Research in Networked Learning

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Conceptualizing and Innovating Education and Work with Networked Learning

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It is going beyond the usual euphemisms to say that this volume on networked learning is timely and urgently needed. As face-to-face engagement and easy travel have become perilous and the need to collaborate with others heightened, electronic technologies enabling processes are required to address emerging challenges and open up opportunities through 'net-working'. Individuals and communities previously excluded can now be engaged in and be empowered through interactions where cameras are now as important as keyboards.
Borne out of focussed necessity, offered here are sometimes raw and responsive contributions offering salient insights and approaches into how one enables processes of 'net working' electronically. Across its three sections these contributions explore processes for supporting learning and working through conceptualizing, designing and enacting networked experiences across professional development, vocational education and higher education, and from the perspectives of institutions and persons including educators, students and other kinds of learners.
Stephen Billett
Griffith University

The book manages both to give an introduction to the field of networked learning, to show examples of designs for networked learning, and to provide an up-to-date insight into the current state of networked learning research. The chapters include several very interesting and highly relevant points for education, both within institutional, professional and informal learning. One of the key focus areas of many of the chapters is how a networked learning approach places emphasis on strengthening the individual learner's agency and developing professional learners' own unique practices. For example, the book argues for moving from pre-designed, one-size-fits-all courses to networked learning activities that are designed in the process and that accommodate individual learner needs. Finally, the book also points towards key challenges for designing networked learning. The pedagogical methods of networked learning, for instance openness, collaboration, dialogue, sharing, can be challenging to learners that are accustomed to more traditional forms of education. Together, these points, arguments and perspectives give

us directions for the future development of the field of networked learning.
Christian Dalsgaard
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Due to the timing of NLC 2020 in May 2020, the way it was held as an online event, together with the maturity of the field it might be said this book represents a coming of age of networked learning. It is certainly a very timely collection that provides insightful and relevant chapters to reflect on what has happened and has taken place since the COVID 19 pandemic hit the world in early 2020 and the consequent developments and response to it by, in particular, educational institutions across the globe. Based on well researched practice underpinned by strong theoretical thinking and ideas, the book is an up-to-date and attractive compendium and resource for both researchers and practitioners across the world—with contributions from all corners of the globe, including the global south and north, thus offering wide and more culturally aware insights. Furthermore, the editors have done a great job in the final chapter of setting the scene for future and important research agendas.
While there is often an urge to pin down the definition of what is networked learning, the chapters show the benefit of having a fluidity but commonality to how we can all engage and learn from courses and initiatives that fall under the broad umbrella of networked learning. The inclusion of some well-constructed frameworks that recognize there is no one-size-fits-all approach to networked learning is impressive. As is the celebration of the importance of technology in its role of supporting the connecting of people and resources and pedagogical approaches based on collaboration, dialogue, inquiry and community while also being mindful of critical issues such as social justice, ethics, trust and empathy.
I would recommend this Networked Learning series book on Conceptualizing and Innovating Education and Work with Networked Learning *to anyone interested in the future of digital education, including networked work learning.*
Vivien Hodgson
Professor Emerita of Networked Management Learning, Lancaster University Management School

Introduction

This book has emerged out of the 12th International Conference on Networked Learning, held 18–20 May 2020 (NLC 2020). From the many interesting, high-quality papers presented at the conference, we have chosen a set which reflect focal points that were raised during the conference. These focal points were repeatedly returned to during the conference sessions and they crystalized in the final plenary session. Here, we invited participants to write, first in the session chat and afterwards on an online board (a padlet), themes and ideas that they had found interesting, thought-provoking and/or emerging for future investigations. Many themes and ideas were suggested, and we have not been able to follow up on all within one volume. Still, we believe to have picked up on most of the suggestions, while also adhering to another important criterion for inclusion in a book like this: to establish coherence of contributions. In the months following the conference, the chosen papers have then been further developed by the authors, through rounds of reviews and revisions, into the chapters making up the body of this collected volume.

We experienced NLC 2020 as a very special conference. It took place during the first wave of the COVID-19 pandemic and was one of the first conferences that, on very short notice, had to be converted from the anticipated usual physical format (to be held at University of Southern Denmark (SDU), Kolding, Denmark) to a fully online conference. Of course, in the months (and in some cases: years) after NLC2020 this became the 'new normal', as all conferences that were not cancelled moved online. To capture the feel of the time, we wrote this introduction fairly quickly after the conference and have only slightly edited it since then (primarily with these sentences). This means that the following depiction of the process will read a bit quaintly, given that what then was uncharted land for us has since become routine considerations and practices. We find that the quaintness holds merit in giving voice to the novice organization of a networked conference and in expressing experiences of our Networked Learning community which we might otherwise forget we ever had.

The realization that we would have to convert to an online format dawned slowly on us in the organizing committee and at different stages due to the different national responses that we were confronted with. Maarten de Laat was the first to point out

that ‘we probably need to start thinking about going online’, whereas in the Danish group we were initially less concerned. Even up to primo March we were still considering that it might be possible to host the conference physically and include online participants. However, following the national lock-down in Denmark on March 11–12th, we started to respond fully to the gravity of the situation. On March 25th, we announced that the conference would be held fully online, and on April 2nd, we further announced that conference participation would be free of charge and that the costs would be carried by the Networked Learning Conference funds. Having made this overall decision, some key, urgent actions needed to be carried out within the short timeframe left to secure a smooth online running of the conference. For instance, we were not yet fully sure which online platform we could use to host the conference. While Zoom seemed to rapidly develop into the default platform for many online events, critical voices were also raised in terms of security and data collection, and some universities discouraged their staff from participating in Zoom meetings (to the point of fully blocking participation). Further, there was an issue of ensuring that we had enough institutional licenses available for hosting largescale live sessions. We also discussed what delivery formats would be best suited for a global conference, how to build and maintain a sense of community, and how to welcome new conference participants. Further issues concerned the time commitment we could expect from our participants and the kind and amount of technical support we needed to have on stand-by to deal with potential connection problems and secure a smooth conference experience for all.

The question about delivery formats was one of the most challenging as the conference experience and participation possibilities would to a large extent hinge on this. Should the conference be hosted as a synchronous event, i.e. with timed live-sessions, or should we offer asynchronous sessions with pre-recorded videos and forum discussions that could be spread over a longer period of time? An asynchronous format can better accommodate to different time zones, but there would be a serious risk that participants would treat the conference as a side activity they could get to later on. This would clearly jeopardize the lively discussions usually found at NLC. Therefore, to enhance the possibilities of NLC 2020 becoming a lively community and networked learning experience, we decided for a synchronous event, utilizing Adobe Connect. This decision also took into account that conference delegates would already have reserved the dates for the planned regular physical conference, whereas the longer period of time needed for an asynchronous format might challenge their ability to take part and potentially further marginalize their engagement. The drawback of choosing a synchronous format was that participants outside the European time zones would probably not be able to attend all sessions. To compensate for this, we chose to record all the sessions and make them freely available after the conference. Further, we reached out to CanopyLab (www.canopylab.com) who agreed to host the conference on their social learning platform. This gave us a conference landing page for all delegates, with links to the synchronous settings, and with possibilities for delegates to make profiles, get to know each other, reach out and set up meetings to network, collaborate and continue the discussion asynchronously after the live presentations were held.

We are very grateful to CanopyLab for this sponsorship. We are also very grateful to a great number of people and institutions that helped us go from the above-mentioned stage of decisions to the actual running of an online synchronous conference: The IT-support and Centre for Teaching and Learning at SDU, the administration at Aalborg University, and the Danish e-infrastructure Cooperation (DeiC) were all very helpful. A special thank you goes to Christopher Kjær, SDU. Without his excellent support and expertise, we would have been lost. We further wish to thank Springer for sponsoring 2 months' free access to a set of chapters in books on networked learning, starting at the time of the conference. This was a great help in inviting newcomers into the domain of the conference.

Looking back at the event some weeks later, we found that the online conference was well received. Most of us had been in lock-down for several weeks or months by the time of the conference, and in our experience, it represented a most welcome opportunity for delegates to engage with fellow researchers. This engagement of course involved scholarly discussion on networked learning—the theme of the conference—but it also allowed us to share stories about how to survive or cope when working from home, caring for others, with many of us also tasked with home-schooling children and negotiating other challenges of life, like getting hold of toilet paper. These were indeed difficult and strange times as has been well documented in the collectively authored paper 'Teaching in the age of COVID-19' (Jandrić et al., 2020) cleverly collected and curated by Petar Jandric and Sarah Hayes as a historical testimonial to the experiences of teachers and researchers during the early stages of COVID-19.

The decision to have an online free conference resulted in a surge of interest globally, and sign-ups for the conference quickly neared 500, our maximum number of licenses. Figure 1 shows the geographical distribution of registered participants. The conference markedly increased its global outreach as compared to former, physical conferences. We are happy to say that the interest was maintained throughout the event. This is indicated quantitatively by the average attendance of 150 people per day and more than 250 people attending in total. Qualitatively, it is shown in participants' reflections on the opportunities which the online format presented in terms of open and interesting discussions as well as new kinds of dynamics and interaction. Such reflections were repeatedly put forth in the conference's many session chats and they were a vibrant theme also in the last session's chat and padlet calls for themes and ideas. For example, one participant wrote that during presentations chat discussions were '. . .really useful for sharing not only opinions but links to resources as well'. Delegates in general reported feeling a strong connection in the chat. Downsides to the online format were discussed too, of course. A widely reported one was the reduced interaction in between sessions. Delegates missed the opportunities for sharing coffees away from the crowd, 'not having more informal places to go and chat'. Overall, the conference was, however, considered to be a worthwhile first step in online conferencing and it was suggested that this format could 'Pave the way for more environmentally friendly conferences'.

As the conference took place only a few months into the spread of COVID-19 in Western Europe, the new circumstances of education online and hybrid teaching was

Fig. 1 Geographical distribution of registered participants at NLC 2020

another central theme in the feedback. Some pointed at the need for professional development in order to handle online education. Others articulated the need for a dialogue to address future challenges for education. A third point concerned the situation of online learning for the learner: Although teaching takes place online and learning is based on interaction with the screen, the role of the body in learning processes should not be overlooked. One delegate thus suggested: 'Networked learning [is] an expression of enactivism and co-dependence of the individual and the environment'.

In extension of this theme, more general reflections on technology and on how to understand networked learning also surfaced. An exemplary comment was: 'Technology shapes us as much as we shape it'. The discussion of the concept of networked learning was substantial in presentations, round tables and workshops as well as in the comments and observations made. One topic that was raised concerned the nature of that which is being connected: technology as connecting *devices*, technology as connecting *archives and information*, and technology as connecting *people*. This opened for a discussion of the ways in which different media archive and collect information differently and of the surveillance issues that emerge as a result. Finally, ethical issues in the context of networked learning and the future of education was a theme that reverberated with the delegates. Many were concerned about the role of technologies and AI in education: 'How can we trust these tools? What is/should be their relationship with humans?' These are likely be to be themes that will return in coming networked learning conferences.

As indicated, we have chosen the chapters for this book so that they reflect focal discussion points such as the ones mentioned in the preceding paragraphs. In our concluding Chap. 13, we present all chapters in more detail. This will allow us to take up again the question of how they—individually and jointly—signal current and emerging issues within networked learning. Here, we restrict ourselves to presenting the overall discussion points which make out the main themes of the book. The first one concerns how to characterize the field of networked learning—as a community, as an epistemic practice and as a domain. We have represented this focal point in the first chapter (following this Introduction). The chapter investigates how the term 'networked learning' has been used over the years in papers presented at NLC. The overview and discussion provided by the chapter serves as an introduction to the field to newcomers and as a steppingstone into the rest of the book. For this reason, we have allocated it the place of 'setting the stage'. The rest of the book has three parts and a Conclusion written by the editors.

Part I is entitled *Professional Learning*. It picks up on the above-mentioned discussion point, actually central to the NLC series from the beginning: how can networked learning designs and interactions facilitate professional development and learning? The part contains three chapters, concerned in different ways with introducing design to professional development with networked learning. One chapter looks at how a networked professional development course can be used to nurture a design thinking mindset amongst its participants. Two chapters develop design frameworks to articulate and support professional development. One of them reports on a project which aimed to design and evaluate a framework for ICT-mediated boundary crossing in Danish dual Vocational Education and Training programmes. The other one develops a general framework of design dimensions that can be used in designing networked professional development courses.

Part II contains three chapters investigating *Learning Networks' Development and Use of Digital Resources*. All three chapters look at learning networks consisting of educators and at the educators' collaborative development and use of digital resources to support student learning. The focus is on how the educators' engagement with the digital resources work to foster their network itself as well as the educational goals for which the digital resources are designed. One chapter reports from a design-based research study of Danish K-12 teachers' use of the CourseBuilder space for sharing materials. The chapter identifies barriers to this space evolving into a design space for the teachers. A second chapter concerns Canadian university educators' support of their students' development of digital literacy through collaboratively shared, shaped and reshaped instructional material. The last chapter investigates a learning network's use of open learning resources to promote social action in Brazil. The focus on the one hand is on the resources' roles in educational innovation and on the other hand on the building-up of the learning network.

Part III consists of five chapters which in different ways explore *Innovating Networked Learning*, with new formats and aims for teaching and learning, new technologies, and new ways of conceptualizing learning in networked settings. The first two chapters look at new teaching and learning formats in combination with

new technologies. Thus, the first chapter reports from a study of a new teaching and learning format which integrates networked learning and inquiry-based learning at the postgraduate level in Malta. The second chapter takes a critical look at the new blockchain Woolf University and its promise to radically transform higher education, building on cooperative principles. The three remaining chapters introduce new conceptualizations of the learning process and its different aspects. One chapter seeks to reconceptualize human-AI interaction in both formal and informal learning settings from a perspective that sees this interaction as co-constitutive, and in that sense 'more-than-human'. One chapter introduces enactivism as an epistemological viewpoint to conceptualize the multiple relationships between mind, body and environment in networked learning. The final chapter develops a framework for mapping and analysing learners' Personal Learning Networks (PLN). A PLN here consists of the different resources which a person makes use of in learning: people, technological devices, services and information resources.

In concluding this short Introduction, we wish to say that we, as conference organizers, are indeed very pleased with the turnout and the astonishingly engaged participation of delegates which we saw at NLC 2020. Those of us responsible for future events—the Co-Chairs Thomas Ryberg and Maarten de Laat, as well as Nina Bonderup Dohn (ongoing member of the scientific committee)—need to think about how to sustain this great community. We will take our experiences from NLC 2020 into account in designing future Networked Learning Conferences to include wider participation, as well as plan new types of networked learning events. The biennial NLC will always be the main event, but in the in-between years we plan to organize new (hybrid/online) activities to promote networked learning on other continents and to address emerging topics and new research directions at events focused on dedicated themes. It is our hope that such events will also support the development of papers to be presented at the Networked Learning Conferences.

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Chapter 1
Tracing the Definition of Networked Learning in Networked Learning Research

Murat Öztok

1.1 Introduction

The latest Networked Learning Conference held in Kolding, Denmark, in 2020 was the 12th addition to the biennial conference series started in Sheffield, UK, in 1998. Much has changed in the theory and practice of networked learning research as the community of networked learning researchers grew in size and depth. Indeed, as Heraclitus once said, change is the only constant in life. This chapter is about changes in networked learning research, but it does not simply discuss the zeitgeist of the years preceding the biennial conferences. Rather, it documents the ways in which networked learning researchers have interpreted the fundamental concepts that define networked learning research. I believe this is important 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, and technologies we use hinder us from clearly 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 analyse the research trends in the Networked Learning Conference series are scarce (see, for example, de Laat & Ryberg, 2018). The findings presented in that paper 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

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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 the networked learning community. The work described in Hodgson and McConnell (2018) is the first ever attempt to define and understand the networked learning community as a 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 and thus the perspectives presented are only a small proportion of the entire community. This manuscript builds on the findings presented in that work, but it shifts the focus from participants' attitudes to the research presented in the conferences.

The aforementioned studies from de Laat and Ryberg (2018) and Hodgson and McConnell (2018) are important steps towards understanding the epistemology of networked learning research. Yet, I take a different approach in this work. I qualitatively analyse how the concept of "networked learning" has been utilised in the proceedings published at the Networked Learning Conference series. In specific, I semantically analyse the discourse in the papers presented (Fairclough, 2001) and explore the theories, technologies, networks, and contexts in relation to the definition of the concept of networked learning coined by Goodyear et al. (2004).

In what follows, I discuss the definition of 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 network (the space or community in which networked learning is conceptualised).

1.2 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 discussing when the concept is coined and why it is coined in that particular way.

With the boom of the Internet at the end of the 1990s, the millennium witnessed the emergence of online education both as a research discipline and as a research space. With the exponential growth of online technologies came the opportunities to

deliver education in formats and ways that were not possible before (Harasim, 2000). Technological affordances had been largely informing educational activities and there was a discord concerning pedagogical practices in online spaces (Ely, 1999). For example, the terms e-learning, web-based learning, and online learning were widely used to label any sort of teaching or learning activity that employed online technologies. The hype around the use of technology was much more prominent compared to voices concerned with pedagogical processes or outcomes (Harasim, 2000). As a reaction to *using technology for the sake of technology*, researchers defined a distinctive theory of learning that necessarily values cooperation, collaboration, and dialogue. The concept of networked learning emerged as one answer for such attempts. 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). While this approach is not specific to networked learning research, as I argue below, relational perspectives are at the core of the activities *we do*.

The definition of networked learning, therefore, implies certain theoretical beliefs and practical perspectives about who *we are* and what *we do*. Deconstructing this definition is essential for understanding the epistemology of networked learning research.

There are three notions inherent in the definition of networked learning: technology, connections, and network. While these notions operate in uniformity to define networked learning, each of them provides a focal point through which the practice of networked learning can be further explored in detailed. Below, I will explain how I conducted the analysis and then will present my findings in relation to these three notions.

1.3 Method

I downloaded 412 papers presented in the Networked Learning Conference series between 2004 and 2018, a time frame from when the definition was coined to the latest conference. I catalogued these papers using NVivo, and then I searched the term "networked learning" in order to narrow my focus down to papers that make 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. In order to deal with linguistic or contextual diversity, search terms also included semantical derivatives, such as technologies, connecting, networks, and networking. For each category of analysis (technology, connections, and network), I employed descriptive and critical discourse analysis in order to construct meanings across different papers (Fairclough, 2003). Instead of relying on quantitative measurements or distributions (for example, frequency of words in use,

corpus linguistics, cluster analysis), I qualitatively analysed the meaning in context. This approach is fundamental to interpretivist perspectives in two ways. First, it allows data to be analysed across different contexts, disciplines, and time frames, providing a more holistic view of the phenomenon. Second, it refuses to employ predefined categories that are imposed by established theories or frameworks but allows data to emerge subjectively, providing a more interpretive understanding of the phenomenon.

Several meanings emerged through this process and I combined, compared, and contrasted them in order to create more comprehensive yet more distinct meanings. Therefore, the findings presented in this chapter do not report each and every single paper that deals with technology, connections, or network; rather, the findings summarise my subjective interpretation of 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 standing out because they 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 use 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.'s (2004) definition of the networked learning without considering whether the author(s) in those papers I analysed subscribe to that definition or not. Overall, the sample size is somewhat limited based on the including/excluding criteria and the conclusion is somewhat detached from the content of the papers analysed; however, these limitations do not concern the tracing of the conceptual developments themselves and therefore do not discredit the validity of the analysis or the subsequent interpretation.

