multiplicity of meaning; focus on how things connect rather than what things are (VAGLE)

Potential for post-intentional phenomenology

is the pattern set to change, with the more recent post-intentional phenomenology offering by Vagle (2016)?

Underpinned by deleuzoguattarian thinking (Deleuze & Guattari, 2004), the latest phenomenological evolution concentrates on the 'variant' features of a phenomenon, offering the potential to 'join the conversation about multiplicity, difference and particularity' (Vagle, 2014)

Image: Richard Giblett (2009). 'Mycelium Rhizome'. Pencil on paper. 120 x 240 cm

Likening learning to the roots of a plant.

Roots can spread out laterally & horizontally, consisting of a series of nodes, with no distinct centre, beginning or end, and no defined boundary – the only restrictions to growth are those that exist in the surrounding habitat.

Rhizomes resist organisational structure and chronology and instead grow and propagate in a 'nomadic' fashion.

Focuses on the inter-connectedness of ideas as well as boundless exploration across many fronts from many different starting points.

Potential for post-intentional phenomenology

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NLC, 18-20 May 2020

Transcendental

- Consider phenomena from different perspectives
- Unit of analysis is meaning giving subject
- Identify units of meaning and cluster into themes to form textural description (the what of the phenomenon).
- Use imaginative variation to create structural (the how) description.
- Combine these descriptions to form the essence **of** the phenomenon

Neubauer et al. 2019

- The researcher brackets
- Reads the data
- Reduces it to meaning units
- Re-reads reductions then engage in thematic clustering
- Compares the data
- Writes descriptions in an ongoing process of continually engaging with the data & writing reflections and summaries until the essence of the lived experience can be described

Hermeneutic

- Place **'being'** at the centre of the research - what it is to **be in** the world in various intentional ways
- Unit of analysis: the transaction between situation & the person
- Engage in a hermeneutic circle through iterative cycles of capturing & writing reflections towards a robust and nuanced analysis
- Consider how the data (or parts) contributed to evolving understanding of the phenomena (whole)

Neubauer et al. 2019, Vagle, 2018

- The researcher reads the data constructs a vague understanding
- Engages in reflective writing, then re-engages with the text with revised understandings
- Employs anecdotes, examples & use of the vocative

Grondin, 2012

Post-Intentional

- Bring a critical dimension to the research
- Identify a phenomenon in its multiple, partial & varied contexts
- Read & write through the data in a systematic responsive manner
- Craft a text that captures tentative manifestations of the phenomenon in its multiple, partial & varied contexts

Vagle, 2014

- Emphasis on constant self critique by researchers
- "*whatever understanding is opened up will also move with and **through** the researcher's intentional relationships with the phenomenon... in the dynamic intentional relationships that tie participants, the researcher, the context, the broader social issues and matters, the produced text, and their positionalities together*"

Vagle, 2018, p32)

Phenomenography

- 'Conception' is the unit of description
- Take a referential aspect (what is being experienced; what it means)
- Categories of description- *each one describes one experience/conception*
- Takes a structural aspect (how the phenomenon is experienced).
- Outcome space - *shows how categories are related, including the dimensions of variation that link & separate the conceptions*

Marton & Pong, 2007; Webber & Johnson, 2015

- Researcher views bracketed
- Data are coded and analysed at the semantic and conceptual levels to find a range of categories that encompass participants' conceptualisations (expressed experience and understanding) of the research phenomenon.
- Categories are described,
- Relationships between categories determined to form an outcome space

Cossham, 2017

In contrast to phenomenology, pheomenography

- conception' is the unit of description, with 2 aspects: the referential aspect, the global meaning of the object conceptualized; & the structural i.e the specific combination of features that have been discerned and focused on

- is interested in the description & analysis of experience at a collective level: i.e. the group's various ways of knowing, understanding, and conceiving phenomenon in the world (Marton & Pang, 2008)

- individual voices are not heard

- has an epistemological & ontological perspective:

- ontologically that *"an individual cannot experience without something being experienced"* (Marton and Pang, 2008, p. 535)
- yet one can understand phenomena through cognitive, epistemological questioning, *what do you know, how do you know it...*

- not equivalent to, but a form of 'content analysis'
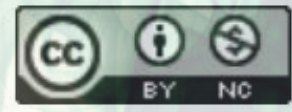
Phenomenograhy

Felicity Healey-Benson,
DBA research, UWTSD,
NLC, 18-20 May 2020
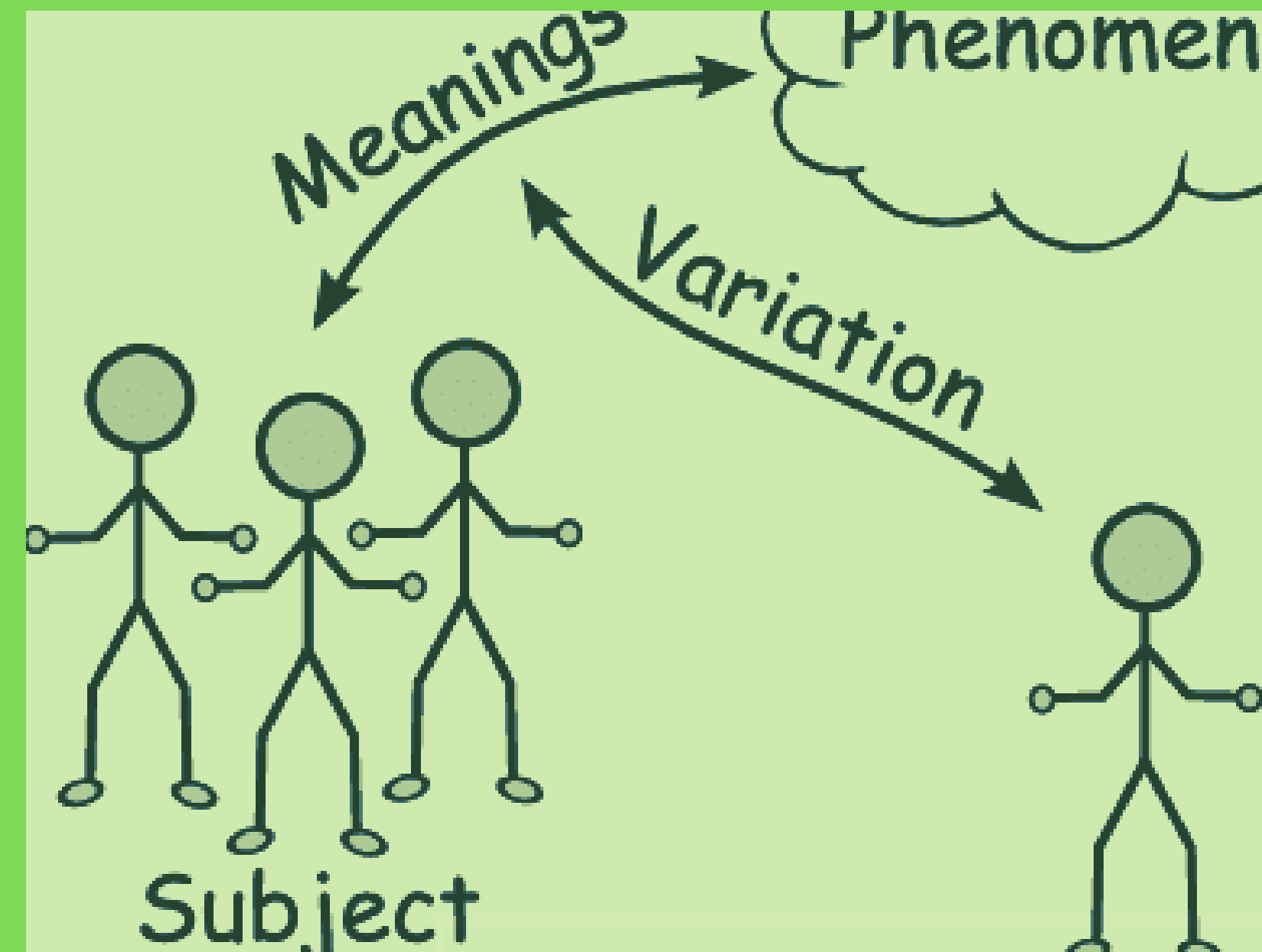
Analysis of papers to the NLC 1998-2018 (11 conferences) reveals 5 used 'phenomenological' methodology, with 1 discussion paper