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 an outsider in my analysis. Lastly, I can only reiterate the words of others whose work I have drawn upon 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 a better understanding of ourselves as a knowledge community.

1.4 Technology

The definition of the concept of 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 and 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 serve 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 worldwide popularity (for example, MOOCs), that particular technology is scrutinised for its capacity to promote connections within a learning community (see, for example, Czerniewicz et al., 2016; G. Jones et al., 2008; Mackness & Pauschenwein, 2016). It is important to explain here what "new" means or what "quick to experiment" refers to. New technologies or platforms refer to emerging technologies whose practical applications and pedagogical potentials are relatively under-realised. For this analysis, it refers to educational uses of such emerging technologies. Following the same line of thought, whether researchers are quick to experiment is a qualitative judgement about how fast these pedagogical potentials are tested out in research studies. The analysis revealed that certain technologies were at the focus of networked learning research in certain years (or in proceedings corresponding to those years). The latest example to this phenomenon is the use of MOOCs in networked learning. When MOOCs first appeared in the proceedings, much research reported what MOOCs are and how they can be optimised for educational purposes; then, in later years, the focus shifted to analysing networked learning practices in such platforms. It was evident that researchers discussed the ways in which such technologies can best support networked learning activities.

Interestingly, at 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 go 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.

1.5 Connections

It is beyond doubt for the networked learning community that the connections between community members and learning resources are key for networked learning to occur. The overwhelming majority of papers I analysed—regardless of research context, target population, technological choice, and theoretical approach—concerned with relational aspects of learning. Thus, it was clear that orchestrating connections to form a learning community has always been an interest for researchers in the networked learning community.

The results indicated that networked learning is closely aligned with other sociocultural theories of learning (C. Jones et al., 2015), including social constructionism (i.e. Ask & Haugen, 2008), activity theory (see, for example, Guldberg, 2010; Karasawidis, 2008), constructivism (i.e. Brown et al., 2006; Lee et al., 2018), and actor-network theory (i.e. Gourlay, 2014; Johnson, 2016) 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 by which these theories part ways from one another is in how they are utilised. 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 et al., 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 carries 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 recognises 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 a 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 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 a learning community and its learning resources (Goodyear et al., 2004). This remains the guideline for the networked learning researchers. Regardless of the learning theory that is being used, the networked learning community tackles 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 are 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 a 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.

1.6 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 that the concept of community resonates 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 to 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 that the ties that bind a community are conceptualised in three different ways: a sense of community, pedagogical activities (e.g., collaboration or cooperation), and social engagements within a community. 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 networked learning researchers. Whether explicitly used as a research aim or implicitly discussed as an outcome, the concept of sense of community was manifest in an overwhelming majority of research analysed in this chapter. Admittedly, this is not surprising given the importance of the collective pedagogies for networked learning research. Referring to the degree of one's sense of belonging to a community (Oztok, 2016), the concept is at the heart of the idea of networked learning. Indeed, the pedagogical value of the sense of community has long been established within the networked learning community. This was evident in the fact that the use of the concept spans over decades, from the early conferences (i.e. Guldberg, 2010; Ramanau et al., 2008) to the late ones (i.e. Hammond, 2016; Tremblay, 2018). It is a fundamental concept as it allows networked learning researchers to study how people perceive the networked environment as a space, wherein the members can develop relationships among one another (Carson, 2014). Since the definition of 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 et al., 2014; Tremblay, 2018).

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. Networked learning researchers, then, study dialogue (Crosta & Gray, 2014), knowledge construction (Lee et al., 2018), cognition (Parchoma, 2016), high-level thinking (Ramanau et al., 2008), and critical thinking (Corich, 2006). The findings suggest that for 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. This is an important finding because it shows that "network" is conceptualised in line with perspectives that put cultural aspects to the fore. As I have pointed out earlier in this chapter, the community of networked learning researchers comprises diverse set of theoretical approaches and frameworks. Theories, such as actor-network theory, activity theory, or socio-material perspectives, have long been impinging on the literature of networked learning. As I will conclude below, the term network should be conceptualised and studied more broadly.

An alternative approach that can help with broadening our perspective to study network is socialisation. It refers to the social engagements within a community. It is a process of learning that is acceptable to society, a process of internalising the norms of a community (Kehrwald & Oztok, 2016). Although the term socialisation is not widely used in the networked learning community, research concerning how people create and sustain social relationships (Simmons et al., 2018), whether these relationships are strong or weak, and whether there is a sense of coherency and membership within a learning community can be grouped under socialisation (Allan,

2006). I believe that 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. While some researchers employed socialisation, it is an underexplored concept.

Of course, it is erroneous if we only focus on the benefits associated with the concept of network (Oztok, 2019). While research concerned with the exclusive nature of group work is not new to the networked learning community, it is arguably thin in volume and nature. The findings suggest that the negative impact of normalisation is only studied under the sense of community (Johnson, 2012). What impact social hierarchy has on pedagogical practices and outcomes, and how to address these problems, remains largely understudied. It is possible to summarise that networked learning research can be more attentive to questions concerning social justice in networks. This is an important research strand given both the collective nature of networked learning practices and the complexity of the concept of network.

Lastly, as I have argued above, the findings suggest that community is the concept with which *networked* is overwhelmingly associated and through which it is studied. However, there can be other forms of network. What are the alternative frameworks for and approaches to networked learning? How can networked learning research 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.

1.7 The Gold Standard Redefined: Re-conceptualising Networked Learning

Let me reiterate the philosophical stance behind this chapter: change is the only constant. Networked learning research should change and evolve as the members of the community change and evolve. Then, where does this leave us after 22 years since the first conference? What does this change mean for our epistemic practice? There are two recent developments to take into account.

First, the gold standard definition of networked learning went through a rigorous scrutiny by the Networked Learning Editorial Collective. It was an attempt to re-conceptualise networked learning as the research and practice of complex entanglements among various stakeholders. Parallel to the analysis I provided here, the Networked Learning Editorial Collective acknowledges that the old definition can be broken down to three sets of phenomena for explaining these complex entanglements: (1) human/interpersonal relationships, (2) technology, and (3) collaborative engagement in valued activity. The new definition is built on these phenomena, but it goes further to suggest five intertwined "parts" that comprise networked learning:

> Firstly, it involves processes of collaboration. . . . Secondly, it involves processes of 'coming to know' and of acting on the implications of that knowledge . . . Thirdly, these processes

> depend on human relationships: they require and strengthen trust and reciprocity … Fourthly, a network's activities have a larger purpose: they matter to the people involved … Finally, there is the matter of enabling technologies.

These five principles, then, lend themselves to depict the revised definition of the networked learning as:

> Networked learning involves processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies. Networked learning promotes connections: between people, between sites of learning and action, between ideas, resources and solutions, across time, space and media.

Surely, the revised definition provides a much more comprehensive scope for understanding and studying complex pedagogical entanglements. The emphasis is on collective inquiry, knowledgeable action, trusting relationships, and shared challenges that are promising concepts by which the networked learning researchers can probe in detail the dynamics of participatory pedagogies. There is no doubt that the fruitfulness of this definition will be tested as networked learning researchers apply it in their work.

However, many questions emerging from the analysis reported in this chapter remain to be unanswered. For example, the new definition does not imply what learning means but simply suggests that it will occur as a result of collective actions. It is an idealistic approach and only vaguely defines the nature of these activities or the expected outcomes from them. But most importantly, it does not specify, define, or explain what *networked* means. As the analysis in this chapter showed, there were a wide range of perspectives for and approaches to studying the concept of network. How, for example, perspectives different in their approach to network (i.e. actor-network theory, sociotechnical theory, activity theory) can study learning if their aims, scopes, and goals are different? The new definition does not explicitly provide a direction forward. But we should not take this as something bad or missing in the definition. First, perhaps this is a chance for the networked learning community to continue discussing what we mean by networked or learning with the way we conduct research and apply these principles in our practices. Second, perhaps this is a chance for the networked learning community to continue embracing its diversity. The variety of theoretical frameworks for, approaches to, and perspectives in networked learning has been providing a fertile and healthy ground for the theory and practice of networked learning.

Another important point to mention is the lack of reference to questions concerning social justice and equity in the definition. To be fair, the five principles mentioned above take social justice into consideration, and the Networked Learning Editorial Collective discusses social justice and emancipatory activities as one of the fundamental values of networked learning. Arguably, however, the lack of reference to these emancipatory principles in the definition renders social justice-related work as a by-product or an afterthought to networked learning. It is important to note that this does not mean social justice is ignored in networked learning research. Analysing the literature of networked learning in relation to questions concerning

social justice is beyond the scope of this manuscript (but despite thin in nature and volume, examples can be easily found in proceedings). My argument here is that *equity* and *justice* are inherent in any collective pedagogy and thus should be explicitly acknowledged in the definition of networked learning.

Second development to take into account is this book. It is the latest addition to the Research in Networked Learning Book Series, which provides a contemporary picture of networked learning research. It makes sense to very briefly discuss the chapters in this book, not only because each single chapter illustrates different ways in which the definition of networked learning is manifest in *who we are* and *what we do*, but also because when the chapters are combined together, the book provides a unique account of what networked learning research is.

The first section of this book puts professional learning into focus and explores pedagogical design frameworks for understanding collaboration and community dynamics. This is an important agenda because, as this chapter argues, there is a need for a careful pedagogical design that is distilled through a clear understanding of what learning is. These three chapters collectively offer insights concerning design considerations for learning. The second section brings the development of networks to the fore. The chapters in this section concur with the analysis I provided above: (1) networked learning researchers are quick to adapt new and emerging technologies and (2) technology plays a mediating role to form a learning space. Taken together, these chapters show that technology is a pedagogical tool for the creation, utilisation, and sustainability of networked practices. Indeed, networked learning researchers will continue exploring the pedagogical uses of emerging technologies. If the analysis in this chapter showed anything, these current emergent technologies will be the main focus during the next conference as they will gradually become integral in our epistemic practices as researchers. The last section of this book represents a multitude of approaches for and applications of participatory practices in networked learning. These chapters provide means for going beyond the concept of community to understand what networked learning means. This is important because the analysis above indicated a need for critical discussion to better understand the concept at the very centre of this community. Overall, works presented in this book not only show examples of networked learning in action but also offer novel ways to think about frameworks for and approaches to technology, connections, and networks.

Of course, the chapters presented in this book do not provide means for addressing the concerns emerging from this analysis; this was not the intention behind these chapters. Yet, the research presented in this book suggests that we have started to tackle with these critical questions implicitly. And we need a scholarly debate and discussion about them.

1.8 Conclusion

This chapter was concerned with the extent to which the definition of networked learning is manifest in networked learning research. To this end, it explored how the definition is utilised in the design and application of the research through three categories: technology (mediation and/or facilitation), connections (interactions), and network (community and/or context). While the definition of the networked learning is open ended in nature, the findings show that networked learning researchers have arguably enough commonality in their conceptualisation of networked learning.

In my approach to the definition of networked learning, I wanted to explore *who we are* and *what we do* as networked learning researchers. My intention was to better understand ourselves both as a knowledge and as a research community. I never aimed to draw lines on what we do and set boundaries on who we are as a community. It is important not to see the membership in binary terms of being in or out, but to use *who we are* and *what we do* as pockets of interests by which to negotiate our membership with the community. This is why I carefully avoided even a slightest implication of what "we" means. Anybody who subscribes to the principles of networked learning can find a pocket of interest. In this sense, the findings in this chapter concur with the perspectives from one of the previous attempts of studying the networked learning research that are 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 is a field interested in community oriented and collaborative forms of learning . . . it is a field that—being interested in digital technologies—also reroutes its interest or object of study as 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 networked learning, and this was evident in the approaches to networked learning. Learning is studied under various theories; and in accordance, 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 networked learning community mean when they study learning? This is an important point for a further conversation since designing networked learning should not be an open-ended endeavour but rather 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 with which *networked* is overwhelmingly associated and through which it is studied. There is a need for a discussion and debate on other forms of network. What are the alternative frameworks for and approaches to networked learning? This is an important question if networked learning research is going to adapt itself to the changing nature of the educational uses of technologies.

The Networked Learning Editorial Collective suggests five intertwined principles to conceptualise networked learning. A comprehensive approach to *what we do* and *who we are* requires us to understand these principles in relation to one another. The arguments I provided in this chapter concur with this approach: it is important to foreground the dynamics of one principle while keeping the others in the background. This process of analytically shifting between foreground and background allows us to see how the dynamics of each principle operate distinctly yet always in relation to others. Is it more productive, then, to pay more attention to the fundamental principles of networked learning and use them as guiding frameworks for understanding our epistemic practice?

I should, perhaps, end this chapter 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 chapter, and in fact from this book overall, 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 learning means and how we can research it. The current definition has, perhaps, served its term and deserves a well-earned retirement.

I hope this chapter will spark curiosity and encourage others to join the debate and discussion.

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Part I
Professional Learning

Chapter 2
From Design Thinking to Design Doing: Experiences from an Academic Staff Development Programme for Blended Course Design

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2.1 Introduction

Higher education in South Africa has recently seen widespread disruptions as a result of national protests against untenable university fees, Westernised curricula and student exclusions, which have been amplified by the COVID-19 pandemic. These student-led protests have highlighted the inequality that persists in the country's tertiary education system and pointed to the need for new approaches to address systemic problems in this sector. 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). The uptake of design thinking in universities

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around the world is growing beyond the disciplines that were traditionally associated with the creative industries and design. Design thinking is being established as a learning paradigm that nurtures creative problem-solving and multi-perspective collaboration (Von Thienen et al., 2017).

Despite its purported benefits, design thinking is under-researched in the field of academic staff development (Gachago et al., 2017; Goodyear, 2015). The aim of this chapter is to report on and evaluate 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 paper, the authors—a group of academic staff developers and lecturers—were part of the design, facilitation and evaluation of a short course titled *Designing for Blended Learning*. The course was structured around design thinking principles such as problem orientation, learner empathy and collaboration. In this chapter, drawing from participants' feedback, the authors reflect on the first iteration of the course offered in 2017. Since 2017, we have run the course three more times and have reflected and published on further iterations, redesigned based partly on the reflections which emerged from this study (see for example Gachago et al., 2019). However, this first iteration was our first attempt to consciously employ design thinking as a guiding principle. As such, it represents our most radical shift in how we deliver staff development and therefore we regard this work as valuable to explore the potential of design thinking to support blended course design.

2.2 Literature Review

2.2.1 Staff Development in South African Higher Education

Investment in information and communication technologies for teaching, learning and assessment in higher education in South Africa does not always translate into visible change of practice. This is because lecturers continue to replicate behaviourist and teacher-centred instructional methods (Ivala, 2016; Ng'ambi et al., 2016). Academic staff 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 their teaching. Disrupting these practices is 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 is as essential as it is difficult. Moreover, training and support on the use of technology in education often focus on the effective use of the technology itself with insufficient emphasis on course design and training of lecturers to effectively integrate technology in their practices (Dysart & Weckerle, 2015; Ivala, 2016). Academic staff development is often presented in a 'one-size-fits-all' manner (Bali & Caines, 2018), via once-off seminars, which raise awareness around opportunities to use technology in learning and teaching and showcase innovative approaches at the institution. What is missing

in South Africa, however, with some exceptions such as the short courses offered by the regional Cape Higher Education Consortium (CHEC), are longer term sustainable (inter)institutional strategies. These strategies must allow for follow-up and collaboration between academics and academic staff developers in terms of both technical and pedagogical support, such as short courses (ideally co-designed with potential participants), or set-up of local peer-to-peer support networks (Ivala, 2016).

2.2.2 *Design Thinking and Design Doing in Education and Academic Staff Development*

Design thinking is rapidly expanding into fields that have not traditionally been associated with design, such as management, business and education innovation (Razzouk & Shute, 2012). Although there is some confusion about its definition (Beligatamulla et al., 2019), most authors agree that design thinking is human centred, fundamental to everyday human activity, and that it addresses complex or wicked problems (Rittel & Webber, 1973; Smulders et al., 2014).

Despite the establishment of design thinking schools (HPI d.schools) at the Universities of Potsdam, Stanford and—most recently—Cape Town, design thinking is not generally associated with the domain of innovation in learning and teaching in higher education. Neither is it generally employed for academic staff development. While the application of instructional design models such as ADDIE (Analysis, Design, Development, Implementation and Evaluation) is not new in this field, design thinking differentiates itself from these models in a number of ways. For example, it focuses on interdisciplinarity and the iterative, exploratory and sometimes chaotic nature of design (Razzouk & Shute, 2012). Human-centred design offers what most instructional design models lack, namely a focus on the person whom it is designed for (Brown, 2009; Walling, 2014). In traditional instructional design models, there is also a limited focus on creativity (Clinton & Hokanson, 2011).

Following on Nussbaum's (2011) criticism of design thinking, some authors like Martina Rossi (2017) and Juelsbo et al. (2017) have recently picked up on the need for design doing as a way to reframe design thinking for practices beyond the design professions (Rossi, 2017). However, literature on design doing as a 'broader conceptualisation of design thinking' (Juelsbo et al., 2017, p. 149) is limited, and mostly focused on the design professions. In her doctoral work, Stephanie Di Russo (2016) emphasises that 'design thinking is intimately linked to design practice' (Di Russo, 2016, p. 13). She claims that the process of design thinking keeps people 'thinking and doing' as it moves them through the iterative and generative phases of discovery, interpretation, idea generation, experimentation, evolution and refinement (p. 79).

Studies on the potential of design thinking in education (Koh et al., 2015) are focused on postgraduate studies in education (Rauth et al., 2010; Ulibarri et al.,

2014) and professional development for teacher education (Garreta-Domingo et al., 2017; Hodgkinson-Williams & Deacon, 2013) rather than on academic staff development (Gachago et al., 2017; Goodyear, 2015). The gradual shift from traditional instructional design models, such as ADDIE, to learning experience design approaches has been accelerated by the sudden pivot to remote and online learning as a result of the COVID-19 pandemic in 2020. This shift is critical in view of the growing demand for student-centredness, diversification of the student population and growing emphasis on ethics and accountability in the context of the call for equity, inclusion and decolonised curricula (Beligatamulla et al., 2019).

2.2.3 Blended and Networked Learning

Although we use the terminology 'blended learning' rather than 'networked learning' in our study, our definition of blended learning speaks to the more nuanced understanding of networked learning as for example expressed by Goodyear et al. (Networked Learning Editorial Collective, 2020) in their commentary 'Networked Learning: Inviting Redefinition'. We regard blended learning as more than a combination of campus-based and online learning, but rather *as a thoughtful combination of different pedagogical approaches, drawing on a range of teaching and learning theories, using a variety of tools and technologies, to create context-sensitive and flexible learning experiences with and for our learners* (Gachago et al., forthcoming). In our work we also focus on the development of communities of practice (see for example Gachago et al., under review). The elements of human-centred design, digital technologies and a collaborative, relational approach to academic staff development thus cut across our own definition of blended learning, networked learning and design thinking.

2.3 Context and Intervention

2.3.1 Blended Learning Short Course

The design-based research from which the data presented in this chapter is drawn 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 conceptual underpinning of the course design, drawing on a 2016 study on shared characteristics of eLearning champions at the institution (Gachago et al., 2017). Seven themes emerged from interviewing these 'champions', which 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 et al., 2016).