NLC
weak interest in phenomenology

1. **Dohn, N.B. (2012) 'A tacit-knowledge perspective on networked learning'**
2. **Adams, C. & Thompson, T. (2012) 'Interviewing the Digital Materialities of Posthuman Inquiry: Decoding the encoding of research practices*'**
3. **Adams, C. Lin, Y., Madriz, L. & Scott Mullen, C. (2014) 'Snapshots from the Lived World of Massive Open Online Courses (MOOCs): A phenomenological study of learning large'**
4. **Jones, C. (2018) 'Experience and networked learning'**
5. **Johnson, M. (2018) 'Encounters with the mobilage (virtual or actual)?'**

& discussion paper: Oberg, H. & Bell, A. 2012 'Exploring phenomenology for researching lived experience in Technology Enhanced Learning'

Does part of the weaker interest in the use of phenomenology in a NL context lie in the aforementioned issues: complication of choices & difficulty in administration?

Felicity Healey-Benson,
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NLC, 18-20 May 2020

TRANSCENDENTAL/DESCRIPTIVE PHENOMENOLOGY

Epistemological. No personal view/position taken (brackets researcher subjectivity); layers of onion peeled away, Focuses more on the descriptions of the participants than the interpretations of the researcher; what happened, how did the experience of the phenomenon come to be what it is

INTERPRETATIVE/HERMENEUTIC PHENOMENOLOGY

Existential-ontological: Not ignore researcher's prior theories/explanations of everyday life; reflects on essential themes of participant experience with the phenomenon while simultaneously reflects on own experience; focuses on the development of 'thoughtfulness and tact' (Van Manen, 1991); presents the phenomenon through *"texts [that] speak to readers at an intuitive as well as cognitive level, creating a way of understanding is embodied"* (Henriksson & Sevi, 2009)

POST-INTENTIONAL PHENOMENOLOGY

Ontological: Attention to variants; malleable, permeable, multiple meanings in motion, Threads are constantly being constituted/deconstituted/blurred & disrupted – intentionality runs all over the place, experiential themes deemed to be significant for their ability to meaningfully contribute to pedagogic thoughtfulness, informed practical reasoning and responsive practice (Vagle, 2015)

PHENOMENOGRAPHY

Ontological assumptions are also epistemological assumptions. Group focus, attention to variants & multiplicity of meaning; researcher is distanced from making meaning out of the primary phenomenon; interested in how ways of understanding are logically & hierarchically related to each other & the perceptions of the situation in which they are experienced; examines & identifies phenomena influenced by a range of contexts and then presents different ways of experiencing that phenomena from a decontextualized perspective

Variant foci

Felicity Healey-Benson, DBA research, UWTSD, NLC, 18...

Uses in NL context

TRANSCENDENTAL/DESCRIPTIVE PHENOMENOLOGY

USE: learn from the experiences of others; methodology for eliciting meaning from people who had experienced it in a genuine pursuit of understanding (Bell, 2012); allow the phenomena to speak for itself and reveal itself through reflection, something that was concealed within, something that is provided in description by others but grasped by the researcher in reflection (ibid.); contribution to other's understanding in another context.

INTERPRETATIVE/HERMENEUTIC PHENOMENOLOGY

USE: how agents enact in a given context/space; learn from the experiences of other; useful for approaching areas considered too intangible to be measured (Black, 2007); uncovering & fostering practical insights, communicative thoughtfulness & ethical sensitivities in professional practice; suited for revealing; building pedagogically responsive insight for educators, instructional media experts & software architects who design/build/work in such environments (Adams. 2014); reveals the pedagogical differences of situations

POST-INTENTIONAL PHENOMENOLOGY

USE: informed practical reasoning and responsive practice; used to understand 'connectedness' in all types of learning networks; recognises it is not possible to isolate practice to simplistic, compound parts but that reality is socially, culturally and historical constructed; allows for analysis on not just how content or knowledge has been applied to practice, but how it was "being reflected on and in practice through ....moments" (Murphy, 2019)

PHENOMENOGRAPHY

USE: arguably we create systems/networks for users so helps meet 'user' needs: where we want to know how our end users think about information and the systems that we make available for their use; to enable and support change, or inform and influence practice; useful for communication & and education, inter-professional collaboration, The problems of interpretation and the understanding of others' intentions are fundamental to collaboration (Schwartz, 1999); a focus on how plans and actions are understood by participants