Research shows that design thinking is not necessarily a natural talent, but a skill that can be learnt (Lawson, 2005; Rauth et al., 2010) 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 and processes and promote a design thinking mindset. The 10-week-long course was offered in a blended learning format, combining face-to-face workshops and online seminars. 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 and ethics of blended learning (link to the 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 to course design. The course design was iterative, 'designed on the go', and facilitators responded to participants' feedback through, for example, weekly reflections and other forms of interaction.

2.3.2 *Learning Experience Design Process*

The learning experience design process that we refined over the years, through an iterative process, draws from design thinking literature, such as IDEO's (2012) 'Design Thinking for Educators' guide, and also from Gilly Salmon's Carpe Diem model[2] and Diana Laurillard's Six Ways of Learning (2012). In this process, lecturers start with a persona development exercise, which serves as a constant reminder of the needs of the learners for and with whom they are designing. Next, lecturers identify a design challenge which is developed into a design brief, followed by a brainstorming (ideation) activity, using the World Café methodology, to come up with possible solutions to address learner needs (Soeder, 2016). This methodology creates a space for large group dialogues, where all voices can be heard and where ideas can be documented in multimodal formats. The facilitators further support a knowledge tree exercise—inspired by the First Nations Holistic Lifelong Learning Model (CCALKC, 2007)—which recognises both Western and indigenous knowledges and assigns different types of knowledges to the different elements of a tree. The knowledge tree exercise allows the surfacing of assumptions that our

[1] See http://bit.ly/DBLcourseoutline

[2] https://www.gillysalmon.com/carpe-diem.html

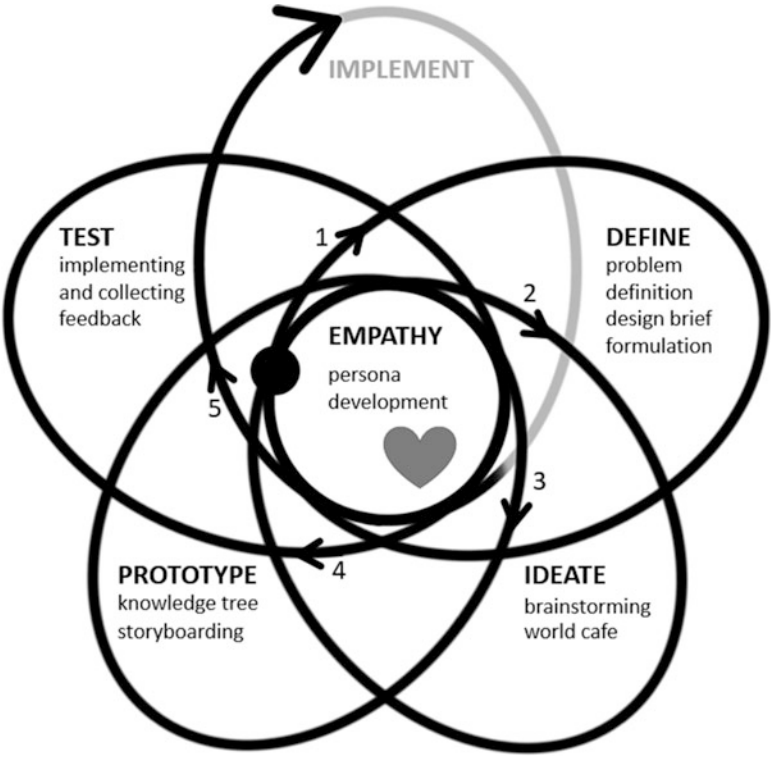

Fig. 2.1 Iterative learning experience design process and design activities

participants make about the different forms of knowledge, for example, what is valued and what is discounted as knowledge in academia. Finally, the learning design process concludes with a storyboarding exercise, where lecturers map learning outcomes, learning activities and course assessments for a course, subject or module, across a certain learning period. Combining the latter activity with Laurillard's six ways of learning, i.e. 'learning through acquisition, inquiry, practice, production, discussion and collaboration' (2012, p. 96), redirects the focus of course design from the tools to the pedagogical practice. Across these activities the facilitators encourage discussion, sharing, reflection, experimentation and mentoring by more experienced colleagues (for a more detailed discussion of our learning design process, see Gachago et al., forthcoming).

In summary, as illustrated in Fig. 2.1, the learning experience design process in this case follows an iterative pattern, which cannot be represented by a linear or even a circular diagram. The start of the learning design process is marked with a black dot and the line that runs clockwise in loops (sequence numbered 1–5), always returning to Empathy at the centre, before moving to the next design stage, represents an iterative and ongoing process. The continuous line ends in an arrow to show that the process is iterative and ongoing. Not only does the process start with Empathy, but

every stage of the process, namely Define, Ideate, Prototype, Test and Implement, is brought back to Empathy through checking the design decisions against the persona that represents the student's learning environment, goals, values and beliefs, knowledge, skills and experiences (Seitzinger, 2016). This approach foregrounds the active consideration for, and engagement with, the learner through placing Empathy at the centre of the learning experience design process.

2.3.3 Design-Based Research Approach as Research Design

In this chapter we report on a design-based research approach (see Barab & Squire, 2004). As facilitators of a design-based intervention, we focused on a single unit of analysis, namely a group of lecturers and support staff at a university of technology. This group was selected as an exemplar for design thinking dynamics in academic staff development. From an evaluation perspective, the case would help us to assess the 'quality, merit and effectiveness' (Saldana, 2011, p. 17) of the institution's staff development initiative. In total, eight participants completed 10 weeks of training—none of them from the Design disciplines at the university. Six of these participants were lecturers in the Faculties of Business and Economic Sciences and Health and Wellness: Nazleen[3] and Riaan worked in the Unit of Applied Law while Precious and Jody were employed in the Sports Management Department. Mark and Sonwabo lectured in Biomedical Sciences, while Noma worked for a central support unit as a language lecturer and Tasmeen was a librarian in the Nursing Department.

Data was drawn from weekly written 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 was 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, in which they discussed their experiences during the course. Questions 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 during the course. The three participants who did not attend the focus group conversation completed an online survey which mirrored the questions asked in the focus group session. 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 from the survey responses, to come up with emerging themes. An open, axial and inductive analysis process was followed, through which all transcripts were coded, categorised and interpreted (see Thornberg & Charmaz, 2014). Six major themes emerged from the analysis, namely interaction and collaboration (with the sub-themes of nurturing empathy and modelling tools and technologies), creativity, evaluation and feedback, experimentation,

[3] All names changed.

Table 2.1 Overview of data collection and reporting process

Method	Number of participants	Reporting in findings
Weekly reflections	8	By name of participant
Focus group conversation	5	As focus group
Online survey	3	As survey extract

time and transferring theory into practice. These themes are discussed in detail in the next section. Ethical clearance was obtained through institutional channels, consent was sought from the participants to participate in the study and names of participants were anonymised. Where possible, we refer to the pseudonyms when using quotes (i.e. when drawing from individual lecturers' reflections or individual survey responses); otherwise we refer to participants in general (i.e. when drawing from data collected in the focus group discussions) (Table 2.1).

2.4 Findings and Discussion

In what follows, we describe the themes that emerged from the data collected in this study, namely nurturing empathy, modelling tools and technologies, promoting creativity, ongoing evaluation and feedback, safe and supportive spaces to experiment, time commitment and transferring theory into practice.

2.4.1 Interaction and Collaboration

A strong emphasis of the course design was collaboration among colleagues from within and outside their disciplines. Working with and from different perspectives allowed participants to learn to cope with contexts that are messy, complex and ambiguous (Jobst et al., 2011). Participants were encouraged to sign up as departmental course design teams and they 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'.

The design team introduced the World Café methodology (Soeder, 2016), usually employed to facilitate large group dialogues, in this course. This methodology encourages everyone's contribution, connects diverse perspectives, promotes listening together for insights and facilitates sharing of collective discoveries, as Mark stated: '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 Café]'.

2.4.2 Nurturing Empathy

One of the key components of user-centred design (Brown, 2009) is focusing on the end user, which emphasises the importance of co-designing interventions with the 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), his or her context, challenges and goals. Respondents commented on their increased awareness of their students' diversity in circumstances, personalities and needs as suggested by Precious: 'I have started to pick up *distinct differences* in my students that I have previously been unaware of'.

2.4.3 Modelling Tools and Technologies

The course designers invited a variety of mentors or 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 considered and analysed as examples or 'precedent' (Hitge, 2016; Lawson, 2005) 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 models in action 'vicarious experiences'. The success of this approach depends on mentors' ability to externalise their tacit knowledge, i.e. design thinking (Koh 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 extract]'.

Design activities and assignments for the course focused on participants' teaching practices and these were chosen to be as authentic as possible. While facilitators 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 to experiment with a range of tools and technologies that they saw fit for their respective contexts (see comment 2). In respondents' comments facilitators found a growing understanding of the affordances of the 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)

2.4.4 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 (2012) developed design activities for educators to model design processes. Such activities include stakeholder interviews, persona development, problem definition and use of metaphors. Participants remarked positively on the range of design activities, but mentioned 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' weekly reflection)

> 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's weekly reflection)

> . . . 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's weekly reflection)

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

Hodgkinson-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, p. 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 Café and the design brief development gave participants time to ponder a variety of problems from different viewpoints. Through full consideration of the design problem rather than rushing to solutions, it was possible to remain 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).

2.4.5 Ongoing Evaluation and Feedback

Design thinking involves iterative cycles of creation and reflection (Rauth et al., 2010). As part of the assessment strategy in this course, participants were required to conceptualise actual course design interventions. A strong emphasis was placed on continuous reflective practice (Hitge, 2016). Participants wrote weekly reflections on their design journeys, 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 design development.

> 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's weekly reflection).

2.4.6 Safe and Supportive Spaces to Experiment

Ulibarri et al. (2014) highlight the importance of creating an emotional, supportive and non-judgemental atmosphere to foster creativity. One example of how facilitators introduced playfulness was the introduction of learning metaphors. Learning metaphors prompt and guide the development of a learning activity or a course by imagining or 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 (which was still a relatively unknown practice in 2017). Participants noted that the course was

challenging at times, and they made reference to their lack of digital literacy skills, but also working in disciplines not known for their creativity, as Riaan noted: 'As academic disciplines, Law is not known for encouraging risk-taking'.

As enabling factors, participants mentioned 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 the participants 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' (focus group).

2.4.7 Time Commitment

As expected, the course presented some challenges. For participants who were mostly academics and 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 conversation 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 sessions were discussed in depth during the focus group conversation. While some reported to enjoy them, others argued for 'less academic' reading that should have taken them outside the 'usual' academic space or 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).

2.4.8 Transferring Theory into Practice

Most disappointing for the facilitators, however, for a course on blended learning course design, which should involve iterative prototyping, was that participants expressed concern that the course did not allow enough transfer into their own practices, 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. However, this finding underscores our understanding of the importance of 'design doing' as a 'broader conceptualisation of design thinking' as suggested by Julesbo et al. (2017, p. 149).

2.5 Conclusion

In this chapter, the facilitators set out to report on the first iteration of an academic staff development intervention for blended or networked learning design, aimed at promoting design thinking principles, processes and mindsets (Rauth et al., 2010). As Taheri et al. (2016) suggest, when developing design thinking capacities, facilitators must consider three specific outcomes: skill-based, cognitive (i.e. design mindsets) and affective outcomes (i.e. creative competence). The data showed that the course was received positively and there was evidence of a shift in how participants understood and engaged in blended course design. Participants also displayed a growing cognitive awareness of the complexities of designing learning for a diverse student population. The course encouraged playfulness and experimentation through the design activities, the informal atmosphere and the mentors who were more experienced eLearning champions. Through the mentors' sharing of their practices and experience, the participants' creative confidence was developed, as an affective outcome of the course. Since this was the first iteration of the blended learning course design, facilitators were 'designing on the go', which also added to the atmosphere of experimentation and openness, and it modelled risk-taking. Similar to other studies (Ulibarri et al., 2014), participants appreciated the course as a safe space to think, to talk about design and to 'play at design'. 'Designerly ways of knowing' (Cross, 2007) were modelled and these are evident in the participants' responses.

An important concern was raised about the direct application and more rapid prototyping of design activities in participants' practice or skill-based outcomes. Taheri et al. (2016, n.p.) warn that 'while design thinking training creates 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 paramount in professional contexts, where individuals need to apply their learning within their own working contexts. Furthermore, they add that an exaggerated focus on cognitive and affective aspects of design thinking might result in unrealistic expectations of what can

happen beyond the training space. However, as Irwin (2015, p. 93) notes, when introducing design thinking into new contexts, especially 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'.

This tension between promoting skill-based, cognitive and affective dimensions in design thinking is mirrored in Nussbaum's (2011) notion of 'design doing' as a way to practice 'design thinking'. Promoting the active engagement of academic staff in learning experience design activities associated with each of the learning design stages (refer to Fig. 2.1), in particular when it comes to prototyping and testing, through the adoption of rapid feedback cycles, would enable and encourage academic staff to value empathy. Furthermore, it would also encourage academic staff to purposefully place the learner at the centre of their blended and networked learning interventions, while strengthening the continuous and iterative dialogue of theory to practice, and thus moving them from design thinking to design doing. In subsequent iterations we therefore included a stronger focus on immediate application to allow better transfer into practice (see design principles in Gachago et al., 2019).

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

The participants' reflections on this course emphasise the difficulty to strike a balance between process and product, playfulness and structure, challenging tasks and a feeling of safety and trust, and lightness and depth. It encouraged the facilitators to create a 'safe' space to experiment, to take risks and fail and in doing so to challenge attitudes of perfectionism prevalent in academia. Facilitators 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. They noticed the importance of modelling a designing-on-the-go approach, through the 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 showed how follow-up and continued work including constructive feedback on lecturers' practice were 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 as a long-term project. Nurturing creative confidence requires a community of practice to draw from, on an ongoing basis. In this chapter we suggest that a brief once-off academic staff development intervention is insufficient. Instead, academics should be encouraged

and supported to continually share their experiences (failures and successes), and present their approaches to blended course design, and opportunities should be created for them to comfortably and confidently ask questions and demonstrate possible solutions, at various departmental, faculty or institutional meetings or other academic forums.

This is work in progress and further research should explore the longitudinal impact of this staff development programme for networked and blended course design. Such research might focus on the possible strategies for actively adopting and demonstrating empathy and learner-centred practices through which design doing can be demonstrated as an expanded conceptualisation of design thinking.

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Chapter 3
Designing for Boundary Crossing and ICT-Based Boundary Objects in Dual VET

Marianne Riis and Anna Brodersen

3.1 Networked Learning in Relation to Vocational Education and Training

In 2020, by way of merging texts from previous research in networked learning and as a means to better encapsulate the diverse theoretical foundations that constitute the field, the Networked Learning Editorial Collective (NLEC, 2020) put forward a new description of networked learning:

> Networked learning involves processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies. Networked learning promotes connections: between people, between sites of learning and action, between ideas, resources and solutions, across time, space and media (NLEC, 2020, p. 9).

The emphasis on promoting connections 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 (apprenticeship) periods throughout their education. During this alternation, students are required to learn a complex set of skills and acquire highly specialized knowledge, and at the same time come to terms with shifts in their roles, responsibilities, and their positions in two distinct types of hierarchies at the school and in their

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workplace, respectively. While learning a trade, students are also becoming professionals, meaning that for VET students, and by association for VET teachers, education is very much a matter of coming to be as well as coming to know.

Nonetheless, making sense and use of learning in and from different contexts and experiencing continuity between school and work have long been considered major pedagogical challenges in Danish VET research resulting in a continuous focus on the transfer phenomenon (Tanggaard 2007; Illeris, 2009). Transfer is, however, a contested concept both in research (Engle, 2012; Hager & Hodkinson, 2009; Lobato, 2006) and among practitioners. In this chapter, 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 et al., 2003; Wenger, 1998), this may not be the best approach. In fact, Wenger-Trayner and Wenger-Trayner claim:

> 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 et al., 2014; Nortvig & Eriksen, 2013; Wals et al., 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 et al., 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 and 2018 (Riis et al., 2019).

In this chapter, 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. 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. In this chapter, we focus on the development of the design matrix, convey main findings regarding the development and usefulness of the matrix, and point to further research.

3.2 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 h of classroom observations as primary methods to generate and collect data.

Table 3.1 Connection between research questions, methods, and expected outcome

Research question	Methods	Expected outcome
RQ1: In what ways and why do VET teachers use ICT-based artifacts as boundary objects to design for boundary crossing and continuity in and across different contexts?	Interviews and classroom observations	New knowledge of how VET teachers understand and use ICT in relation to boundary work and design for boundary crossing
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

Furthermore, the study was inspired by Educational Design Research (McKenny & Reeves, 2013) in so far as the design framework and the design matrix were 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. 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 3.1 shows the connection between the two main research questions, methods, and expected outcome.

3.3 Theoretical Background

The research project is based on a sociocultural understanding of knowledge, skills, and practice requiring a sensitivity towards participation in boundary contexts. From a sociocultural perspective learning is defined as constructed, social, situated, mediated, distributed, and becoming (Dysthe, 2001). Here, we emphasize *learning as becoming*, as we see this perspective in close connection to the aforementioned overreaching pedagogical challenge in the dual-VET system and also as something having a unique potential to be unfolded in the VET system through ICT-based networked learning.

In the definition of learning as becoming, learning is understood as more than epistemic construction and also as a process of becoming *someone* through participation in activities connected to a specific craftsmanship which enable the participants to gradually build an identity as such craftsmen (Riis et al., 2019). This is not to be mistaken as something material that is being adopted in a reproductive way, but in relation to how Wenger (1998) defines learning through participation, which entails an understanding of identity as negotiated experience, community membership,

learning trajectory, nexus of multimembership, and a relation between the local and the global. This understanding also points to a way of seeing identity and practice (and so participation in practice) as a whole, or as Wenger states as "... *mirror images of each other*" (ibid., p. 149).

Nonetheless, research in students' participation in dual VET highlights challenges in designing education in ways that promote the students' experiences of the combination of school and workplace periods as a meaningful whole (Tanggaard 2007; Illeris, 2009). Rather, students experience differences between domains, practices, and context, which, if left unrecognized and unresolved, often result in differences becoming unproductive boundaries for learning and development of professional identity. Based on a review of 181 educational studies, Akkerman and Bakker 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 (Akkerman & Bakker, 2011a, p. 132).

Akkerman and Bakker (ibid., p. 133) define a boundary as "a sociocultural difference leading to discontinuity in action or interaction" 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 and 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 necessitate deliberate pedagogical design in order to reach the full potentials of dual education.

Inspired by Star and Grisemer (1989), Akkerman and 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). In our understanding of boundary objects, we also draw on Illich's (1973) notion of *convivial tools*; we use the term boundary object as an artifact or a tool enabling people "not only to obtain things" (ibid., p. 11), such as "delivering" one piece of information to one another. In our data we find several examples where the tool is just a tool in a more instrumental and one-sided way, such as passing information from school to workplace or the other way around but without having a dialogue—whereby the convivial potential of the tool is missed. As opposed to this, convivial tools are enabling people "... to give shape to them according to their own tastes and put them to use in caring for and about others" (ibid.). Illich further elaborates:

> Tools are intrinsic to social relationships. An individual relates himself in action to his society through the use of tools that he actively masters, or by which he is passively acted upon. To the degree that he masters his tools, he can invest the world with his meaning; to the degree that he is mastered by his tools, the tool determines his own self-image. Convivial tools are those which give each person who uses them the greatest opportunity to enrich the environment with the fruits of his or her vision (Illich, 1973, p. 21).

For this reason, we see conviviality in connection to Akkerman and Bakker's description of boundary objects as tools conveying meaning and enabling people to negotiate meaning and establish a shared understanding. In both conceptions, the tool is being used in a way that makes it possible for people to participate on their own terms.

While Akkerman and Bakker are not particularly focused on the use of ICTs as boundary objects, Heilesen et al. (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 and 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 and Bakker (2011b) have identified four learning mechanisms or processes that potentially occur in and between the boundaries of sociocultural systems. These learning processes constitute the core of boundary crossing:

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 creation of a new in-between practice, for example a boundary practice (Akkerman & Bakker, 2011b, p. 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 (Louw, 2015), this dialogical and collaborative demand is important.

Akkerman and Bakker primarily focus on the processes of boundary crossing. With regard to boundary objects we have been inspired by Henningsen and Mogensen (2013) who, based on the 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 and 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 or affordances of different artifacts, e.g., ICTs.

3.4 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 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 and Bakker and Henningsen and Mogensen, we created a model focusing on boundary crossing mediated by ICT-based boundary objects, which has been refined through three iterations. In all three iterations, the model has been tested by different practitioners (mainly VET teachers). It is beyond the scope of this chapter 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 of designs for boundary crossing. The first iteration of the model depicted the four boundary-crossing processes combined with four main affordances related to the boundary objects. Based on the initial research and testing of ideas in teaching sessions, we decided to revise and reduce Henningsen and Mogensen's (2013) original suggestions and ended up with documentation, simulation, construction, and interaction as main affordances of the boundary objects. 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 one 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) (Fig. 3.1).

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 Fig. 3.2.

As seen in Fig. 3.2, 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 were related to only 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, they would often 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 also pointed to another challenge in using the model, which led us to conclude that a narrow focus on boundary processes and affordances

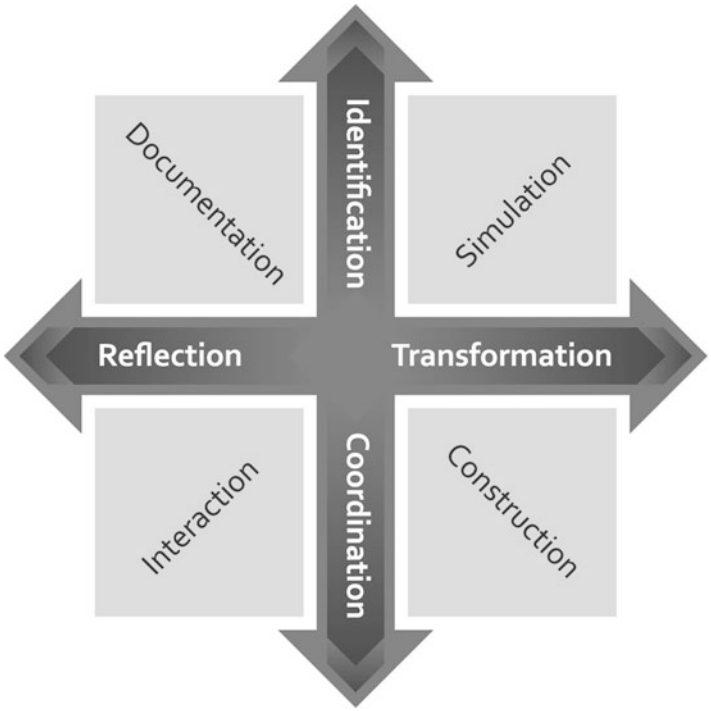

Fig. 3.1 The first iteration of the design model

was not sufficient. 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, and the curricular content. 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 as depicted in Fig. 3.3, which illustrates the many ways (16) it is possible to combine the boundary-crossing processes with different affordances of the ICT-based boundary objects resulting in ICT-mediated *activities*. Figure 3.3 also includes specific ICTs based on our findings from the final data collection period.

In working with the matrix as part of our data collection, the VET teachers were asked to start by defining a pedagogical challenge they wanted to solve and then focus on (a) the ICTs they had access to, and thought might be useful as boundary objects, or (b) the boundary-crossing processes they wanted to design. In any case, the teachers were asked to work with the design of both boundary objects and boundary-crossing processes.

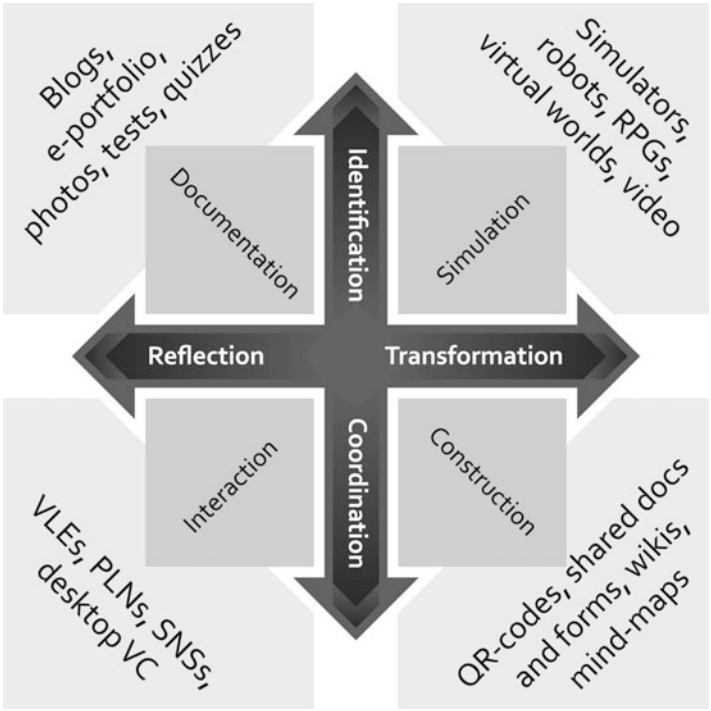

Fig. 3.2 The first iteration of the design model with examples of ICTs

3.5 Selected Findings Related to the Design Matrix as Analytical Tool

In the final data collection phase of the project, we decided to interview 14 VET teachers focusing on their actual use of ICT, and in our analyses, we used the design matrix to map our findings. Overall, our data show that the interviewed VET teachers did not recognize the full potentials of ICT in relation to boundary-crossing activities. The 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.

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 affordances			
Boundary crossing processes – based on dialogical learning mechanisms	**Documentation**	**Simulation**	**Construction**	**Interaction**
Identification	Video OneNote Self-made app		Video Thinglink Self-made app	Facebook Google+ Self-made app
Coordination	Facebook, Google+ Elevplan ItsLearning OneNote Self-made app		Video Thinglink OneNote Self-made app	Facebook Google+ OneNote Self-made app
Reflection	Facebook, Google+ Elevplan ItsLearning OneNote Self-made app		Video Thinglink OneNote Self-made app	
Transformation				

Fig. 3.3 Third iteration: the design matrix with examples of ICTs

3.6 Selected Findings Related to Boundary Crossing as Learning Process

According to Akkerman and Bakker (2011a, b) a key component of boundary crossing as learning process is the ability to "make and take" the perspective of others, thus delineating the differences in order to enhance understanding and potential change in actions and interactions in communities.

Several of the VET students, we interviewed, described how they were taking on new perspectives in their understandings of being professionals, when they were participating in different practices in their apprenticeships. We find many examples of students mentioning that theory makes sense in another way, or that they reach new understandings or even are able to see several other solutions to specific problems. An example, of how a student develops an expanded understanding of theory, by experiencing the use in practice, we find in this quote from a student observing her trainer in health care work:

> That thing about appreciative communication . . . . I had an understanding, that you should just always agree with the citizen and active listening and all that, right? But then, when I saw that, I thought; 'okay, that is also appreciative communication'. Because she shows a respect to the citizen, as she's saying; 'well, I would like to try to help you, but it's not. . . you can't have to great expectations. Where I thought; 'ahh, you don't always have to agree with the citizen' (Riis et al., 2019, p. 49—our translation).

From a sociocultural perspective, this quote points to particular elements in the understanding of learning as being constructed, social, situated, and becoming; the student meets this situation in one of her workplace periods with some idea of what appreciative communication is about, but—when the idea is realized in interaction within a social and situated practice—the idea is unfolded, reorganized, and constructed into new knowledge as a step in this student's way of becoming a healthcare worker. In this respect, we share the sociocultural understanding of learning as a process, where each learner needs to construct his or her own structures of knowledge. It is not possible to seamlessly transfer other people's knowledge; rather it needs to be translated and transformed. In the interaction within a social and situated practice, the piece of knowledge, that the student picked up in class, is now being reconstructed with a new meaning (translated) and transformed into the student's own structure of knowledge. Furthermore, the example illustrates the boundary-crossing learning process *reflection*, where one learns to look differently at one's practice by looking at oneself "... through the eyes of other worlds" (Akkerman & Bakker, 2011b, p. 145).

In another example, a student is confronted with her ethical judgement in a specific episode during her apprenticeship. This demonstrates how the journey of becoming a professional also at times entails moments, where you discover *who you want to be* as a professional through the experience of the opposite:

> [...] and of course, mistakes also happened, while I was out there, and it made me really upset. It hurt me, because it had done harm to someone. And they hadn't been listening, when she [a citizen, ed.] .... because her authority had been taken from her. So, they didn't listen to her, they just did, what they thought was best for her. And it did more harm than good. And so, it hurt to see this (Riis et al., 2019, p. 53—our translation).

This student is at the boundary between practice and theory, or between what she conceives as bad practice and her own ideals. In this confrontation at the boundary, she is discovering her own values (boundaries) and in all likelihood unstated assumptions. By way of reflecting on the situation, she is constructing new knowledge through a social and situated practice which may transform her identity as a professional healthcare worker and perhaps lead to transformed professional practice in the future.

As both examples illustrate, there is a particular potential in the dual-VET system given that the experiences between school and workplace can contribute in different ways to the students' gradual journeys of becoming professionals, but this potential also entails a risk. In dual VET the students are participants in two overreaching but different communities of practice, and so they alternate between different contexts and different roles—but still within the same education—where they have to find meaning and coherence between the two communities for having the best opportunities to develop an identity as professionals. When people alternate between communities of practice, Wenger uses the term *boundary work* to capture this type of activity as something requiring hard work: "The work of reconciliation may be the most significant challenge faced by learners who move from one community of practice to another" (Wenger, 1998, p. 160).

Akkerman and Bakker define a *boundary worker* as a person standing on both sides being able to take on different perspectives by giving them a coherent meaning. Conversely, this also means that there is an inherent risk of boundary workers continuing to stay peripherical on both sides and act as "... marginal strangers 'who sort of belong and sort of don't'" (Akkerman & Bakker, 2011a, b, p. 140). In our interviews, the students often found themselves left alone to do this kind of reconciliation between contexts, and while their teachers utilized different types of ICTs, the tools were rarely used as deliberate boundary objects.

3.7 Selected Findings in Relation to ICT-Based Boundary Objects

As already mentioned, examples of ICT-based boundary objects were sparse in our data. However, in one VET school, the teachers and the workplace trainers collaborated on using a digital portfolio (MS OneNote) as a deliberate boundary tool. In this case, the teachers introduced the tool in the beginning of the education when the students enrolled in their first school period, and the students were instructed in using the portfolio throughout their education in both contexts. Typically, the students were expected to document and reflect upon their experiences, and both teachers and trainers scheduled designated time to discuss with the students. The teachers highlighted the possibility of gaining access to the students' "world outside the school" and in particular to their experiences in the workplaces. Often the students posted photos and videos of their work, and when the students returned to school such documentation would be utilized to promote reflection and dialogue among all the students in order to discuss both differences and similarities between domains, practices, and context.

According to the teachers, the digital portfolio served as a tool for communication and learning, but they also warned that making information (more) accessible does not automate boundary-crossing activity. Such learning processes still need to be scaffolded by the teachers and trainers. This is consistent with theory. As an example, Akkerman and Bakker (2011a) advise that the processes of coordination entail "efforts of translation" (p. 144) or as Wenger puts it, reconciliation between contexts consists of hard work.

The students, we interviewed in this particular case, were generally quite satisfied with the digital portfolio mentioning the advantage of having one, easily accessible place "to store everything" and to make personal notes independent of space and time. While it was evident that the teachers used the students' portfolios in their teaching, it was less evident if the students used the portfolios for actual boundary work or simply for documentation and storage. This underscores that the processes of boundary crossing also need to be learned and continuously cultivated and scaffolded.

In an interview with a teacher from another VET school, we found an example of how the use of an app, which the teacher had developed for the purpose, gave the students a space for uploading videos and pictures during their workplace periods and reflecting upon these in interaction with other students and the teacher. Contrary to the previous example with OneNote, this teacher asked the students to collaborate or at least share their experiences not only with the teacher and a trainer, but also with their fellow students. The students were asked to make videos of specific professional practices in their different workplace contexts to stimulate their own construction of relevant knowledge, and also to enable them to interact with each other about relevant questions in their workplace periods. As such, the app can be seen as an ICT-based boundary object that mediates between school and workplace, giving opportunity for the students to interact with each other during workplace periods, sharing experiences that helps them to see similarities and differences and reflect upon their own practice in interaction with others.

The examples with OneNote and the app point to the potential of ICT-based boundary objects used as mediating artifacts for VET students' boundary crossing. Even though it is mainly the example with the app that shows perspectives on how actual boundary work can be scaffolded, both examples highlight the potential, especially regarding the learning processes Akkerman and Bakker refer to as identification, coordination, and reflection. The artifacts, OneNote and the app, can, if being used as actual boundary objects, support the students' boundary crossing by making a communicative connection between school and workplace periods which promotes dialogue and possibility of translation and transformation of knowledge between the VET students' two learning contexts. Further, the design of a dual-learning environment based on boundary-crossing activities and boundary work has the potential of strengthening the student's reflection and identification of how different contexts shape their learning trajectories of becoming craftsmen and women.

3.8 Discussion

As an analytical tool the design matrix was useful in terms of mapping the 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.

Looking back at the many different types of ICTs, and combinations with boundary-crossing processes, the participants pointed to the two initial workshops, and the findings in the final interviews seemed relatively sparse with regard 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, many of the VET teachers did not acknowledge the affordances of the ICTs and thus found it difficult to envision the use of 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.

Further, in this project focus has been on what we would term "pedagogical" ICT. Most of the ICTs used by the teachers and students in the study are characterized by being heavily institutionalized. Only few teachers promoted and accepted the use of social media as legitimate educational tools, thus missing out on the possibility of connecting to the students' medialized lifeworld and the students' use of such tools also in the apprenticeship periods. As Pallitt, Gachango, and Bali show (Chap. 4), there are advantages and disadvantages of using both institutionalized ICT and more private ICTs such as social media given that no design *or tool* fits all, and this calls for further research.

Our data also reveal that VET teachers use a variety of subject matter-related ICTs and not least ICT directly related to the vocations of the different VET educations. A fair account of VET teachers' understanding and use of ICT-based boundary objects in boundary processes should also include such types of ICT. By way of using ICT more directly related to the students' vocations, we assume that the conceptions of boundary objects and boundary crossing would benefit from extending the sociocultural perspective to include a more dominant material component (Riis & Dirckinck-Holmfeld, 2020) encompassing the nuances and differences in VET. This, however, would also demand further research.

With regard to our understanding of boundary objects as convivial tools, some of the ICTs documented in this project hold the potential to be used as such, but as it is the case with ICTs used as deliberate boundary objects, the tools in and of themselves are not convivial. While some tools afford conviviality better than others, it is still in the actual practice of using the tools that the potential is realized. We would also argue that the majority of ICTs documented in this project (e.g., digital learning management platforms) are still more resemblant to industrial tools, tools where the designers and/or administrators determine the meaning and expectations of others—the very type of tools Illich opposed. In "Deschooling Society," Illich envisioned the creation of "learning webs" consisting of "things/objects, peers, and elders" as entangled arrangements that would ensure ample learning opportunities for anyone who would want such opportunities (Illich, 1971, pp. 76–77). In our view, designing for networked learning through ICT-mediated boundary-crossing activities in dual

VET holds the potential to honor Illich's vision. However, as stated by Goodyear (2011) designing convivial learning environments that afford certain kinds of valued human activity—with or without ICT—is no easy task, and we have only begun to explore the ideas of Illich in this study.

Finally, as a field, networked learning is concerned with educational endeavors across the educational system. In relation to VET and other types of professional and further education, we propose that the new description of networked learning could benefit from including stronger elements of learning as more than epistemic knowledge creation and knowledgeable action. The theoretical foundations of networked learning (cf. NLEC, 2020, Table 1, p. 4). include several authors for whom *learning also is a matter of coming to be* in and across networks of people, tools, and not only sites of action, but also sites of reflection and transformation.

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Chapter 4
No Size Fits All: Design Considerations for Networked Professional Development in Higher Education

Nicola Pallitt, Daniela Gachago, and Maha Bali

4.1 Introduction

Academic staff juggle multiple responsibilities including teaching, research, leadership, professional involvement, community engagement, and administration, and it is often difficult to make time for voluntary, noncertified professional development (PD). While literature on PD is growing, there is still a need to better understand the potential of continuous PD of academic teaching staff via networked learning, which emphasizes learner collaboration and autonomy (Mcconnell et al., 2011), whether conducted fully online or in blended formats (Coswatte Mohr & Shelton, 2017). We follow McConnell et al. (2011) in defining "networked learning," who position the philosophical roots of networked learning in the work of Dewey and Freire. These critical and emancipatory dispositions are also foregrounded in the commentary on "Networked Learning: Inviting Redefinition" published by Goodyear et al. (Networked Learning, 2020).

This definition of networked learning focusing on relationships and collaboration rather than technology promotes openness in attitude, learner collaboration, self-directed learning, and authentic learning. Goodyear (2019) adds the element of

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choice and control over how and how much one participates in the definition of NPD. While networked learning includes both off-line and online learning, connectivism describes networked learning enhanced by social media (see Bali & Zamora, n.d.).

This chapter reflects on three PD interventions[1] 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. Our research question is: What design considerations can be used to analyze, contrast, and design NPD opportunities and course designs?

Using a collaborative autoethnographic (CAE) methodology (Bali et al., 2015), the three authors reflect on design considerations for different forms of NPD courses, based on their experiences of designing and facilitating NPD. We argue that design considerations, such as context, have become more complex and that understanding the dynamics between them is important for designing networked learning experiences. We advocate a "no-size-fits-all" approach to NPD and 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.

4.2 Background

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 et al., 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 & Shelton, 2017). Literature focuses on both student learning and academic development when discussing NPD, with a seemingly greater emphasis on student learning, i.e., "the mission to prepare students for working life in such a qualitative way that students are able to understand the value of a lifelong professional development perspective in their future working lives" (Littlejohn et al., 2019, p. 5) with less emphasis on how staff "perform professional development within their own practices" (ibid.).

While studies on networked learning and design in higher education (HE) exist, few of these deal with design considerations of NPD courses for educators. Research

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

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). Literature also stresses the importance of boundary crossing, linking learning to both internal and external networks (Littlejohn et al., 2019).

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 Leafstedt and Pacansky-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." There are also approaches that offer participants agency in choosing, within the same course, multiple pathways, from the more structured to the less structured, and approaches that offer participants agency in terms of dipping in and out of various portions of more loosely designed PD, with opportunities to be more or less heavily involved in various stages, depending on personal interest and motivation (Bali & Caines, 2018). 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 "dos and don'ts," recipes, or advice (e.g., Vrasidas & Zembylas, 2004).