Felicity Healey-Benson,
DBA research, UWTSD,
NLC, 18

N TH ORDER 360 **PERSPECTIVE**

REPLICABILITY OF RESEARCH DESIGN

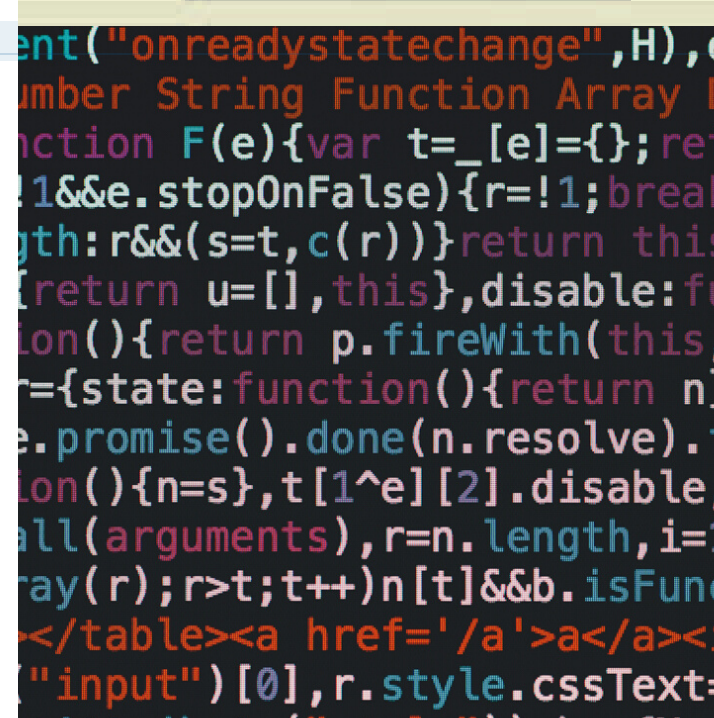**HOW DOES THESE IMPACT NLC KNOWLEDGE?**

RESEARCHER POSITIONALITY
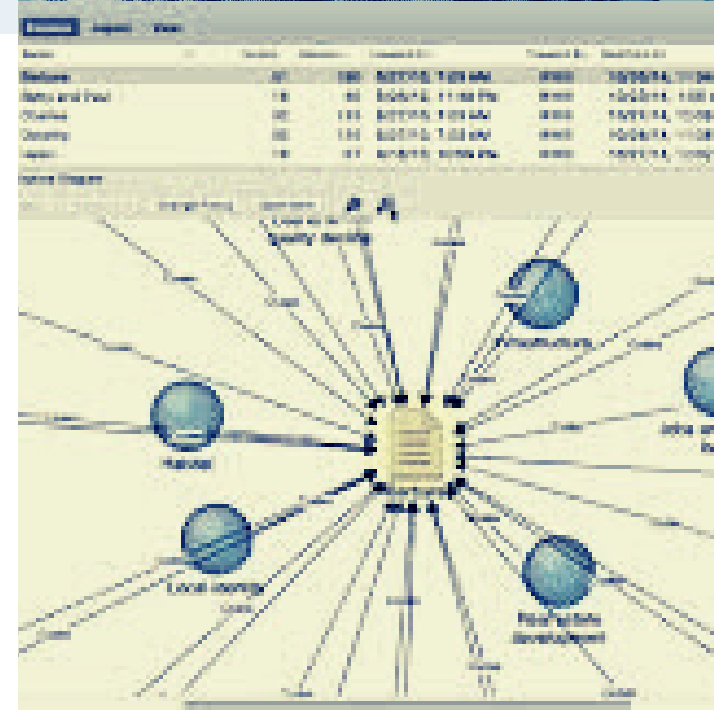
EMPLOY OF QDSA

Qualitative Data Analysis Software

THEMATIC OR CONCEPTUAL ANALYSIS

degree of creativity & imagination

USE OF CODING

Felicity Healey-Benson,
DBA research, UWTSD,
NLC, 18-20 May 2020

THANK YOU

CONTACT

FELICITY.HEALEY-BENSON@UWTSD.AC.UK

EMERGENT THINKERS

Applied Research for Business and Education 4.0 in 4IR

Round Table Session Information and Template.

A round table session provides an opportunity for participants to get together and explore issues related to networked learning in an informal yet structured setting.

Interested in hosting a round table?

You need to submit your round table topic in advance so that the round table topics can be presented in the conference program. This way participants can choose to attend your topic and engage in the conversation.

The round table will be facilitated by the topic host and will last as long as the scheduled session time in the program. Please provide a brief explanation to your topic by way of background information. Outline the goals you have for this session and make sure the participants have the opportunity to engage in the discussion.

There will be no projection or other technology provided to support your round table during these sessions. Please prepare and bring materials for your session if needed.

Round table Submission Template:

- Host name: Mike Johnson
- Round table title: A Networked Learning Disposition?
- Elevator pitch:
Productive networked learning is somewhat contingent on the learner's *disposition*. This round table discussion will explore, evaluate and determine this proposition and any implications for networked learning design, research and practice.
    Introductory questions -
- What is *disposition*?
- What is a *networked learning disposition*?
- What are the practical implications of this for design, research and practice?

- Goal: Illustrate what you would like to achieve as a collective outcome:
I would like to give time to a collective reflection of this topic to:
- Promote participatory scholarly deliberation upon a core theme of the conference amongst delegates, deepening our shared apprehension of networked learning.
- Uncover different dimensions of a networked learning disposition and distinguish salient ones.
- Gather participants' contributions with a view to distil discourse suitable for a collaborative scholarly publication. To this end I would like to make an audio recording of the event, with the consent of delegates.

- How to engage the participants into the discussion:
Not knowing how many delegates will attend, I have outline plans for three group sizes.
Timing: 105 minutes (adaptable).

Materials: (provided by me)

    Flipchart paper and marker pens (blutac?) Flipchart#1 for sources, to record them as they arise – author/date with a brief word of why relevant.

    Note paper and pens

    Bowline laminated guide and 8x3m lengths of rope.

    Activites One and Two typed up on paper copy.

    Audio recorder (digital)

Plan A: 2-8 Delegates in One Group

Timings

-105 Welcome – names and brief introductions, invited to explain interest in the workshop.

-95 Introduce session plan/aim and concept focus: networked learning disposition (MJ)

    Define 'networked learning'.

    Define 'disposition'

-80 Activity One (more abstract than Activity Two): consider a recent time you engaged in, designed or researched networked learning. What was the explicit or implicit theory of how learning would be productive? What is the role of disposition?

<div align="center">AND/OR</div>

-80 Activity Two: How would we learn or design networked learning to tie a bowline knot (employing all kinds of aspects of learning: kinesthetic, tacit, etc.)? or learn the difference between Heidegger and Husserl's 'reduction'? What is the role of disposition?

-50 Comfort break

-35 Re-convene to gather everyone's opinion through writing privately answers to the following:

    How are you disposed towards participating in networked learning? Can you list examples to illustrate this?

    How does this disposition influence the usefulness of networked learning for you?

-25 Share and compare in turn.

-10 MJ offers/invites synthesis.

Plan B: 8-20 Delegates in Small Groups (each group of 4-5)

Undertake the above but

-80 Divided into groups.

-25 Groups would be invited to share their deliberations with the wider group.

-10 MJ offers/invites synthesis.

Plan C: 20+ Delegates using the Fishbowl Technique

-105 Organise the room for the fishbowl discussion.

-95 Introduction to the topic by MJ.

-80 Invite initial participants to the central discussion chairs and begin the debate until no further questions or contributions arise.

-10 MJ offers/invites synthesis.

Disposition and networked learning

Michael Gallagher (2018) discussed the case of Amira, a fictional student, at the previous Networked Learning Conference. Amira demonstrated skill and fluidity in negotiating various hurdles and exploiting opportunities of mobility. Amira seemed caught up in a web of connections, spun from different contexts of life, many mediated electronically, which conditioned the way she negotiated life. Accordingly, mobile learning needed to account for various capacities: material, deliberate/intentional, and dispositional, the latter being, "what she does largely as a reflexive response to her systems of mobility." (2018, p.195) The dispositional is not the intellectual, it is implicit or tacit. Earlier in the paper, Gallagher aligns disposition with *habitus* (Bourdieu 1977), following Kress and Pachler's (2007) adaptation of the term, agreeing that disposition is the 'evolving personality structure of the individual' (Gallagher 2018, p.192). Taking 'evolution' here as a metaphor is problematic given the long-ages usually required for change to occur. The implication seems to be that dispositional change is at least a life-wide project. Kress and Pachler illustrate their position from Böck's (2004) visual essay to highlight a kind of dispositional digital divide, where individual's worlds are '*im*mobile' or 'highly mobile', 'stable' vs. 'fluid', and of knowledge 'canonicity' vs. 'provisionality'. Similarly, while admitting a flawed dichotomy, Lankshear and Knobel (2006) present two 'mindsets'. Mindset 2 is said to be amenable to 'new literacies' (see Table 1, below). Many other such terms (see https://mm.tt/1307147654?t=X7bIAL5E06) are used to delineate something essential, if not immutable, about a person which will impact the accomplishment of productive networked learning. If Amira enacts a disposition of mobility, and mobile learning emerges from that, it may be possible to say that networked learning emerges from a network disposition (see https://mm.tt/1418683213?t=IoQAgKhdOA).

Table 1: Some dimensions of variation between the mindsets (Lankshear and Knobel 2006)

Mindset 1	Mindset 2
The world basically operates on physical/ material and industrial principles and logics. The world is "centered" and hierarchical.	The world increasingly operates on non-material (e.g., cyberspatial) and post–industrial principles and logics. The world is "decentered" and "flat."

• Value is a function of scarcity
• Production is based on an "industrial" model
  • Products are material artifacts and commodities
  • Production is based on infrastructure and production units and centers (e.g., a firm or company)
    • Tools are mainly production tools
• The individual person is the unit of production, competence, intelligence
• Expertise and authority are "located" in individuals and institutions
• Space is enclosed and purpose specific
• Social relations of "bookspace" prevail; a stable "textual order"
	• Value is a function of dispersion
	• A "post-industrial" view of production
	  • Products as enabling services
	  • A focus on leverage and non-finite participation
	  • Tools are increasingly tools of media-tion and relationship technologies
	• The focus is increasingly on "collectives" as the unit of production, competence, intelligence
	• Expertise and authority are distributed and collective; hybrid experts
	• Space is open, continuous and fluid
	• Social relations of emerging "digital media space" are increasingly visible; texts in change

Learning may be considered from the perspective of the dimensions of change expected in the learner: deeper or shallower, lasting or transient, etc. How much of the most beneficial deeper and long-lasting effects can be attributed to the learner's disposition? Is dispositional change possible? As Gallagher (2018) acknowledges, the related concept of *habitus* is accused of determinism, negating individual agency to change, but he also points out that this critique can be diluted when viewed through recent posthuman theories, such as assemblage and actor-network theory, where agency is distributed. Nonetheless, disposition, as fundamental to human being, appears to remain a factor in the practice, design and research of networked learning. This round-table discussion aims to explore this and other related questions.