We also 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 et al., 2016). In similar fashion Pallitt et al. (2018) note the lack of formal research on learning design in African universities more generally and local meanings of learning design that depend on institutional resources, beliefs about learning and teaching, and a range of other factors.

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 organizations that we design rely on being inhabited by the teachers and learners who will "enact" our designs. While this framework is useful for analyzing 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 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 this chapter, we argue that design considerations have become more complex and that understanding the dynamics between them is important for designing networked learning experiences.

4.3 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 in 2019, 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, and we met synchronously multiple times to make sense of connections and dig deeper into understanding each other's contexts.

Collaborative autoethnography (CAE) involves the collective negotiation of meaning and interpretation based on our individual experiences expressed as narratives, and 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 et al., 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 et al., 2010). But autoethnography goes beyond storytelling, in order to make "linkages between the micro and the macro . . . there is a need for thick description, analysis, and theorizing" (Wall, 2016, p. 6). As Hine (2015, loc. 34 on Kindle) asserts:

> . . . autoethnography is a powerful tool for exploring the ambiguities and uncertainties inherent in Internet usage and for exploring how online and offline sites are connected in contingent and flexible fashion. It also cautions against unthinking pursuit of a "complete" understanding of such a phenomenon, and counsels researchers focusing on complex online/offline phenomena to embrace the sense of uncertainty and "good enough" assumptions that permeate the experience of navigating such territory.

Conducting collaborative research enabled us to collectively question, revise, and refine our individual interpretations and conclusions, allowing us to interrogate the less visible dimensions of the PD activities we were analyzing, such as the motivations, off-line connections to the online events, and decisions made along the way that cannot be seen in the final output. Our process of developing our framework was iterative and nonlinear, growing from synchronous conversations, Google docs, WhatsApp chats, emails, and a shared Google Draw to visually compare our own experiences to our developing framework (see Fig. 4.1). 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.

Some of the key elements of digital collaborative autoethnography as a methodology are that the journey is messy, and the initial research questions need to be open and exploratory to allow for unexpected discoveries and interpretations. Doing it collaboratively, we started with open questions for describing each of our contexts,

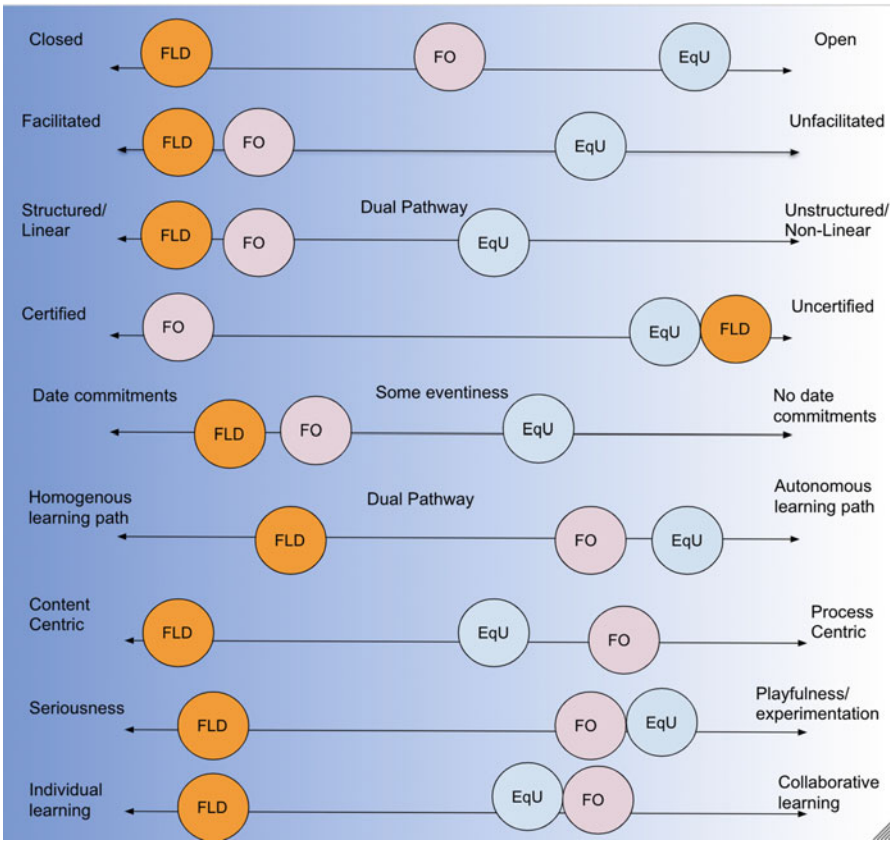

Fig. 4.1 The three courses mapped along the dimensions of NPD

and it evolved as we asked each other questions to try to understand deeper and find connections—the resulting analysis may seem neat and linear, hiding the complex realities of the process that led us to it (Baym & Markham, 2009; Bali, 2020).

4.4 Findings and Analysis: Design Considerations for NPD Courses

The following section discusses three NPD courses where the authors have been involved in the design and facilitation along 11 dimensions which emerged through the process of reflecting on our courses and their similarities and differences in design: facilitation, openness, structure, voluntariness, certification, linearity, eventiness, content vs. process/experience, learning path, playfulness, and collaboration (see Table 4.1).

Table 4.1 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 facilitators but there are no further efforts to build community	Daily announcements, individual progress reports shared during consolidation weeks, facilitated asynchronous activities, weekly online meetings	Facilitators managed site and Twitter and facilitated studio visits. No learning facilitation for open participants, only our own students
Openness: To what extent was the course open to any participants outside an institution, and were materials openly accessible?	Closed course site. Only open to institutional participants. No pre-requirements. Invites are sent out by institutional channels, participants apply via online form	Open license version of the course site (without participant activity) and course leader's guide. Course site is built using an institutional instance of open source LMS, Sakai. There are selection and funding criteria	Open to anyone to participate, public website and social media presence, public livestreamed and recorded studio visits. Also open to anyone to contribute but only facilitators control web and Twitter content
Structure: To what extent was there course structure that was planned and followed?	Highly structured. Biweekly 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 the 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

(continued)

Table 4.1 (continued)

Dimension	Flexible learning design—FLD	Facilitating online—FO	Equity unbound—EqU
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 2 weeks. Workshops scheduled every 3 weeks	Consolidation weeks to catch up on activities 2 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, 1996)	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 are 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 freedom 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 seemed to come naturally to us. Example is Twitter Scavenger Hunt activity

(continued)

Table 4.1 (continued)

Dimension	Flexible learning design—FLD	Facilitating online—FO	Equity unbound—EqU
Collaboration: To what extent is collaboration built into the course design?	No collaboration. Mainly self-study and development of qualification. Facilitators are drawn from the institution	A combination, the course design involves a progression from noticing individual needs to ways of being and working together. The course scaffolds socialization necessary to facilitate collaborative learning	Some interaction on activities like studio visit and Twitter chats. But no collaboration towards a particular product by participants. Students in my own courses did collaborative activities outside EqU.

4.4.1 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 et al., 2019). The institution I am based at is required to re-curriculate more than 60 programs before 2021. The Curriculum Officers' (CO) 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 emphasized are the promotion of greater inclusivity among students at our institution, including making the curriculum more meaningful, and ensuring greater flexibility in the delivery of teaching and learning. Our center 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 COs 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 center. 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 contexts 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 disciplines and faculties. 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, reflecting on what worked and what did not, 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-h workshops every 3 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 multicampus 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 using 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 3 months, with new topics released every 2 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 h a week on online activities. The module content and structure were set up before the start of the course, 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 from 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 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 is 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 reinserting the atmosphere of joy and playfulness that usually characterizes our f2f PD activities.

4.4.2 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 lead cohorts consisting of (usually) 20–30 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, and playful and reflective learning. Learners are expected to spend up to 8 h 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 8 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 to Week 5 each of the participants takes 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, posts in a learning journal (renamed blog tool) 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 icebreakers where course participants and facilitators share their highlights for the week, acknowledging their 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 decide 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.

4.4.3 Course 3: Equity Unbound (EqU), International Collaboration

EqU is an "equity-focused, open, connected, intercultural learning experience across classes, countries and contexts."[2] It is a collaboration between me, author 3 (American University in Cairo), Mia Zamora (Kean University in New Jersey, USA), and Catherine Cronin (at the time employed at the 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 that 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 (readings, 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

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

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 access 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 inserted 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 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.

4.4.4 A Comparison Across Dimensions

Through discussing differences and similarities between our PD courses, we developed a framework for design considerations along 11 dimensions, similarly to Dron and Anderson's "decagon of cooperative freedoms" (2014, p. 69). Their work describes characteristics of course design for online learning in groups, with a particular focus on the level of freedom of a learner to choose along ten dimensions of online learning, such as time or place of learning. Our dimensions talk to the designers' choices regarding learning design. Table 4.1 describes where each of our courses lies on the spectrum and Fig. 4.1 represents it visually.

Anderson and 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, 2018), 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).

4.5 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 constraints, and finally the issue of certification, volunteerism, and unpaid labor.

4.5.1 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 their teaching and learning practices. 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 are 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 accustomization process the learners go through and which resembles the accustomization 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 ongoing collaboration between staff developers and academics are 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 centers behind—and becoming more distant from educators at our own institutions who prefer teaching in familiar ways. We recognized 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 tool and discussion forums of an LMS rather than public blogs and social media.

4.5.2 Choice and Agency vs. Institutional Expectations/Rules

Our framework 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 design considerations for their own context and audience. Choice and agency are paramount, both for staff developers and lecturers. But this may clash with institutional expectations; e-learning policies may favor institutional LMSs over open approaches, thus limiting online collaboration and engagement. What helped us think through our framework 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.

4.5.3 Certification, Volunteerism, and Unpaid Labor

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 find 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 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 the need for financial compensation. However, not everyone can afford to volunteer their time in these ways. Also, free participation and unpaid labor are not a sustainable approach for long-term PD.

4.6 Concluding Remarks

In this chapter, we suggest a framework for design considerations for networked learning for PD drawing on our own practices. This framework is neither prescriptive nor judgmental: 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 framework 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 framework. 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 framework 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 framework and approach.

4.7 Coda: Professional Staff Development After COVID-19

We wrote most of this chapter before the pandemic late 2019. COVID-19 and the ensuing lockdown have suddenly made NPD part and parcel of academic staff development and have changed our own academic development practices radically. The explosion of webinars supporting academics from all over the world in moving their teaching online has created opportunities to hear more diverse voices, join international conversations, and become part of global networks. Offered by institutions of higher education, but also of national associations of teaching and learning, and often organized as inter-institutional collaborations, these webinars, courses, and programs have created a culture of openness and sharing.

From our own experiences we can see that:

- Educators value the relationship-building dimensions very highly, and within online environments, it seems that, in the absence of in-person events, they prefer synchronous communication with others when it is feasible, over asynchronous collaboration which requires more time management, autonomy, and organizational skills.
- Facilitating engagement in online synchronous PD is not an easy skill and there is an emergence of new facilitation techniques, such as virtual liberating structures (see Lipmanowicz & McCandless, undated, and resources created by OneHE & Equity Unbound, 2020), to create more interaction and engagement.
- The sudden increase in online academic staff development can seem overwhelming and emphasizes the importance of academic staff developers' role in curating and preselecting webinars and PD for their colleagues, to reduce complexity for colleagues unused to connectivist and self-directed learning experiences.
- Also these offerings are again often once-off interventions, without consideration for more sustained and context-sensitive PD.
- Finally, digital inequalities are surfacing in relation to these predominantly synchronous interventions, limiting access to those who have data constraints and who can engage in the English language (although there are some examples of localizing content such as the Arabic language webinars offered by e/merge Africa).

These emerging trends suggest that design considerations for NPD warrant further research.

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Part II
Learning Networks' Development and Use of Digital Resources

Chapter 5
Investigating Teachers' Use of Educational Tools as a Collaborative Space for Networked Learning

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5.1 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.

In this chapter, we employ a design terminology to understand how spaces, processes, people and products work together—or against each other—in relation to teacher collaboration, collaborative (re)design and collaborative design spaces. Firstly, we understand collaborative design spaces through Buur and Bødker's concept of 'the design collaboratorium' (Buur & Bødker, 2000). A design collaboratorium is a design space that supports and promotes collaboration and joint action between groups of people [teachers] in a design process. In this way, a design collaboratorium is a distinctive type of design space that is particularly suited to facilitate teachers' remix practices. Secondly, we understand teachers engaged in

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remix practices through the lens of Laurillard's notion of 'teachers as designers' (Laurillard, 2012). Teachers as collaborative designers highlight a position where teachers take up the role of becoming developers, co-developers or remixers of own or others educational materials. In this way, teachers as designers take up a distinctive role of collaborating with other teachers as they engage in the design of educational materials as reflective and intentional (co-)designers (Schön, 1987; Nelson & Stolterman, 2012). Thirdly, we understand collaborative (re)design as a design process taken up by teachers as designers in a design collaboratorium with the aim of (re)designing educational materials through the use of collaborative tools and materials offered by the design space. Importantly, a final distinction between 'design space' and 'designed space' has to be made in the context of this chapter. The designed space of CourseBuilder functions as the design space for teachers wherein they are invited to be designers, co-designers and re-designers of educational materials. That is, CourseBuilder as designed space offers teachers a design space that may or may not support and promote teachers' cooperation, networked learning and collaborative design practices. In other words, even though CourseBuilder constitutes a design space it might not be an ideal design collaborator, design collaboratorium or supportive design space in relation to teachers' collaborative and networking practices. Consequently, a Design Based Research approach is employed in order to investigate CourseBuilder as design space, teachers' design collaboration and networked learning within the space as well as how to best (re)design collaborative design spaces for teachers as collaborative designers of educational materials.

Within collaborative design spaces teachers' remix practices are primarily done in face-to-face collaboration or based on the sharing of local materials within the institution and its 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) for 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, 1998; Clandinin & Connelly, 1992). However, according to Conole and 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 were considered to be the lack of necessary e-learning skills (Conole & Dyke, 2004), inadequate support and training (Oliver et al., 2002), no easy-to-use toolkits, guidelines and frameworks, and the absence of methods for

understanding, unpacking and repurposing existing technology-enhanced educational materials (Conole & Fill, 2005). In the last decade many of these technological resources have been designed with more user-friendly interfaces and they are now generally made readily available to teachers and students.

The availability of the above-mentioned factors now potentially provides teachers with the opportunity to integrate learning activities that effectively utilise technology-enhanced learning materials that are shared, adopted and adapted. However, Kali et al. (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 et al., 2015, p. 173).

To pursue these ambitions, we investigate *how teachers' collaborative interaction with educational materials 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 (Fig. 5.1).

The two-tone circular elements in the model represent the three phases of research and development activities, whereas the dark grey circular elements represent the two main outputs of the design-based research process. Finally, the lower part of the figure represents the interaction with practice that increases over time through research activities and design moves. This chapter engages the above challenge through *evaluation* and *reflection*, as constituting the initial phase of a project focusing on educational materials as collaborative design spaces. The case study thereby serves as a delimited starting point within a larger design-based research

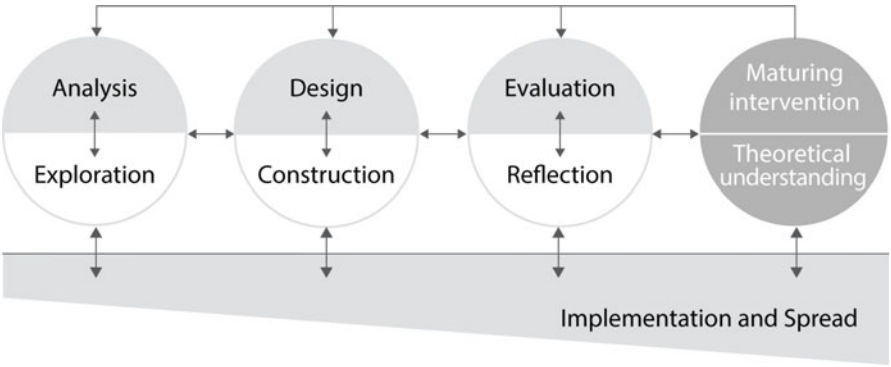

Fig. 5.1 Model for design research in education. (Inspired by McKenney & Reeves, 2019)

process. Prior to this starting point workshops where held with teachers where CourseBuilder was presented to and could be tried out by teachers that were invited to put forward critique and requests to the design team. More than 40 such test and feedback workshops with teachers where carried out ahead of the official launch of CourseBuilder. However, CourseBuilder was still a somewhat closed development process, that presented teachers with a finished concept and prototype to which teachers could respond. After the launch, continued incremental adjustments have been made, but the overriding concept, design and functionality is unchanged. Accordingly, the development and implementation of CourseBuilder can be considered to be largely based on a classic waterfall model.

Kali et al. (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 et al., 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 6 years after the CoruseBuilder was launched be achieved?

5.2 Collaborative Design of Educational Materials Among 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; Knutsson & 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 and 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 and Bødker (2000) and Bødker and 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 and resharing.

In Knutsson and Ramberg (2018), teachers themselves point towards four 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 (Knutsson & 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 correspondence with the intentions of challenging the assumptions that digital tools and other institutional systems reflect students' educational practices and learning environments, raised by the Networked Learning Editorial Collective, we intend to apply a teacher's perspective on evaluating specific learning environments as potential supportive and productive frameworks for networked learning: 'Networked learning involves processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies' (Networked Learning Editorial Collective (NLEC), 2020, p. 8).

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, pp. 377–378). 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).

5.3 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 educational material development. But as shown in Fig. 5.2, a triangulation of case study data sources has been ensured by employing method and analysis integration as described by Frederiksen (2013, pp. 21–24).

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 chapter focuses on the quantitative sources of data whereas the qualitative aspects are used as steppingstones for future research in the concluding remarks. The collected data shows created, shared and reused courses. These data are on an institutional level, and thus does not contain personally identifiable information. People at Systime with relevant GDPR in-service training had access to data, but this data has, until now, not been used to inform Systime about the use and usefulness of CourseBuilder.

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

Fig. 5.2 Methodology—The study triangulates findings from survey, platform data and interviews

5.4 Case: The CourseBuilder

All K-12 teachers in Denmark, Greenland and on the Faroe Islands have free access to the educational materials 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. Sixteen thousand six hundred 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 Danish national programme on digital literacy which states: 'Digital learning materials and tools in a digital world, IT and digital tools and learning materials should be a natural part of didactic practices and teaching for children and young people. New digital tools and learning materials must challenge the digital generation at daycare facilities, schools and other educational institutions, and support good didactic practices and high-quality teaching' (The Danish Government, 2016a, b, p. 29). But at the same time it can also be interpreted as part of a larger stragey to promote the iLibrary as a new educational 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 an educational 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 among 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 educational 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 (Fig. 5.3).

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

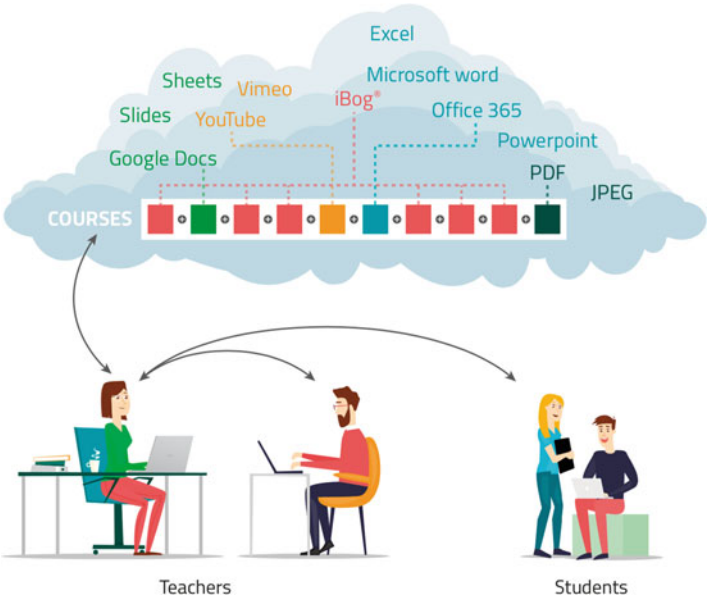

Fig. 5.3 The logic of the CourseBuilder enables teachers to integrate content from the iLibrary (text, video, questionaries, etc.) with content from other sources. When designed, the course description can be distributed using the school LMS. (Image permission: Systime)

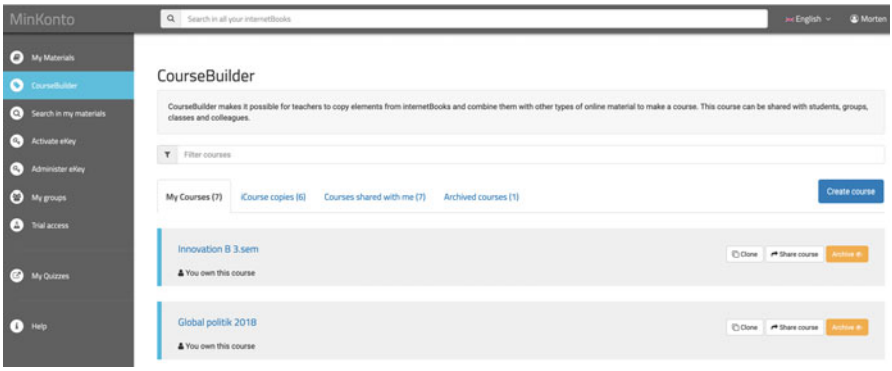

Fig. 5.4 My Courses—An overview. (Image permission: Systime)

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 (Figs. 5.4 and 5.5).

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

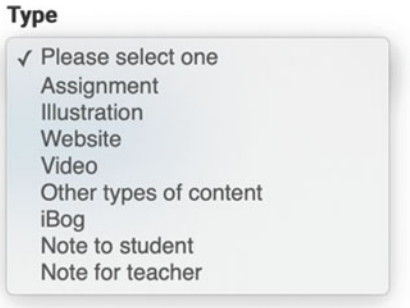

Fig. 5.5 Types of content. (Image permission: Systime)

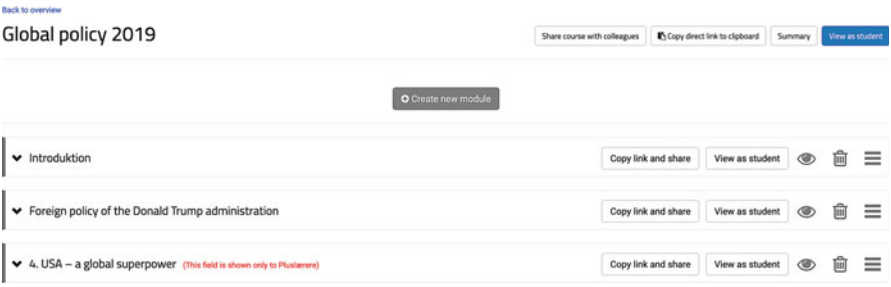

Fig. 5.6 Overview of the course. (Image permission: Systime)

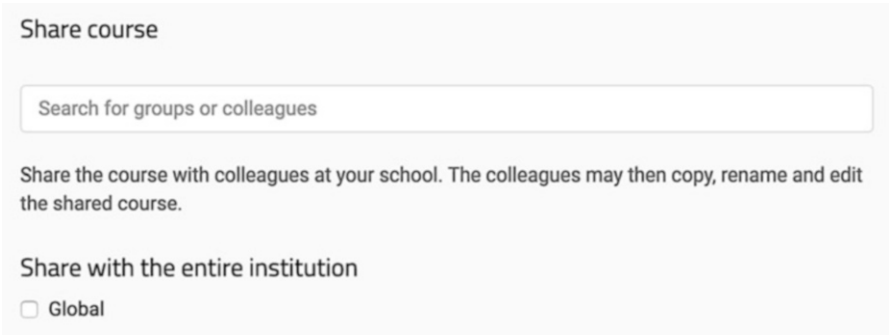

Fig. 5.7 Share a course in the CourseBuilder. (Image permission: Systime)

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 (Figs. 5.6 and 5.7).

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 (Fig. 5.8).

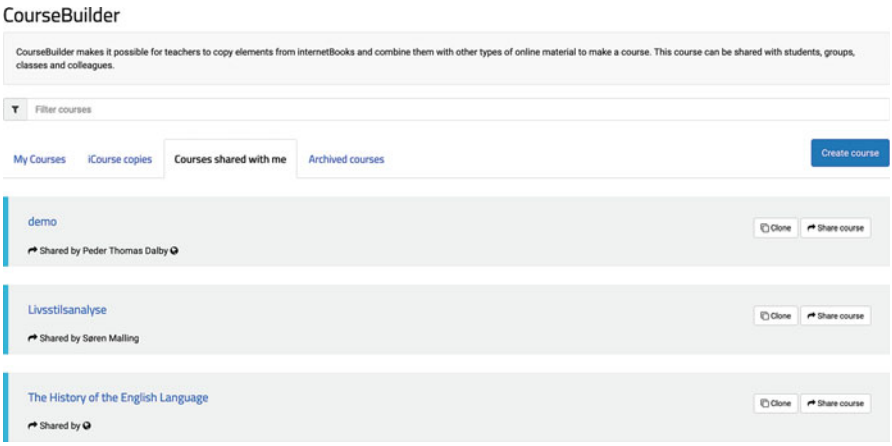

Fig. 5.8 Sharing and cloning. (Image permission: Systime)

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.

5.5 A Collaborative Space for Teachers' Remix?

The workshops with professional instructors were held (partially) to introduce teachers to the use of the CourseBuilder as an educational 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. Even though the survey cannot claim to be representative of the entire cohort of teachers (50 institutions) as not everyone responded to the survey, there is correspondence between the teachers' responses in the survey and the system data on actual use of CourseBuilder. In this way, the survey can be said to substantiate and give insight into the observable use of CourseBuilder.

The survey showed that 95% had used some kind of digital learning materials in their teaching in a period of 2 weeks prior to the survey. Ninety percent of the teachers replied that they generally use digital educational 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*

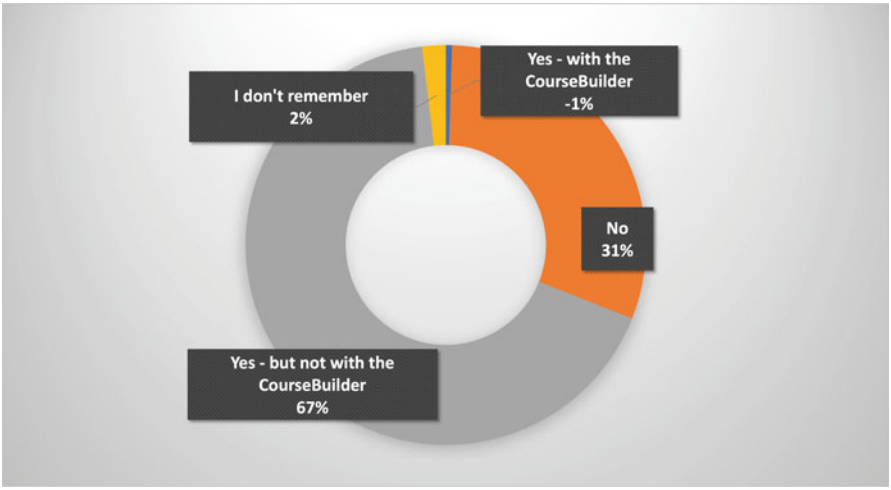

Fig. 5.9 Answers to the question: Have you ever reused colleagues course plans in planning your own teaching? >0.5% (one person) replied 'Yes—with the CourseBuilder'

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 (Fig. 5.9).

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 6 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 is seemingly not correct as 177 respondents (83%) in the survey replied that they share educational 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 educational tool.

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).

5.6 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 3 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 Bernard & Lundgren-Cayrol (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, pp. 285–286). 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 3-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, then 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.

5.7 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; Knutsson & Ramberg, 2018; Goodyear, 2015; Voogt & Pelgrum, 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 theoretical 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 Fig. 5.10 — 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 and (2) investigations into barriers in teachers' remix practices and

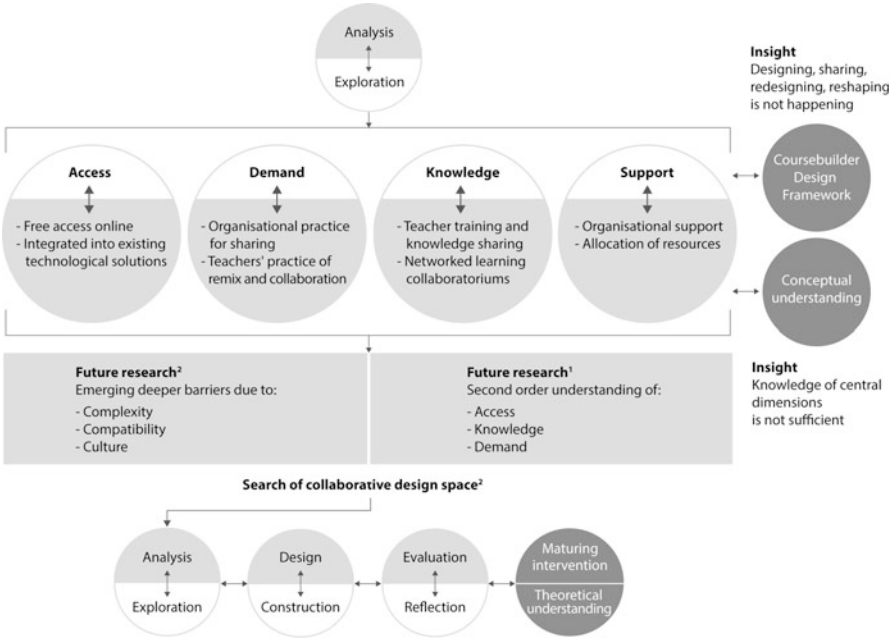

Fig. 5.10 Results and outline for future research. (Inspired by McKenney & Reeves, 2019)

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 educational 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 and 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 stated goals. 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' apparent non-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)

Following this, a more substantial focus on participatory design, value-sensitive design or co-design as well as more extensive integration of and collaboration with teachers in the beginning phases of design and development might have ensured a larger degree of collaboration and networked learning within CourseBuilder. Such approaches will be investigated in the following steps of the overall design-based research project.

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.

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 process of designing collaborative design spaces for networked learning.

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Chapter 6
Building Digital Literacy Through Exploration and Curation of Emerging Technologies: A Networked Learning Collaborative

Ann Hill Duin, Isabel Pedersen, and Jason Tham

6.1 Introduction

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. Massive amounts of data are collected, mined, and used to alter human behavior. In higher education and the public sphere, information about emerging technologies is often proprietary and withheld from citizens or is too complex for people to understand. As college-educated people are huge consumers of digital products which affect their own digital lives (Pedersen & Aspevig, 2018), we see it as most critical to foster student development of an expanded understanding of their digital literacy.

To date, digital literacy efforts in US 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).

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In the realm of the authors' collective discipline, technical communication, digital literacy scholarship has revolved mainly around the use of computers for composing and producing meaning (Breuch, 2002; Hovde & Renguette, 2017; Selber, 2004). Technical communication scholars have focused on technological literacy (tool knowledge), and most recently code literacy (content management rules/knowledge). Hovde and Renguette (2017), drawing on the work of technical communication scholars who have addressed technological literacy (Breuch, 2002; Brumberger et al., 2013; Cargile Cook, 2002; Northcut & Brumberger, 2010; Selber, 2004; Turnley, 2007), consolidate this scholarship into functional, conceptual, evaluative, and critical levels of technological literacy. Instructional models in technical communication exist for the purpose of cultivating technological and, most recently, code literacy (Duin & Tham, 2018). However, no innovative model exists for building digital literacy, i.e., literacy that includes "making ethically informed choices and decisions about digital behaviour. . . digital safety, digital rights, digital property, digital identity and digital privacy" (Traxler, 2018, p. 4).

To mitigate this gap, we designed an exploratory study called Building Digital Literacy (BDL). The study's goal is to examine student development of digital literacy as a result of use and/or curation of collections on emerging technologies on a digital resource, the Fabric of Digital Life repository and archive (Fabric, https://fabricofdigitallife.com/). Critical to this work is the collaborative engagement in place to foster understanding of digital literacy as well as to support instructional development, pedagogical deployments, and associated research. Specifically, we invited instructors from two national/international technical communication societies to collaborate as a means to develop an understanding of digital literacy and to deploy instructional units for building digital literacy.

This research comes as the result of collaborative engagement spearheaded by the Digital Life Institute at Ontario Tech University in Canada along with research affiliates at the University of Minnesota and Texas Tech University in the United States. A distinctive feature of this study is the evolutionary development of this networked learning collaborative with members' clear focus on understanding digital literacy and their willingness to draw from their wide range of expertise for inspiration throughout the three phases of research to date.

This chapter begins with discussion of networked learning definitions and an overview of the Fabric of Digital Life archive. We then discuss the three phases of this study:

- Phase one from January to May 2019 focused on the initial proof of concept and overall processes and logistics, i.e., whether and how the Fabric digital archive might be used to build student digital literacy.
- Phase two from September to December 2019 focused on building the network for joint problem solving and knowledge creation surrounding our understanding of digital literacy.
- Phase three from January 2020 to May 2020 focused on building community and collective intention surrounding digital literacy understanding and student digital literacy development.

Phases two and three most align with hallmarks of networked learning: connections between instructors and their uses of Fabric; building the network and fostering development of relationships, information flows, joint problem solving, and knowledge creation; and building community and shared identity in understanding digital literacy and articulating the overall project's unique set of challenges. Phases two and three also include examination and redefinition of digital literacy.

6.2 Networked Learning

Definitions of networked learning emphasize inter-personal connections, network, and community. Goodyear et al. (2004) define networked learning 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). Similarly, Hodgson et al. (2014a, b) view networked learning as co-created. The experiences and perspectives of others are needed for learning, and for this research the multiple perspectives served to build collective understanding of digital literacy.

For this exploratory study, we draw on Jones et al.'s (2015) distinctions regarding how networked learning further defines community and network:

> Network refers to the set of relationships such as information flows, helpful linkages, joint problem solving, and knowledge creation. Community is a special case of networks and 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. (p. 2).

At the 2020 Networked Learning Conference, Goodyear, Hodgson, Jandric, and Dohn convened a roundtable to invite further redefinition of networked learning. Additional scholars continued to work with Goodyear et al. to develop, review, and edit the following definition of networked learning that we use throughout this chapter:

> Networked learning involves processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies. Networked learning promotes connections: between people, between sites of learning and action, between ideas, resources and solutions, across time, space, and media. ("Networked learning: Inviting Redefinition," np).

In this study, inter-personal connections evolved as a result of instructors collaborating, cooperating, and inquiring together to define and understand digital literacy and create instructional units to deploy as a means to build student digital literacy. Instructors from aligned backgrounds (composition, rhetoric, technical communication, education) met bi-weekly online to promote relationships in support of understanding and building digital literacy, including information flows and helpful linkages (open shared notes), joint problem solving in the development and

deployment of instructional materials, and knowledge creation through shared leadership in creating research direction, compiling and studying data, and co-authoring multiple documents.

6.3 Fabric of Digital Life

Fabric of Digital Life (Fabric, https://fabricofdigitallife.com/) is a cultural analytics database that tracks the emergence of embodied computing platforms. As stated on the site, Fabric is "a research database and repository created by Dr. Isabel Pedersen and members of Decimal Lab at Ontario Tech University in Canada. Fabric now fosters a community of individuals that contribute to it, not only to its content but also to its metadata development and scholarly use." Its focus to date is on carryables, wearables, implantables, ingestibles, embeddables, robotics, and ambient platforms.

Curated by both established and student researchers, dozens of collections work to situate emergent, embodied, technologies within broader digital cultural spheres. Fabric's aim is to contextualize emergence within both traditional and non-traditional media genres such as magazine journalism, broadcast news, marketing outlets, tradeshow videos, video games, government publications, films, and academic research venues to reveal how digital technology is evolving. For example, an invention might be announced in an academic journal article, celebrated in a popular science magazine, and depicted as a fictional artifact in a video game. All of these instantiations of an invention contribute to its emergence. To assist student exploration and/or curation of collections, Fabric uses an open access content management system and presentation software, CollectiveAccess that draws on the Dublin Core™ Metadata standard to organize and standardize its fields of information. The researcher contribution interface facilities adding invention artifacts and a public web interface provides means to identify, collect, archive, catalogue, revise, and analyze the discourses (i.e., articles, images, audios, videos, other artifacts and events) surrounding emerging technologies.

Whether examining, contributing, or curating Fabric collections, students become exposed to multiple stakeholders in the exploration of technology emergence through these different media genres. To further assist student analysis, Fabric categorizes items according to three discursive types: inventions, responses to inventions, and objects of allusions to technologies:

- *Inventions* are usually produced by an inventor or team of inventors that include technologists, authors, engineers, makers, researchers, artists, companies, or governments that can claim to have created an invention. Concept videos, patents, and journal articles are the most common invention representations.
- *Responses to inventions* describe representations about inventions, including journalism, blogged opinion pieces, university publicity articles, video lectures,

or academic journal articles that describe inventions, but are authored by non-inventors.
- *Objects of allusions* to inventions are visual or textual fictional depictions of devices, technologies, or even creative ideas about technologies. Films, novels, games, and television shows are objects of allusions.

By inviting students to explore Fabric collections, they can trace origins for technology adoption that might originate, e.g., in a science journal or a fictional depiction. Exploration and use of Fabric's extensive metadata categories reveals ideologies, value-systems, and narratives that drive technological innovation for both better and worse.

For this study, we sought to use Fabric as a learning database in which digital literacy might be cultivated and exercised. Specifically, we asked students to engage with Fabric in one or more of these ways:

- Examine: Students explore the objects in a collection, examining their origin, feature, and potential uses in the society. Instructors may ask students to consider the rhetorical, social, or technical implications of these objects as part of the examination.
- Contribute: Students archive single objects using existing keywords and metadata on Fabric. Students learn to use media editing tools like image and video editors to create a thumbnail for the archived object.
- Curate: Students envision, create, and submit a new collection for possible publication at Fabric based on a thesis or unique point of view. Students identify and propose artifacts from within and outside of Fabric, completing a curation collection form that includes an overview/abstract of the collection. To do this, they complete a Google (or Excel) sheet for metadata planning associated with each artifact, and they compose an overview of their collection (Fig. 6.1). Working with the archivist to ensure appropriate metadata, registration, and submission, they then upload their artifacts to Fabric through a customized interface. On the public interface, each item includes a thumbnail for the artifact housed at Fabric as well as the metadata (Fig. 6.2). Their metadata is then published as part of each artifact in their collection (Fig. 6.3).