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Round table Submission Template:

Host names:

Thomas Ryberg, Lykke Brogaard Bertel, Antonia Scholkmann, Anette Kolmos, Mia Thyrre Sørensen, Elisabeth Lauridsen Lolle

Round table title:

Networked Learning and PBL Future – an institutional development project

Elevator pitch:

In 2018, an ambitious cross-faculty research project titled "PBL future" was launched within Aalborg University (AAU). The aim of "PBL Future" is to develop research-based directions for problem- and project-based learning (PBL) and networked learning in AAU. In AAU PBL has been implemented as an institution-wide pedagogy since AAU's inauguration in 1974 (Kolmos, Fink, & Krogh, 2004). The project aims to re-conceptualise how PBL and networked learning could operate in new formats, based on the core principles of PBL, while exploring and developing new digital approaches that operate in and open up for new hybrid PBL and networked learning models. In the project, there are five sub-projects addressing particular aspects in relation PBL and networked learning. In this round table we will discuss three of these in more depth:

- Scenarios and future development in organisational change processes – methodologies and theoretical reflection
- Emerging PBL Collaboration Skills for a Digital Age – students' use of networked technologies in hybrid environments
- PBL competence development of individual students (working with portfolio methods and digital tools)

Within each of these three themes we shall discuss current findings, thinking, theories, questions, methodologies, but more importantly co-developing with the participant richer pictures of current knowledge and state-of-the-art in relation to the three themes. More concretely, this co-development will manifest itself as the production of rich-media posters to support and reify the discussion taking place in sub-groups.

Goal:

Within each of the proposed themes, we shall present findings, ideas and emerging questions emanating from the research project. Each theme will initially have five minutes for presentation. More importantly we are interested in the session as an opportunity for knowledge building and knowledge sharing amongst the participants who are interested in or working with one or more of the themes. In sub-discussions the aim is to co-develop posters and rich pictures (drawings, post-its, text) to map current knowledge, questions, references, journals, papers, ideas, curiosities etc. within the themes. These rich-media posters will subsequently be made available online. The themes are described below based on existing project descriptions ('PBL Future', 2019):

Scenario methodologies, practice and theory

Presenter and moderators: Lykke Brogaard Bertel, Anette Kolmos

As part of the PBL future project a large baseline study has been conducted and five subprojects are carried out during 2018-2020. All sub-projects will contribute to the final phase of the PBL-future project about on new PBL directions. In this final stage, the results from baseline-study and the subprojects will feed into creating a series of directions and scenarios. Scenario methodologies will be applied pointing at a diverse range of basic assumptions, criteria and processes (Kosow & Gaßner, 2008). In the round table, the current progress will be presented and discussions on methodologies, practice and theory will be opened for the participants to co-develop a shared mapping of the field and theme as a rich-media poster.

Students' use of networked technologies in hybrid environments

Presenter and moderators: Thomas Ryberg, Mia Thyrre Sørensen

The aim of this subproject is to identify and conceptualise new collaboration skills that emerge due to the changes in how students work and learn in PBL environments saturated by digital technologies. Recent studies show that students are already working and learning in 'hybrid' environments. Certain tools and services are omnipresent in students' work (e.g. Facebook and Google Drive/Docs), but gaps happen in the students' use of technologies, and more academically oriented services and practices are less commonly adopted (Ryberg, Davidsen, & Hodgson, 2018; Thomsen, Sørensen, & Ryberg, 2016)

Main questions are: 1) What experiences do students have with digital technologies and what is the impact of new technologies and hybrid spaces on students' collaboration in a PBL environment? 2) What are the PBL practices and collaboration skills that emerge out of this meeting and how do these translate into wider PBL competences that students develop or need to develop throughout their study?

In the round table, current ideas and findings will be shared and will form point of departure for conceptual, theoretical and methodological discussion in relation to understanding students' use of technology in higher education in relation to PBL and networked learning. In the sub-discussions participants will co-develop a shared mapping of the field and theme as a rich-media poster.

Portfolio methods and networked learning

Presenter and moderators: Antonia Scholkmann, Elisabeth Lauridsen Lolle

The aim of this subproject is to study individual students' reflections on their PBL competences, when they utilize digital tools in form of e-portfolios. Individual students struggle at times to identify the specific competences they acquire through their project work, their courses and the overall educational outcomes they strive towards.

PBL learning approaches present some unique challenges for an individual to evaluate the outcomes of their own learning, since much focus is on the benefits of working and thinking in teams in which the diversity of contributions helps to solve complex problems (Hmelo-Silver, 2004; Scholkmann et al., 2018). However, university education ought to lead to higher order learning competences that include the competences to think independently, including about one's

own learning. Self-reflection and formative assessment can assist such aims (Davies & LeMahieu, 2003). Tools that support self-evaluation include portfolios since they provide the structures needed for organized reflection and (self)-assessment of learning. In electronic form, they can include multimodal formats (text, images, video), that afford flexible and hybrid learning spaces.

In the round table, current ideas and findings will be shared and will form point of departure for conceptual, theoretical and methodological discussion in relation to portfolio methods and networked learning. In the sub-discussions participants will co-develop a shared mapping of the field and theme as a rich-media poster

How to engage the participants into the discussion:

The round table will begin with a very brief presentation of the overall theme and the PBL future project (5 minutes). Each theme or subproject will then be presented along with key questions and suggested topics for further debate (3*5 minutes).

We split into sub-themes or discussion groups. Initially, with equal numbers for each theme. After approximately 15-20 minutes there is an opening for changing to another sub-discussion and this pattern will be repeated two more times, so participants have an opportunity to move through all three subdiscussions (or stay in one debate if preferred). In the sub-discussions the moderators will facilitate the joint development of shared mappings of the field, the group discussions and the theme as a rich-media poster.

There will be a final wrap-up session presenting the rich-media posters i.e. the knowledge mappings, drawings and posters that emerged from the work. These will later be made available for all participants online.

References:

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Outline for round table discussion about Networked Professional Development

Host:

The Educational Design and Thinking Research Group from Centre for Teaching Development and Digital Media, Aarhus University

Title:

The Contemporary University's Role in Developing, Conducting and making Networked Professional Learning a practice

Elevator pitch:

There is a growing demand for professional development, driven by employees, employers, HR-departments, and organisations alike, both in the private- and the public sector. This demand emerges from a need for an ability to continually and flexibly improve professional practices in order to respond to the impact of new knowledge, methods, and digital technologies. On the basis of the newly published book *Networked Professional Learning - Emerging and Equitable Discourses for Professional Development*, we will discuss the concept of Networked Professional Development and how universities can contribute to society through educational practises that support networked professional development – both in formal and informal settings. The discussion will take off from the following three questions:

- How do universities further develop Networked Learning as a professional development practice?
- What capacities do universities need to utilize to conduct Networked Professional Development?
- In which organisational settings (public- and private sectors alike) is Networked Learning a fruitful approach to Professional Development?
- How do universities involve end-users (e.g. the leaders, the HR-departments, the professionals, students etc.) in the process of designing practices and spaces for Networked Professional Learning?

Goal:

To exchange ideas and knowledge about practices of Networked Professional Learning

Engaging participants:

Using design workshop inspired tools and techniques to spark a discussion and to catch and collect insights that might emerge underway.

Round table Submission Template

Host name
Emmy Vrieling-Teunter[a], Rosanne Hebing[b], and Marjan Vermeulen[a]
[a]*Welten Institute, Open University, Heerlen, the Netherlands;* [b]*Iselinge University of Applied Sciences, Doetinchem, the Netherlands*

Round table title
Student welfare through involvement and networked learning in primary teacher training

Elevator pitch: Address the topic and the questions to discuss at your round table
What makes students eager to learn? This is a fundamental question for every educator. After all, students who are motivated and involved in their studies are more likely to succeed (Affolter, Gerber, Grund, & Wagner, 2015) and simply 'pleasant to teach'. Student welfare is particularly relevant for primary teacher training colleges in the Netherlands, which struggle with dwindling student numbers, high variety in student population, and the risk of study delay or dropout (Dutch Inspectorate of Education, 2017).

In order to enhance student engagement, teacher training colleges in different regions in the Netherlands - Doetinchem, Utrecht, Rotterdam, and Amsterdam - have formed teacher learning groups (TLGs) on various topics relevant for (pre-service) teachers, consisting of students of different years, teacher trainers, and in-service teachers. TLGs are increasingly acknowledged as a powerful means of enhancing learning and development. On the one hand, they offer students room for social learning and agency, stimulating their involvement and motivation (Vrieling-Teunter, Van den Beemt, & De Laat, 2019). On the other, they stimulate and facilitate in-service teachers' professional development (Lieberman & Wood, 2003). As TLG participants work together to solve authentic problems (Laferrière, Lamon, & Chan, 2006), both pre-service and in-service teachers gain specific and concrete ideas that can be directly related to their own classroom practice (Guskey, 2002). TLGs can thus be seen as social action evolving around relationships, or ties. TLGs, as collections of ties, enable both collaborative and individual learning and knowledge sharing (Schreurs et al., 2014).

Previous research has mainly focused on in-service teachers in TLGs. The current study explicitly puts student learning to the forefront (cf. Huiskamp, Vrieling, & Wopereis, 2017). A prerequisite for students' successful TLG participation is facilitation; enabling TLG participants in terms of time, space, and skills is fundamental for social learning and innovation (Hanraets, Hulsebosch, & De Laat 2011). Traditionally, most teachers carry out their work individually in their own classroom settings (Doppenberg, Bakx, & Den Brok, 2012), which makes the integration of social learning in schools a difficult manoeuvre (Vangrieken et al., 2014). Another complicating factor is that TLGs are often discipline-specific and their ties strongly localised (Pataraia et al., 2014). This makes it less likely for TLG participants to be exposed to new ideas and to integrate ideas created elsewhere into their own practice (Pataraia et al., 2014). In order to comply with the need for facilitation, we look for guidelines that assist facilitators in optimising the professional development of students in TLGs. For this aim, we perform a review study that searches for guidelines for designing TLGs as an educational setting, specifically focusing on the way in which we best facilitate students' role.

The preparation of students for their social role as learning professionals in schools is weakly conceptualized in teacher education curricula (Dobber, 2011). It is therefore relevant to consider ways in which teacher trainers can prepare students for successful participation in TLGs as part of the continued professional development in practice. Our review study was guided by the following research question: What facilitation guidelines can be discerned in literature to optimise pre-service teachers' professional development in TLGs?

The studies presented in the literature review were identified in several steps. First, searches on the EBSCOhost database were applied. This meta-database includes, among others, the ERIC and Web of Science databases. Peer-reviewed journal articles and book chapters published between 1 January, 2000 and 7 June, 2019 were included. In line with an earlier review study in the area of teacher facilitation in TLGs (Vrieling, Van den Beemt, & De Laat, 2018), we used the keywords 'team learning', 'network learning', and 'community learning' to integrate the three basic forms of social learning in literature. In addition, we used the key word 'collective learning' because collective learning also concerns a long-term perspective and is appropriate within educational teacher curricula. In sum, the following key words were used for a Boolean search: 'team learning' OR 'network learning' OR 'community learning' OR 'collective learning' AND 'teacher education' AND 'student learning'. This search resulted in 269 articles. In addition, we sought for studies in the specific area of student welfare using the key words: 'teacher education' AND 'student welfare'. This search resulted in 5 articles. After exclusion of the double findings, 190 articles remained.

The abstracts of all selected sources were studied first, resulting in a final selection of articles. After reading the abstract of the articles, 175 sources were left out of the analysis because they did not meet the inclusion criteria: (1) student involvement; (2) social learning; (3) relationship teaching institute and workingplace; (4) face-to-face and blended learning. Exclusion criteria were: (1) student collaboration; (2) student-teacher collaboration; (3) team teaching; (4) online learning. In total, 15 studies were read in depth. These studies provided the basis for further analysis.

In the final phase, the selected sources were categorized by: (1) first authors' names; (2) title of source; (3) year, volume and issue number of publication; (4) type of research (conceptual versus empirical); (5) clarity of method section; (6) main findings of the theoretical search. During the content analysis, the properties of the textual information were systematically identified by their relationship with (A) characteristics of student learning in TLGs; (B) inluencing factors on student learning in TLGs; (C) effects on student learning in TLGs, including student welfare.

The results show that the facilitation of student learning in TLGs has not been a prolific topic of scholarly publication (n=1; Elster et al., 2014) over the last twenty years. It appears to be an unexplored area that needs further elaboration in future research. The following table shows the findings of Elster et al. (2014) that fit within our three categories.

Characteristics of student learning in TLGs	The term Community of Learners (CoL) is based on theories of situated learning which describe the collaboration of teachers with each other and with researchers. CoLs are expected to improve learning and teaching skills, to share responsibility for professional growth, and to partake in professionally guided discourse about one's own teaching and learning.
Inluencing factors on student learning in TLGs	➢ Setting joint goals for the participants in a learning community ➢ Focusing on students' learning (outcome orientation) ➢ Reflecting on curriculum, teaching, and learning processes ➢ Focusing on collaboration ➢ Enabling teachers to perceive themselves as learners ➢ Ensuring autonomy and freedom of decision-making
Effects on student learning in TLGs, including student welfare	➢ Increase of subject knowledge in the field ➢ Increase of methodological knowledge ➢ Increase of the self-estimation of students' own competences that led to the willingness to teach in this way ➢ Increase of practical knowledge on how to initiate and conduct processes in the field, which in turn led to a readiness to use the aquired knowledge in practice ➢ Increase of interest in self-reflection

In addition, we found the following categories in literature:
- Community engagement (n=9): The combination of learning objectives with community service in order to provide a pragmatic, progressive learning experience while meeting societal needs of student learning outside the institute in the community;
- University-school partnerships (n=5): working partnerships between university teacher-educators and school teachers to design, develop and deliver innovative learning experiences that bring together not only people with different perspectives, but also pedagogical theory, research and practice.

Goal: Illustrate what you would like to achieve as a collective outcome

Although teacher training institutes see the value of networked learning for their students, the findings of the review study show that attention for student learning in TLGs in educational curricula is scarce. This indicates the necessity to do follow up research in this area. The round table presents an opportunity for us to exchange our experiences and collaboratively search for facilitation guidelines for students participating in TLGs. We will search for additional theoretical sources and practical examples that will be structured according to the three categories mentioned above: A) characteristics of student learning in TLGs; (B) inluencing factors on student learning in TLGs; (C) effects on student learning in TLGs, including student welfare.

How to engage the participants into the discussion

After a general introduction (5 minutes), we will first share our experiences and results, grounded upon the three categories mentioned above (5 minutes for each category). Then we will collect ideas that are written on three white papers (one for each of the three categories) in the conference room, distinguishing between theory and practice (45 minutes). To wrap things up, we will discuss how the input contributes to facilitation guidelines for students participating in TLGs (20 minutes) and necessary follow up research concerning student learning in TLGs (20 minutes).