6.4 Phase One: Initial Proof of Concept

During phase one of this study (January to May 2019), an initial team of five (Fabric editor, Fabric senior archivist, two graduate students and one professor at the University of Minnesota) met weekly to build out and test the concept of using Fabric collections in their design of instruction for expanding student understanding of emerging technologies as related to technical and international communication. Reviewing the complete set of phase one meeting notes, we emphasized that being digitally literate implies the ability to make ethically informed choices and decisions about one's digital behavior, i.e., to understand one's digital identity, property,

What Language Sounds Like: Wearable Devices in Translation Communication (2019)

Curators: Kristine Ryan, Sue Loly, and Miranda De la Victoria | University of Minnesota | April 2019

Collection Editor: Isabel Pedersen
Acquisitions Editor: Ann Hill Duin
Collection Archivist: Sharon Caldwell

This collection responds to a rising global trend in wearable devices used for language translation and international communication. This developing technology could revolutionize and disrupt the necessity to learn and practice new languages and remove hurdles that have previously existed in global business. With a view to immediacy, users are looking for easy, fast, and convenient ways to communicate in real-time between foreign languages. Some of the claims about it are hopeful, "I think what automatic translation does for us as humans is really open doors" (Waibel, 2018). Innovative companies have been working to bridge the digital divide by developing more user-friendly technologies and by creating opportunities for everyday people to manage real-time communication, despite language barriers.

However, is it enough? How do these technologies affect the other nuances like traditions and cultural behaviors that to date have been such a vital part of intercultural communications? Is raw translation enough? How important are the other cultural dimensions? The "word meanings don't match up precisely across languages" and "we generally mean much more than we say" (Haugh, 2017).

The artifacts showcased here consist of wearable devices designed for translating national languages, American Sign Language (ASL), words and thoughts emitted by the brain and through the skin, as well as for translating or manipulating our experiences through Audio Augmented Reality (AuR).

Fig. 6.1 Example overview of a student team's curated collection. (Image permission: Fabric of Digital Life)

rights, and safety. While we discussed the importance of measuring digital literacy understanding as part of examination and curation of emerging technologies, the majority of work focused on logistics and development of an initial set of instructional materials and associated assignments for use in examining, contributing, or curating Fabric collections.

An outcome of phase one work was the development of initial instructional materials for use across multiple technical communication and writing courses as a means to build digital literacy through exploration and/or curation of collections on emerging technologies. Development included spreadsheets, instructional videos, and guides to break down steps in the use and/or development of Fabric collections. These instructional units ranged from assignments for 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. These instructional units were used in both upper level technical and professional writing and advanced/graduate level Writing Studies courses as part of short (1 week) to longer (4 week) assignments. Students across these courses developed and published six collections that were then published at the Fabric 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.

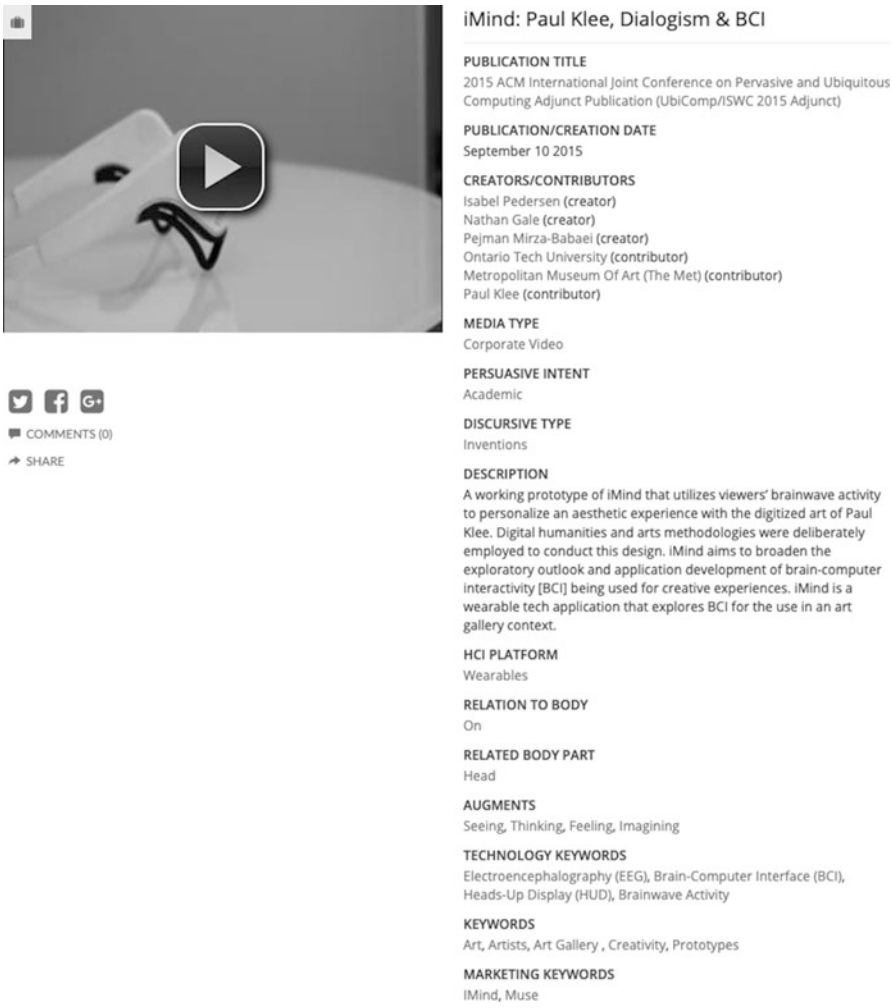
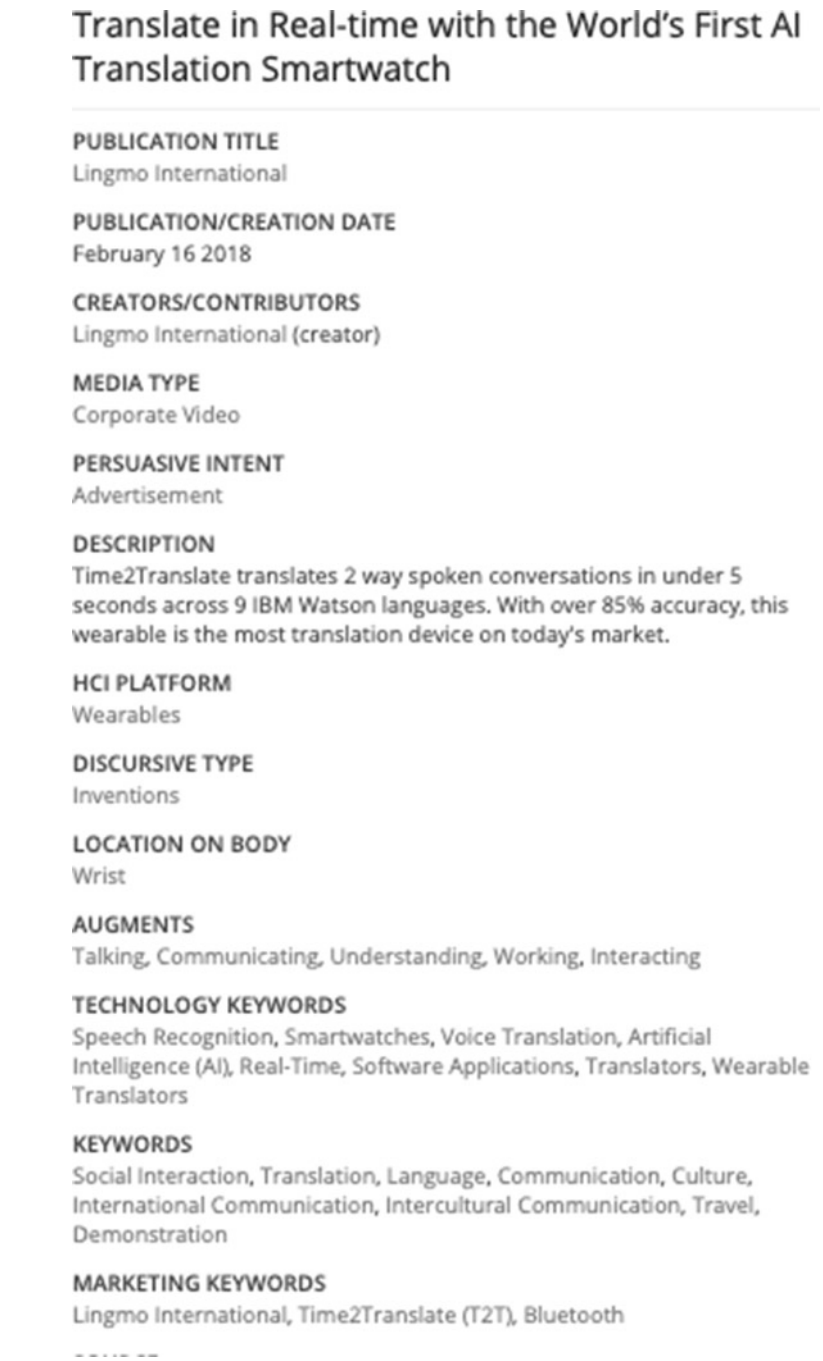


Fig. 6.2 Screenshot of an example of an uploaded video to Fabric. (Image permission: Isabel Pedersen)

All deployments during phase one focused on pilot testing student curation, adding 103 new artifacts to Fabric across the six new curated collections. Appendix includes detail regarding collection titles, artifact counts, and inclusion of previous Fabric artifacts. This development and pilot testing of instructional materials worked to guide students in learning a common language of classification of technical emergence. Another outcome was a keyword schema that helped students to standardize the constantly evolving language used to describe emerging technology. Finally, this feedback informed the development of a contributor's web interface and



Translate in Real-time with the World's First AI Translation Smartwatch

PUBLICATION TITLE
Lingmo International

PUBLICATION/CREATION DATE
February 16 2018

CREATORS/CONTRIBUTORS
Lingmo International (creator)

MEDIA TYPE
Corporate Video

PERSUASIVE INTENT
Advertisement

DESCRIPTION
Time2Translate translates 2 way spoken conversations in under 5 seconds across 9 IBM Watson languages. With over 85% accuracy, this wearable is the most translation device on today's market.

HCI PLATFORM
Wearables

DISCURSIVE TYPE
Inventions

LOCATION ON BODY
Wrist

AUGMENTS
Talking, Communicating, Understanding, Working, Interacting

TECHNOLOGY KEYWORDS
Speech Recognition, Smartwatches, Voice Translation, Artificial Intelligence (AI), Real-Time, Software Applications, Translators, Wearable Translators

KEYWORDS
Social Interaction, Translation, Language, Communication, Culture, International Communication, Intercultural Communication, Travel, Demonstration

MARKETING KEYWORDS
Lingmo International, Time2Translate (T2T), Bluetooth

Fig. 6.3 Metadata published as part of an artifact in this collection. (Image permission: Fabric of Digital Life)

revision of editorial, archivist, and contributor practices, to facilitate contributions for the future phases of the study.

6.5 Phase Two: Building the Network for Collective Work

Prior to beginning phase two, as co-investigators we received both Institutional Research Board (STUDY00005919) approval from the University of Minnesota (for Duin and Tham) and Research Ethics Board approval (15375) from Ontario Tech University (for Pedersen). We also applied and received funding from the Council for Programs in Technical and Scientific Communication (CPTSC, https://cptsc.org/), for phase two research. We invited CPTSC members as well as members of the Association of Teachers of Technical Writing (ATTW, https://attw.org/) to join this study to increase understanding of student development of digital literacy as a result of examining, contributing, and/or curating collections of artifacts on emerging technologies. Both organizations support teaching, research, program development, and administration in technical communication. During phase two, eight instructors at five US institutions, along with Pedersen and Caldwell from Ontario Tech, took part in building the network for collective work to foster student digital literacy.

As co-leaders of this work, we began building the network for collective work by visiting one on one with each member to share work from phase one along with a rich set of google folders that included background readings, guides and video tutorials, and examples of student collections. We developed a site (https://sites.google.com/umn.edu/buildingdigitalliteracy/home) to share example assignments across multiple courses. Upon consent to participate, instructors were invited to use these instructional units for student exploration and/or possible curation of collections on emerging technologies. Instructors also agreed to share their learning objectives and timeline for specific exploration and/or development of collections on emerging technologies as part of an assignment in their courses; received a consent form to share with students, inviting them to share their exploration and/or curation work and to complete a short survey in which they respond to questions on how their exploration and/or curation work has influenced development of digital literacy; and had the option to provide a short (one page) reflection on their incorporation of an exploration/curation assignment and its impact on building student understanding of digital literacy.

Each assignment or project in a writing or technical communication course became equivalent to a mini-case study on student development of digital literacy as a result of exploring and/or curating collections on emerging technologies. In addition to instructor use of Fabric as part of technical communication or writing courses, one instructor shared about her Teaching Digital Rhetoric of Artificial Intelligence course that focuses on critically analyzing human-computer interactions and building an AI project:

> Students explore theories of rhetoric and AI in relation to topics such as identity, gender, posthumanism and culture. The design component of the course enables students to visualize socio-technical networks in the making of chatbots, develop algorithmic structures and test their design for diverse audiences. Finally, students learn to build chatbots using programming languages and various technologies. My plans are to use Fabric to analyze humanoid robots and use that analyses to design their own projects.

Another instructor shared about his use of augmented reality (AR) in teaching Shakespeare:

> I would like to contribute data from the development process of this AR application to Fabric; using Fabric to identify human-centered design practice. Have students find an interest on Fabric and then create an instruction set to help others navigate. By doing so, they can both develop a better understanding of digital literacy, build skills in DL, and help increase accessibility. The instruction set will be written and the written element might serve as a script for a video instruction. I am leaning toward having students record their screen instead of a camera instruction video.

To develop relationships, we located a time when all could meet bi-weekly via zoom to share updates, provide advice and receive direction on Fabric use and the curation process, and develop and share assignment development. All were invited to contribute to each meeting's agenda as well as to insert notes and links during each discussion. The annual CPTSC meeting also occurred during phase two, and a subset of instructors collaborated to showcase their set of Building Digital Literacy assignments, examining them according to the multiple digital literacies being discussed. This joint knowledge creation resulted in a great amount of discussion on what instructors termed *productive ambiguity*: How is this pedagogical activity helping students embrace uncertainty and build confidence in learning technology?

Throughout these meetings, we evolved as a network displaying collaborative, cooperative, and collective inquiry. As one instructor wrote in the shared meeting notes: "Each of us is incorporating multiple technologies throughout our study and use of Fabric. [We are] learning how to play an instrument, conduct the orchestra, and make the instrument."

6.5.1 Defining Digital Literacy Through Joint Problem Solving

Each meeting also included joint problem solving and knowledge creation through our extensive review of documents and ongoing discussions related to digital technologies and literacy. Instructors shared studies on digital literacy, including Stordy's (2013) taxonomy of literacies and definition of 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). Noting the ongoing challenge of navigating the many definitions of digital literacy from the mid-1990s onward, we located Feerrar's (2019) documentation of Virginia Tech University's use of the

Fig. 6.4 The Digital Capability Framework at the Building Digital Capability site (2021). The framework shows four key areas with ICT proficiency as the core of digital literacy, with digital identity and well-being encompassing all components of the framework. (Image permission: JISC)

Joint Information Systems Committee (JISC) Digital Capability Framework (2020), developed in the UK, as particularly influential to that 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 deepen digital know-how, defining digital literacies as "the capabilities which fit someone for living, learning and working in a digital society." In this framework shown in Fig. 6.4, digital literacy capabilities include 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 well-being.

This joint problem solving focused on the development of guided prompts for use across deployments as a means to student development of digital literacy. One instructor 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).

Throughout phase two instructors illustrated trusting relationships as they articulated their difficulty in defining digital literacy and studying the impact of Fabric use on building student digital literacy. Members collectively developed and agreed to ask students the following three questions and to collate our results:

1. To what extent is your work with the Fabric of Digital Life influencing your understanding of digital literacy?
2. What are the most challenging aspects of this assignment? Why? How did you overcome them?
3. 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 our analysis of survey results, we learned that students explicitly engage prior knowledge (mental models) and metaphors in learning a new tool, thus informing our evolving framework for building digital literacy. We share detailed results from this analysis in another publication (Tham et al., 2021). Given our focus here on networked learning, we focus most on instructor reports and meeting notes.

Instructor reports and meeting notes from phase two indicated that students across undergraduate and graduate levels benefited from examination and/or curation of collections on immersive technologies as a means to build digital literacy. Students benefited 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. Around half of the deployments during phase two focused on student examination of collections, and about half on student curation of collections, with greater use of previous Fabric artifacts. Therefore, phase two added 65 new artifacts to Fabric across six new curated collections (see Appendix).

Based also on thematic analysis of meeting notes, phase two served to build the network for collaborative work. This networked learning collaborative 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 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 articulated productive ambiguity in the deployment process, noting how it shapes student journeys in learning and fosters digital literacy.

On the editorial side at Fabric, the contributor's interface meant the editorial team could see all submissions and work collaboratively with instructors and students 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 collaborative members. With knowledge of the full content scope, editorial team members sometimes also added relevant items to collections. The Fabric editor made editorial revisions for each curated collection in keeping with the prescribed style. Each collection was made available to the public and announced on a social media channel in order to reach research communities.

6.6 Phase Three: Building the Community for Collective Intention

In phase three (January through May 2020), the majority of instructional deployments focused on student examination of collections, and one course deployment included teams who curated five collections, adding 55 new artifacts to Fabric (see Appendix). During phase three, we developed as a community with collective intention for building student digital literacy.

Members of CPTSC and ATTW were again invited to join this effort, with 16 members taking part in phase three: 11 instructors across seven institutions in the USA (University of Central Florida, University of Minnesota, State University of New York, University of Richmond, North Carolina State University, New York Institute of Technology, Texas Tech University); three undergraduate research assistants from the co-authors' respective universities; and the archivist and editor from Fabric. Ten of the 16 members had taken part in phase two.

While all meetings in all phases of this research were conducted via zoom or other desktop videoconferencing technology, of note is that the majority of phase three took place at the time of COVID-19. What had been normal "updates" and "check-ins" quickly became a time of exigence to determine how people were doing and how we could help each other throughout the pandemic. While our networked learning task continued to be the building of student digital literacy, of greatest importance became the well-being of each individual in this community amidst the pandemic's many challenges.

As a networked collaborative, we began phase three with collective discussion on the importance of studying our development as a collaborative along with our collective intention of pursuing increased study of building digital literacy. We decided to employ collaborative autoethnography (CAE) methodology, 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 et al., 2013). Given our various roles as editors/curators, graduate students, undergraduate students, and faculty, we noted Hernandez et al.'s (2017) emphasis that collaborative autoethnography allows for power-sharing, "inviting people who might otherwise be in hierarchical relationships to become part of a mutually enriching process" (p. 253). In this case, the "mutually enriching process" was again one of pursuing collective intention as a networked learning collaborative. At the first bi-weekly meeting during phase three, we discussed Lapadat's (2017) focus on ethical inquiry in which she writes:

> Collaborative autoethnography incorporates the ethical praxis of autoethnography but as a method offers greater scope and inclusivity, enhanced rigor,. . . a supportive structure for witnessing and therapeutic effects, collegial relationship building, and the fostering of joint engagement in social actions. Collaborators who trust each other function as members of a democratic community of inquiry and make the shift from individual to collective agency. In this way, collaborative autoethnography offers a path toward personally engaging, non-exploitative, accessible research that makes a difference. (p. 1).