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Nordic Approaches to Computational Thinking in Teaching and Learning

Host names: Johan Lundin (University of Gothenburg), Renate Andersen (Oslo Metropolitan University), Teemu Leinonen, Nina Bonderup Dohn (University of Southern Denmark), Håkon Swensen, Louise Mifsud (Oslo Metropolitan University), Anders Morch (University of Oslo), Anders Kluge (University of Oslo), Stig Børsen Hansen (University of Southern Denmark), Daniel Spikol, Jussi Mikkonen (University of Southern Denmark), David Cuartielles, Rocio Chongtay (University of Southern Denmark)

Abstract

- Nordic countries have recently implemented changes in the curriculum introducing computational thinking integrated in Mathematics, Natural Science, Arts and Crafts and Music. This poses challenges as well as opportunities, in particular for teacher education, as it is responsible for educating teachers who can teach computational thinking skills within these subjects.

Round table description

In this round table, we focus on critically examining the notion of computational thinking (e.g., Denning & Tedre, 2019) in the context of teaching and learning. For example, teacher education has the mandate to educate teachers who can teach pupils programming skills according to curricular demands and programming related to computational thinking. Given the current capacity of training teachers in learning and teaching programming in the Nordic countries, we are dependent on teachers' engaging in networked learning in professional communities, including teacher communities of practice and online access to best practice by examples.

Another example is to examine to what extent the practice of programming (learning and doing it) can develop pupils' computational thinking skills and vice versa if knowledge of computational thinking can improve one's skills in programming. We consider these concepts as in tandem, where one necessitates the other. Another approach will be to question whether programming would lead to improved skills and competency in computational thinking. It is also relevant to question the concept of computational thinking in light of what the future citizens would need in order to handle the increased digitalization of society, organizations and leisure life. In addition, we ask the question whether it is a good idea to teach and learn three things at the same time: Computational thinking, programming, and subject matter (math, natural science, etc.)

The roundtable addresses the challenges and opportunities that the introduction of computational thinking in compulsory schooling leads to, as seen from a networked learning (NL) perspective. We understand networked learning along the lines of the second approach in the overview provided by Dohn et al (2018) of Networked Learning Conference perspectives, focusing on *learning networks*: "What makes learning 'networked'" is the connection to and engagement with other people across different social positions inside and outside of a given

institution. The network is supportive of a person's learning through the access it provides to other people's ideas and ways of participating in practice" (p. 204). Learning networks need not be mediated by ICT within this approach but may also refer to co-located people (small group participation) who engage in a range of hybrid virtual-physical learning activities (Dohn, Sime, Cranmer, Ryberg, & De Laat, 2018).

We suggest discussing the following questions in a plenum round table at the conference, which we believe is of interest to the general audience:

- Is computational thinking the right concept for promoting digital citizenship and empowerment?
- What are the arguments for introducing computational thinking and/or programming in school (all Nordic countries are in a similar position when it comes to integrating programming in specific subject areas such as math and natural science, but also arts & crafts and music in some countries)?
- The relationship between computational thinking and programming is well established in computer science, but will computational thinking for computer science integrated into other subjects serve a useful purpose, or will it take focus away from the subject matter?
- How can computational thinking support collaborative and networked learning processes?

Goals of the round table - collective outcome

- Input from the audience to what should be a working definition of "Computational Thinking" of practical relevance for teacher education, focusing on teachers' communities of practice as "learning networks". We aim to achieve this by combining a top-down and a bottom-up process. Top down by looking at how computational thinking is operationalized in the Nordic curricular/policy documents (a preparatory activity by the panelists), and bottom up by the ideas emerging in the roundtable discussion.
- Broadening the scope of participation to other schools / research groups in the field.
- Presentation of annotated exemplars of what "Computational Thinking" cases could be both as a subject in its own right and as applied to or integrated in other subjects.
- Identifying relevant interdisciplinary literature.
- A critique of current, inadequate/outdated definitions of CT? (It seems the original idea is interesting but that it has been simplified or "watered" out in later / contemporary interpretations. Should we go back to sources or start from the current best definition?)
- Practical examples (of using CT) in learning and in teaching programming courses such as 1) studies of teaching it and 2) teacher cases. For example, we could be collecting a broad scope of practices that might create a good pool of material for directing work towards best practices, and driving the development of new methods.
- Making distinctions and types of practice with ICT (e.g. to distinguish between programming in hardware-oriented approaches (Micro: bit/Arduino; maker spaces) vs programming for non-specific hardware (Scratch/Python on screens only), distinguishing different ways of invoking a program (event-based, automata-based, flow-based, etc.)

- Distinguishing programming environments from e.g. domain-oriented design environments; where in the latter programming is introduced to solve breakdowns (e.g. programming in Minecraft to enhance game experience and make tedious tasks simpler)
- Collaboration/Nordic unique perspectives: Computational participation and collaborative aspects is part of the Nordic tradition of programming and systems development that started back in the 1970-80s with Participatory Design projects (Nygaard, 1986) and treating programming as theory building (Naur, 1985).
- How do we differ from other popular approaches/perspectives that also advocate participation/collaboration (e.g., Kafai, 2016)
- How computational thinking make sense in educational policy documents and national educational plans such as curricula for specific subjects with core concepts and learning goals?

How to engage the participants in the discussion

- We ask panelists and audience to bring (a) case(s) for discussion, good, bad, and ugly examples.
- Panelist(s) will show examples of empirical research (results and data) with the aim to present in non-technical language to motivate audience participation
- Demonstration prototypes tested out in one or more educational institutions
- Engage the audience in using computational tools (e.g. Arduino or Minecraft).
- A short design experiment for anyone to understand the complexity of the term.

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Workshops

Workshop proposal for Networked Learning Conference

Convenors and/or Presenters:
Nina Bonderup Dohn, Stig Børsen Hansen, Ane Bjerre Odgaard, Roland Hachmann

Workshop Title:
(How) Can computational things be utilized in networked learning?

Workshop Description:
The aim of this workshop is to discuss with participants what roles (if any) "computational things" can have in networked learning practice and, vice versa, what roles (if any) networked learning can have in learning with "computational things".

"Computational things" are physical artefacts which use computer programs to bring about observable changes in themselves or other artefacts. Typically, the interaction between the computational thing and the environment is mediated through sensors and actuators. Lego Mindstorms, Kubo robots, e-textiles, as well as things integrating Arduinos and Microbits are all examples of computational things. Increasingly, computational things are introduced in education at all levels to support the learning of computational thinking. Because of their materiality, they are useful for concretizing abstract processes and lend themselves to tinkering, which is generally found to support student engagement and motivation (Kafai, 2016; Kafai & Resnick, 1996; Resnick, Berg, & Eisenberg, 2000). On the face of it, however, precisely because of their materiality, they would seem more suited for learning anchored in specific places; i.e. for learning in what Carvalho et al. have termed "place-based spaces for learning" (Carvalho, Goodyear, & de Laat, 2017). On the other hand, research provides examples of competences that may be fostered through networked learning despite their dependency upon physical presence, e.g. beer brewing (Wright & Parchoma, 2014). And Kafai's work on computational participation, though focused mainly on screen-based programming e.g. in Scratch, includes examples of what might be termed networked learning with computational things in the form of e-textiles (Kafai & Burke, 2014).

The workshop will have both a theoretical and a practice focus, dealing with questions such as:
- How can computational things, situated in "place-based spaces for learning", be utilized in networked learning across geographical settings?
    - Which forms of boundary crossings are required?
    - How can such boundary crossings be supported in practice?
    - What would be relevant learning designs for *networked learning with computational things* at different educational levels?
- How can networked learning be utilized for learning computational thinking with computational things?
    - Which forms of boundary crossings are required?
    - How can such boundary crossings be supported in practice?
    - What would be relevant learning designs for *learning computational thinking with computational things through networked learning* at different educational levels?

- What concepts of materiality are useful in conceptualizing computational things?

Intended Audience
Delegates interested in computational thinking and in supporting the learning of computational thinking utilizing material, programmable artefacts - and in discussing how this focus relates to networked learning, theoretically and practically.

Participant Engagement
We shall bring several computational things (e.g. Lego Mindstorms, Kubo robots, Microbits kits, Arduino kits) for participants to get acquainted with and try out. We shall then make a poster session where participants in groups develop ideas for learning designs with *networked learning with computational things* or *learning computational thinking with computational things through networked learning.* Groups will be asked to circulate to other posters and comment on the developed designs.

Participant Outcomes
Participants will go home with ideas for learning designs with *networked learning with computational things* or *learning computational thinking with computational things through networked learning*. They will also go home with theoretical reflections on how abstractions can be concretized through material, programmable things, and how this potentially may hinder transfer to other situations.

Workshop Alignment with Conference Themes
The conference themes include *Transfer and transformation of knowledge, practice and networked learning* and mentions Computational thinking as an emerging issue. This workshop will look at the situated processes of computational thinking with computational things and discuss the role of networked learning in transfer of these processes to other contexts.

Workshop Process/Activities (please provide an indication of how long each activity will last)
1. Introduction to the workshop, including practice examples of learning computational thinking with computational things (the computational things are passed around), presentation by conveners and examples from the audience, 20 min.
2. Poster session, step 1: self-formed groups (4-6 people per group) develop ideas for learning designs, facilitated by convener questions. Design notes/drawings on poster. 30 minutes
3. Poster session, step 2: Circulation of groups to next poster. Comments on design, facilitated by convenor questions. Notes on poster. 10 minutes
4. Poster session, step 3: Circulation of groups to next poster. Comments on design, facilitated by convenor questions. Notes on poster. 10 minutes
5. Poster session, step 4: Groups return to own poster. Read notes. Prepare plenum comments on design. 5 minutes.
6. Short plenum presentations of designs & comments on design. 15 minutes.

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Networked Learning Conference 2020 https://www.networkedlearning.aau.dk/nlc2020/call-for-papers/

1.5 hour workshop presentation submission

Title of Presentation:
Developing an Institutional open educational practices (OEP) Self Assessment Instrument

Intended Audience
Individuals and institutions interested in taking a look at OEP and how to scale OEP initiatives at their institution; those interested in self assessment tools that speak to the current state of OEP initiatives; those involved in the identification and creation of institutional OEP supports for students and faculty.

Workshop Description
As institutions move to considering the implementation of open education environments, it is critical to understand the characteristics and potential success factors for institutional open educational practices. Higher education institutions are changing to meet the needs of contemporary learners, and as a result, there is a need to discuss the benefits and challenges of implementing open education practices in these spaces (Paskevicius, 2017). While there are currently limited institutional case studies on openness to build upon (Morgan, 2018; Childs, Axe, Veletsianos & Webster, 2019), there is potential for the lessons learned from the rich research on blended learning (Lim & Wang, 2017; Graham et. al., 2013) and institutional transformation research (Kezar & Eckel, 2002) to lend insight to potential practices for institutional OEP initiatives. By adopting both an appreciative and critical approach, a draft OEP self-assessment instrument for institutions was created with the intention of examining the similarities and differences between institutional approaches and their evolution.

This workshop will provide an overview of the theoretical underpinnings and description of the OEP self-assessment instrument and its component parts. Through small group activities, participants will examine and discuss propositional categories and components of the OEP self-assessment instrument. Participants will complete the online OEP self assessment instrument and discuss their experience with a focus on expanding their understanding of what others are doing in institutions globally, and improving the OEP instrument for global use. Participants will also identify initiatives and/or approaches that could help expand OEP at their own institutions.

Participant Engagement
Participants in small groups will complete the OEP self assessment instrument and contribute to the evolution and refinement of existing practices for expanding OEP uptake in models of contemporary learning.

Participant Outcomes

Participants will examine and discuss:

- · what it means to for an institution to embrace OEP;
- · ways to measure the current state of institutional OEP;
- · existing practices for institutions on an continuum of openness

Workshop Alignment with Conference Themes

- Theories, methodologies, and design for Networked Learning
- Learning on the move; places and spaces for networked learning
- Learning at scale, in the wild, and across boundaries, (in)formal, professional and open lifelong networked learning.

Workshop Process/Activities (please provide a indication of how long each activity will last)

Proposed draft agenda for the workshop:

Timing	Task
5 min	Introductions & description of context (BCCampus; BC post-secondary institutions involved; OEP project impetus)
15 min	OEP theoretical underpinnings and model description & propositional definitions and categories
20 min	Individual or pair completion of the OEP self assessment instrument
20 min	Small group examination of categories & areas of focus (think, pair, share, group) · 1 min silent reflection; 3 min w elbow partner; 12 min w group of 4
10 min	Small group revisit your experience with the OEP self assessment instrument and · discuss potential refinements/gaps · write gaps and suggestions for edits on flip chart paper on table · lessons learned/shared Note: may use liberating structure technique in this section to solicit input
10 min	Gallery walk

10 min	Large group structured debrief; next steps; invitation for continued involvement

Convenors and/or Presenters

Dr. Rasha Essam

Workshop Title

Data Visualisation: Visualise your data by connecting to the universe

Note: The term "the universe" here is used in order to highlight that the visuals which the attendees will use in order to represent their analysed data are related to the universe/life making it easier for readers to relate and understand, leading to faster and more accurate decisions that can affect their findings and conclusions while doing research studies.

Workshop Description

The planned contents of the workshop and the way participants are intended to engage:

- Data visualisation examples will be presented for asking participants to interpret and draw conclusions from.

- The advantages of data visualisation will be highlighted.

- A comparison between good and bad data visualization will be highlighted.

- Participants can bring their own data to work with, and/or they can work with the presenter's data in order to analyse and represent data in a visual format.

- All participants need to bring with them their laptops and have Microsoft PowerPoint installed on it.

Intended Audience

All researchers who want to analyse and represent their data visually for the ease of processing, understanding, learning, and quick decision making.

Participant Engagement

Participants will be engaged in two types of activities for the interpretation and visualisation of data. That will be done by providing graphically illustrated icons that are designed and developed by the presenter and given for free to all participants to help them in visualising complicated data easily. The icons are related to familiar visuals which they used to see every day in the universe/life, so that when they represent the data through these icons, readers can understand them quickly and relate. These icons are provided by the presenter and will be shared with all attendees for free.

Participant Outcomes

Participants will be able to: 1) interpret different types of visually-represented data; 2) visualize qualitative/quantitative data; and 3) represent data through visual representations using the icons provided by the presenter.

Workshop Alignment with Conference Themes

The connection between the workshop to networked learning relies in the data representation of data collected in the research studies related to networked learning. Data after being analysed are represented visually for the ease of understanding and decision making. The data are represented in the form of different types of networks that can be further analysed for showing transparency in the meaning behind the connection existing in the analysed data elements. In addition, the two themes that are related to the workshop are:

1. Methods, research design, data and analysis in Networked learning (e.g. phenomenography, social network analysis, ANT and post-ANT)

2. Roles of learning analytics, big data, and artificial intelligence in Networked Learning

Workshop Process/Activities (please provide an indication of how long each activity will last)

The workshop will start with the importance of visualising and representing complex data visually for facilitating the learning and decision-making processes in addition to minimising the word count problem while writing any piece of research. Furthermore, the workshop will include two activities as follows:

1. Visual data interpretation (30 minutes) [The presenter will show different models of data analysed in a visual format. In addition, the presenter will show the difference between good and bad data visualisation that can affect their findings and conclusions further.]

2. Visual data representation (60 minutes) [The attendees will be asked to use the provided icons to represent their own data or the data provided by the presenter. The presenter will act at this stage as a facilitator in order to provide feedback and answer questions.]

3. Closure (15 minutes) [All attendees' data representations will be shared among each other for feedback from each other.]

Workshop proposal for Networked Learning Conference

Convenors and/or Presenters
- Dr. Jen Ross, Senior Lecturer in Digital Education, University of Edinburgh
- Dr. George Veletsianos, Professor and Canada Research Chair in Innovative Learning and Technology

Workshop Title
What's the future like? Speculative Methods in Networked Learning

Workshop Description
The goal of this workshop is to introduce participants to speculative methods and explore their application to the field as a way of imagining potential futures and scenarios for learning, design, and technology. We define speculative methods as "research approaches that explore and create possible futures under conditions of complexity and uncertainty" (Ross, 2018). We aim to facilitate a broader conversation regarding the future of technology and networks in education through the exploration of the use of speculative methods as research methodologies.

Recent years have seen increased interest in and discussion of education futures. Some of the emergent discussions include conversations around how technologies manifest themselves in our daily lives and educational experiences (Aagaard, 2018), and what may be appropriate pedagogies to equip learners for the future economy (Facer & Sandford, 2010). As Ross (2017) argues, envisioning futures also "inform[s] us about what matters now in the field, what issues and problems we have inherited and what debates define what can or cannot be currently thought about or imagined" (p. 220).

Considering that the current state of education, at all levels, is situated within a context of ever-evolving social, cultural, political, and technological shifts, there is a need for networked learning scholars and practitioners to explore various ways that they can imagine and design future potentials and realities. The use of speculative methods enables researchers to ascertain and discern between probable, possible, and preferable trajectories (Bell, 2017) to offer evidence-based guidance when making current decisions related to networked learning, and to explore what may or may not be possible in their own contexts. They also give us tools for taking critical perspectives on the nature of the future itself, and how we think about and work towards particular education futures (Facer 2016). In prior iterations of this workshop (Veletsianos, Belikov, Johnson, 2019), participants appreciated being able to think creatively about the future and identify micro, meso, and macro obstacles to reaching them.

Intended Audience
Individuals interested in critically exploring and designing education futures. These include students and academics (who may be interested in applying this method to their scholarship), and practitioners such as learning designers or administrators (who may be interested in using this method in institutional change-making efforts). This workshop is appropriate for anyone with an interest in designing and developing learning environments, creating new learning experiences, exploring the opportunities and challenges created by new or current technologies, leading conversations at their institutions around potential futures for their programs and departments, and exploring a variety of other potential futures for their work and scholarship.

Participant Engagement

The workshop is divided into 3 sections.

The first section will involve a presentation of foundational knowledge necessary for the application of speculative methodologies. Participants will learn about the theoretical background of futures and anticipation studies, types of speculative methods that have been applied to previous studies relevant to educational technologies, and the benefits and limitations of this research approach.

The second section will invite participants to apply speculative methodologies in order to imagine future scenarios for a topic that they are interested in. Participants will be divided in small interest-based groups and will use creative approaches to individually and collaboratively develop and discuss future scenarios. Scenarios may explore educational issues including datafication, privacy, augmentation, presence, interaction, and post-digital networks in the context of global challenges and issues.

The third section is a culminating discussion in which participants will be asked to share what they discovered during the prior activity along with how they could apply speculative methodologies to their research practice based on their current interests. Within this critical discussion we will challenge participants to reflect on their own biases and consider what drives their speculative exploration. We will also invite participants to share any experiences they have had with these methodologies, as well as explore potential difficulties and methodological decisions that may need to be addressed as we implement these technologies.

Participant Outcomes

By the end of the workshop, participants will
- develop a foundational knowledge of speculative methods
- develop a speculative scenario
- investigate how speculative methods apply to their own practice

Workshop Alignment with Conference Themes

The workshop explores the use and application of an emerging research method in networked learning, and aligns with the following conference themes:

- Theories, methodologies, and design for Networked Learning
- Methods, research design, data and analysis in Networked learning (e.g. phenomenography, social network analysis, ANT and post-ANT)
- Philosophy and educational technology
- Networked learning literacy and agency
- Debates and emerging issues in networked learning (e.g. postdigital education, computational thinking, online activism)

Workshop Process/Activities (please provide an indication of how long each activity will last)

Time in minutes	Activity
10	**Welcome & Introductions**

	Round Robin intros
15	**Presentation:** Share foundational knowledge on speculative methods
40	**Small-group discussions and activities**
10	**Break**
30	**Large-group discussions**
5	**Closing**

References

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Networked Learning Conference 2020

Title of Presentation:
GELO and GreX: A framework and dashboard to investigate technology competency and culture.

Intended Audience
Individuals and institutions interested in taking a look at fully online learning with community supports; those interested in assessment tools that speak to the readiness for participation in fully online learning environments; those involved in the creation of supports required by institutions for students and faculty.

Workshop Description
Participation in 4th Industrial Revolution society is increasingly dependent upon competencies related to the use of digital technologies for a wide variety of purposes. A person's competence in the use of digital technologies has implications for a wide variety of contexts and situations, including learning in physical as well as virtual spaces, career choices and employability, digital citizenship, cultural orientations and values, and even democracy (Erstad, 2010). This workshop will provide an overview of the Global Educational Learning Observatory (GELO) project and invite participants to experience a variety of self-assessment tools accessed through the customizable dashboard, the Global Readiness Explorer (GREx). The GELO project attempts to provide a framework for an international network of institutions utilizing data-driven evidence to inform evolving best practices for online and mobile learning.

To achieve this, the project (i) assembles a nucleus of formal educational institutions, (ii) constructs the necessary tools to extend research on formal learning models, and (iii) reaches into the workplace as well as other more public spaces to integrate with informal learning settings. The primary source of data derives from a customizable dashboard, the Global Readiness Explorer (GREx), and the tools that can be implemented within it. These tools are designed to give individuals, organizations, and institutions the means to construct complex profiles that can be used to identify gaps in competency attainment and development. Through small group activities, participants will examine and discuss the various tool suites in the GREx including the digital learning competency profiler (DCP); the fully online learning community survey instrument (FOLCS); the Personal Cultural Orientation Scale (PCOS) and others. In this workshop, participants will choose a self-assessment instrument to participate in and then discuss their experience with a focus on improving the GREx tool suite for global use. In addition, participants will examine the GREx for use with their students as a component of determining readiness for moving into fully online learning environments. The workshop will conclude with an explanation of the global educational learning observatory (GELO), and participants will be invited to join this global research network.

Participant Engagement
Participants in small groups will discuss, and experience the DCP, the FOLCS and a variety of online tools associated with GREx, and contribute to the evolution and refinement of theoretical descriptive and predictive models of contemporary online learning.

Participant Outcomes
Participants will examine and discuss:

- · what it means to be a fully online learner;
- · what does it mean to be working in an online community in formal educational contexts;
- · ways to measure readiness;
- · collaborative research (GELO) approaches and tools to examine readiness, culture, competence (confidence and frequency of use of technology) and the impact of this in fully online learning environments.

Workshop Alignment with Conference Themes
- · Theories, methodologies, and design for Networked Learning
- · Methods, research design, data and analysis in Networked learning (e.g. phenomenography, social network analysis, ANT and post-ANT, learning analytics, big data)
- · Networked learning in the public arena (open learning and networked publics)
- · Learning on the move; places and spaces for networked learning

Workshop Process/Activities (please provide an indication of how long each activity will last)

Proposed draft agenda for the workshop:

Timing	Task
5 min	Introductions & description of context (UOIT, RRU, EILab)
15 min	GELO and GREx history and toolset, theoretical underpinnings and model description
20 min	Small group examination of some of the toolsets (think, pair, share, group) 1 min silent reflection; 3 min w elbow partner; 12 min w group of 4
20 min	Individual or pair completion of the DCP; FOLCS or other tools in GreX
10 min	Small group discussion about the toolset experienced · gap analysis re: match/differences/ areas of question · write gaps and edits to definitions on flip chart paper on the table
10 min	Gallery walk
10 min	Large group structured debrief and next steps (GELO invitation)