These themes overlap directly with core tenets of networked learning, that of building trusting connections, shifting from individual to collective agency, and overall collective intention for building community.

At our second meeting of the term, we collectively determined how CAE methodology would work for those deciding to participate. Each member of this networked learning collaborative recorded an autoethnographic reflection of around 400–500 words at two or three points throughout phase three. At each CAE point, a member was to reflect individually to preserve his/her distinct and independent voice prior to posting the reflection to a shared Google document. The first CAE reflection was intended as an open reflection on any aspect of the project.

Members reviewed and discussed the first set of reflections, continuing to conceptualize digital literacy amidst ambiguous requirements (i.e., competencies or technical know-how) and broad perception on what counts—and doesn't—as digital literacy. We stumbled upon the notion of threshold concepts as part of a bi-weekly discussion, noting that there may be some "transformative ideas" that do not necessarily dictate the definition of digital literacy but provide a common language for building digital literacy. According to Meyer and Land (2006), the characteristics of threshold concepts are as follows:

- Learning them is generally transformative, involving "an ontological as well as a conceptual shift. . . becoming a part of who we are, how we see, and how we feel" (Cousin, 2006).
- Once understood, they are often irreversible and the learner is unlikely to forget them.

- They are integrative, demonstrating how phenomena are related, and helping learners make connections.
- They tend to involve forms of troublesome knowledge, what Perkins (2006) refers to as knowledge that is "alien" or counterintuitive.

Members therefore determined that the second CAE reflection would focus on a "threshold concept" within the project. Members again reviewed and discussed the second set of reflections, discussing and determining then that the third reflection should be a video of final reflections on the project and overall experience. This CAE method thus provided a more democratic research approach while engaging multivocality across the networked learning collaborative.

Fourteen members chose to participate in these CAE reflections. In a planned publication, we will share a detailed analysis of the three sets of reflections. The first two sets of reflections were shared using text, and the third consisted of video recordings. Here we share themes from the first set of reflections; these focused on defining digital literacy, collaboration, and productive ambiguity.

First, members noted continued evolution in moving from working to define digital literacy to instead challenging and expanding its definition:

> One of the more interesting things for me in the BDL [Building Digital Literacy] collaboration has been having this sense of what digital literacy is challenged, expanded, and enriched through discussions with collaborators. (graduate student)

> I don't think digital literacy needs a single definition anyway if we truly practice student-centered pedagogy. I believe instructors should meet students where they are and co-construct a digital literacy development plan that builds upon individual students' existing knowledge and competencies. (graduate student)

> Digital literacy addresses, amongst many other things, how humans learn to adopt and adapt, and *teach* others to do so, amid a dynamically evolving technology landscape. Of the many great defining quotes, I like this one that explains the *ebb and flow* surrounding the process: "Digital literacy is an ongoing and dynamic process—it is not a threshold which, once achieved, guarantees familiarity with the digital for ever after; it is rather a temporary achievement which will be good as long as the current environment does not change" (Martin 2006, *A European framework for digital literacy*). (Fabric editor)

> What is most interesting about ACRL's [a literacy] framework is that they incorporate the idea of 'metaliteracy', which echoes the importance of this kind of collaboration and co-creation. Metaliteracy "expands the scope of traditional information literacy skills to include the collaborative production and sharing of information in participatory digital environments" (ACRL, 2016). (Fabric editor)

> I wonder how students take up learning about digital literacy even as they rely solely on digital tools to participate in our courses. (graduate student)

Second, members reflected on their roles in this networked learning collaborative based on diversity of demographics and participation:

> The BDL is a team of diverse scholars who have come together to understand and share their ideas about digital literacy through their own classroom experiences. Most (if not all) scholars on the team are from humanities departments and the level of project management, articulation of goals and problems in defining the field is prominent in their work. (graduate student)

> My hope is that students who contribute to Fabric feel as if they are invited to participate in an ongoing collaborative digital literacy endeavor that will live and evolve beyond their time as students. . . As I observe this term's BDL assignments, projects, papers and conversations, I continue to grapple with the collaborative relationship between past, present, and future curators and collections. Can metadata structure do more to evolve student contributions and digital literacy goals? For example, should collections like the *Implanted and Embedded Medical Devices* collection remain capped to 2019? Or, should other student/researcher teams be invited to "review and revise" the collection abstracts and artifacts so that we can update them to 2020 (and beyond) and build on previous student work to develop another skill associated with digital literacy? How will Fabric credit students who review and revise? And so on, and so on! (Fabric editor)

> We are not often exposed to pedagogy-in-practice outside our institutions during our training as teachers (and sometimes not exposed to much pedagogical diversity within our institutions), and as such, being a part of a collaboration that has grown to include people at all stages of teaching experience has contributed a lot to my own teaching style. (graduate student)

Third, members continually returned to the topic of productive ambiguity that had initially been introduced into discussion during phase two. Here members connected ambiguity with developing digital literacy as well as the potentials of digital repositories such as Fabric for digital literacy development:

> I do not introduce digital literacy as a topic in class prior to the Fabric assignments; I prefer for students to carve out some of their own understandings via us struggling through ambiguity as a class. Further, I find that the hands-on, problem-solving approach to struggling a bit as a class through the Fabric assignments leads to better overall engagement and learning outcomes. Many of my assignments (not just the Fabric ones) leave room for students to forge their own path. I believe that practicing decision making in this way is an important activity for generating broader problem-solving strategies, especially in terms of developing digital literacy, which is in constant flux with changing technologies. (graduate student)

> I'd like us to think and discuss more about ways to truly capture the potentials of digital repositories for digital literacy development. How might we address questions of validity and "rigor"? How can we ensure student-centeredness in our methods? (graduate student)

Fourth, throughout the study, undergraduate research assistants shared their unique insight:

> There's a wealth of information, but not a clear trajectory to addressing digital literacy with this information, because the digital world is not a static environment. The technologies, ideologies, and cultures that affect this connected international group are minute and pervasive. Small ideologies and small pieces of technologies have incredible reach. (undergraduate research assistant)

> Almost every object in our daily lives is becoming 'smart' or 'computerized'. Fabric is trying to capture this fleeting moment of change in how students and digital literacy is ingested, but everyday I engage with this kind of content, I wonder if the moment has already passed.

6.7 Conclusion

Key takeaways from this exploratory study include the following:

- Students across undergraduate and graduate levels benefit from examination 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, and seeing the website as a collection with artifacts that are navigated and how suitable items are identified, submitted, and accessed.
- Students explicitly engage prior knowledge (mental models) and metaphors in learning a new tool, thus informing our developing framework for cultivating digital literacy.
- Instructors appreciated ambiguity in the deployment process, noting how it fosters productivity and shapes student journeys in learning.
- Instructors are more likely to choose to have students examine, discuss, and critique collections as they address digital literacy; student curation is a larger task requiring more dedicated time.
- Bi-weekly meetings proved enormously effective in building connections, network, and community in support of building digital literacy.

Regarding use of Fabric, 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.

Drawing on our collective disciplinary knowledge of rhetoric, composition, and technical communication coupled with this shared research experience, we now share a common language for building digital literacy, namely, that digital literacy is concerned with the rhetorical situation. Digital literacy is a conceptual

development that requires continued cultivation; it is a culmination of the past, present, and future.

First, digital literacy is concerned with the rhetorical situation. To understand, define, and assess digital literacy, we must consider its application within specific contexts. The learner's personal culture, characteristics, and interests affect the individual's development of digital literacy. Similarly, the learner's social spheres help inform such development. Assessment of digital literacy must then be adapted to the sociocultural contexts in which the learner is performing digitally literate activities.

Second, digital literacy is a conceptual development that needs to be cultivated and sustained through tinkering with different technologies, platforms, information, and purposes. As different tools become more readily available to learners, instructors should create opportunities for experimenting with these tools while encouraging learners to reflect on their process and outcomes. Learners should think critically about their goals when tinkering with the tools and clearly articulate their understanding of the affordances and constraints of different communication media and information technologies. Learning activities should leverage the learners' prior experience and frames of reference as a springboard to new digital literacy goals.

Third, digital literacy is a culmination of the past, present, and future. To understand past and present practices, instructors may encourage students to use metaphors or describe their mental models when using new or unfamiliar technologies. Digital literacy may be assessed by how learners approach and address technological issues. As well, digital literacy may be evaluated through the quality of delivery produced by learners. Since digital literacy is future-oriented, instructors may also apprehend digital literacy from learners' descriptions of their personal and professional trajectories, and the roles of technology in those directions.

Critical to the continued building of digital literacy is broadening access to and participation by increased members of this networked learning collaborative. Goodyear et al. (2020), in their work to develop a revised definition of networked learning, note five constituent parts for networked learning:

1. It involves processes of collaboration, co-operation, and collective action.
2. It involves processes of "coming to know" and acting on the implications of that knowledge.
3. It depends on human relationships that require and strengthen trust and reciprocity.
4. The network's activities have a larger purpose that matters to all involved.
5. The importance of "convivial tools" or those that "lend themselves to creative use by networks of people. . . They afford opportunities for people to make their lives together." (p. 7).

We contend that critical to building student digital literacy is such collaborative engagement to foster and support instructional development, pedagogical deployments, and associated research. Throughout these three phases, members "came to know" and act on the joint problem solving and knowledge creation articulated, determined, and deployed during the bi-weekly meetings. All work depended on the

continued development of human relationships, trust and reciprocity, and the networked learning collaborative's activities focused on a larger purpose that mattered to all involved: the imperative to build student digital literacy. Last, open sharing of all instructional materials, resources, meeting notes, and reflections afforded opportunity for members to develop understanding and social change together.

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Appendix: Collection Titles and Artifact Counts for the Three Phases

Phase one collection titles and artifact count

Phase One Collection Titles	Artifact Count	New artifacts	Inclusion of previous Fabric artifacts
Emerging Technologies for Technical Communication	24	24	
Wearables and Carryables for Everyday Communication	16	15	1
What Language Sounds Like: Wearable Devices in Translation Communication	18	18	
Cultural Reality—A VR Experience	19	14	5
AR from Conception to Reality	23	20	3
Implanted and Embedded Medical Devices	13	12	1
Total	113	103	10

Phase two collection titles and artifact count

Phase Two Collection Titles	Artifact Count	New artifacts	Inclusion of previous Fabric artifacts
Non-Traditional Prosthetics	14	8	6
Biotechnology and Human Health: Harvesting the technology of plants and microbes to augment the human body	12	12	0
Surveillance, Sousveillance, and Security Technologies: A variety of wearable computing devices	24	19	5

(continued)

Phase Two Collection Titles	Artifact Count	New artifacts	Inclusion of previous Fabric artifacts
VR as a Sales Tactic	12	12	0
The Embodied Classroom: Technologies Used in Secondary Composition Pedagogy	6	6	0
Emerging Technologies for Business Communication	8	8	0
Total	76	65	11

Phase three collection titles and artifact count

Phase Three Collection Titles	Artifact Count	New artifacts	Inclusion of previous Fabric artifacts
Digital health devices and strategies	18	16	2
Fostering a Culture of Transcreation for Improving Mistranslation and Miscommunication	20	15	5
Challenges with Improving Workplace Communication	14	9	5
Japanese Technologies	19	2	17
Using Technology to navigate foreign lands and cultures	22	13	9
Total	93	55	38

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Chapter 7
It's Your Turn! Supporting Social Change Through Networked Learning and Game Playing

Lucila Carvalho, Pippa Yeoman, and Júlia Carvalho

7.1 Introduction

Education is never neutral. One of the main functions of education has been to facilitate young people's integration into an existing system or society. However, in the foreword to *The Pedagogy of the Oppressed*, Richard Shaull reminds us that education can become "the practice of freedom" or "the means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of their world" (Freire, 1972, p. 14). This chapter presents Fast Food da Politica (FFDP) as a case study of a learning network that embraces the practice of freedom as its core sentiment. FFDP is a not-for-profit Brazilian organization that works to empower young and old, men and women to take hold of their own futures.

FFDP uses games and open resources to educate Brazilians on a complex topic—the mechanisms and functioning of their political structures. The organization draws on the concept of "fast food" to convey that political engagement can be something fun and easy to go through. We argue that this learning network strongly enacts the networked learning values of participation, co-creation and knowledge building (Hodgson & McConnell, 2019). The very essence of the type of knowledge shared

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within this network is also deeply connected to Freire's critical pedagogy (Freire, 1972), as their goal is to empower children, youth and adults to learn about the functioning of Brazilian politics and, in so doing, to encourage social action based on people's understanding of their civil rights. Overall, the network strives to educate people to practice freedom and to figure out the importance of their participation and contribution to transform their own world (Freire, 1972).

FFDP focuses on material non-digital games especially designed to spark interest about the mechanisms of political structures. This chapter brings selected examples of games to discuss how specific qualities and properties of these games contribute to create an educational environment that transforms learning into an exciting challenge (Bayeck, 2020; Donovan, 2017; Oblinger, 2006). Our analysis focuses on the physicality of games, and how certain qualities contribute to tool mediated experiences that help situate people's understanding of the world, through their interactions with things that are extending beyond brains and bodies (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). We are interested on the invitations for participation that FFDP games afford. But the game elements within this network are only part of a much broader picture.

Brazil is a country marked by regional and socio-economic differences. Like in many developing nations, social, political and economic challenges abound, perhaps as a result of years of scarce support for the development of robust public policies and processes, and a sustained lack of investments on initiatives to expand and democratize people's access to knowledge and to education about these processes. Indeed, Brazilians could greatly benefit from open education initiatives that encourage critical and creative engagement with civic knowledge and citizenship, in ways that foster knowledge building through networked learning (Freire, 1972; 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 often relate to respect and empowerment of learners, and place learners as co-producers of their own learning trajectories (Ehlers, 2011). As we will discuss, FFDP games are openly shared as OERs.

We analyse FFDP as a case study of a productive learning network (Carvalho & Goodyear, 2020) using a particular set of analytical lenses—the *Activity-Centred Analysis and Design* (ACAD) framework (Goodyear et al., 2021; Goodyear & Carvalho, 2014) and the ACAD wireframe (Carvalho & Yeoman, 2019; Yeoman, 2015, 2018). The ACAD framework and wireframe allow us to identify key

structural elements (such as tools, tasks and social structures) in a learning network, and abstract how these elements may contribute to influence emergent activity. Through these lenses, we explore the ways this network is operating and highlight the importance of alignment between multiple design elements, focusing on the following: (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. Overall, 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 network 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, and to provide free access to 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). As with many others living and working in developing countries, their activities came to a standstill, after the COVID-19 outbreak. The network is now facing new challenges to continue with their mission, which includes adapting their material games to the digital realm, and to find new ways of disseminating their ideas.

In the next section we contextualize our approach to networked learning, briefly introducing the *Activity-Centred Analysis and Design* (ACAD) framework (Goodyear et al., 2021; Goodyear & Carvalho, 2014) and the ACAD wireframe (Carvalho & Yeoman, 2019; Yeoman, 2015, 2018). We then discuss issues associated with the use of games in education, before presenting FFDP as our case study of a learning network. We conclude our chapter with a brief account of the recent challenges FFDP is confronting and discuss the implications of our work for analysis and design of other productive learning networks.

7.2 Framing Designable Structures at Macro, Meso and Micro Levels

According to Dohn (2018), the notion of *networks* can be used to express different meanings. It sometimes refers to geographically distributed people, who come together via interconnected technologies. Or it can be used to describe communication that is mediated by the use of the Internet. Networks may allude to machines and agents, or instead, be about life activities in spaces that mix the physical and virtual. Networks can also describe people's dependence on others for their daily activities, such as, relying on a personal network of family or friends. There are many perspectives one can take, and they all foreground connections. Recently, the networked learning community came together to invite participation and contribution to a redefinition of networked learning, searching for a shared vision that enacts its values and practices:

> Networked learning involves processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies. Networked learning promotes connections: between people, between sites of learning and action, between ideas, resources and solutions, across time, space and media. (Networked Learning Editorial Collective, 2020, p. 8)

Carvalho and Goodyear (2020) suggest that *networked learning* is process-oriented and connected to a philosophical and pedagogical perspective on learning, whilst *learning networks* describes inquiry in educational research and is often object-oriented. The *Activity-Centred Analysis and Design* (ACAD) framework (Goodyear et al., 2021; 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 characterized as emergent. Designable components include those in (1) set design—or the digital and physical structures, tools and resources made available at learntime; (2) social design—referring to social arrangements of learners, roles and divisions of labour, and (3) epistemic design—or the proposed tasks, including knowledge and ways of knowing. The last component in the ACAD framework is emergent and characterized as the co-creation and co-configuration activity, which accounts for learners' agency to re-configure and co-create what has been proposed at learntime.

In *The Architecture of Productive Learning Networks,* Carvalho & Goodyear (2014) brought together a rich collection of learning networks analysed through the lenses of the ACAD framework. Each carefully selected case study describes a particular network, and their engagement in various forms of social action. Of particular relevance to this chapter is *Diseña el Cambio*, a learning network designed to promote social action in a developing country in Latin America, specifically in Mexico (Nichols & Ashe, 2014).

Drawing on the ACAD framework (Goodyear & Carvalho, 2014), alongside Goodyear's (1999) earlier notions of pedagogical frameworks and the concept of

Table 7.1 The ACAD wireframe

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

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 dimensions of design (set, epistemic, and social), at different levels of granularity: micro, meso and macro levels (Table 7.1).

The ACAD wireframe has been used to address some of the practical challenges in educational design in multiple studies. 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) (see Carvalho & Yeoman, 2019; Yeoman, 2015, 2018). In other words, the ACAD wireframe allows us to identify whether aspects of a learning network seem to reflect close alignment (or show a disconnect) between dimensions of design (social, set, and epistemic) at different scales (micro, meso and macro levels).

In practice, when using the ACAD wireframe, a researcher is exploring connections between design elements, for example at the micro and meso levels. Researchers may look at the mechanics of a particular game; or the structure of a learning task in a lesson—both examples of *micro epistemic design*. The strategic vision, or the stated values of a network or school, can be identified when they refer to "representations of all voices" or valuing "learning together and making decisions together"—both examples of *meso social design*). Crudely speaking, one might suspect that a misalignment exists, when values grounded on collaboration, inclusivity and working together (*meso social design*), are not consistently enacted in the classroom, for example through a preference for the lecturing teaching mode (*micro social design*), tasks that emphasize individual work only (*micro epistemic design*) and classroom arrangements that seat students in rows, rather than in groups (*micro set design*).

In this chapter, we use the ACAD wireframe to analyse the coherence of the designable components at the meso and micro levels of FFDP, the learning network that is our object of study. However, before looking closely at the structural elements

in FFDP, we discuss relevant research involving the use of games in education, as this is a crucial component of the epistemic design of this network.

7.3 Games in Education

Game studies is a cross-disciplinary field of research that focuses on understanding how games support people's engagement in learning. The field combines literature on *serious games*, *game-based learning*, *gamification* and *epistemic games* (Dicheva et al., 2015; Rooney & Whitton, 2016; Schaffer, 2006). *Serious games* describe games specifically devoted to teach certain knowledge, content, or curricula (e.g. Mathletics, Scratch, etc.). *Game-based learning* refers to the design of learning tasks that embody game characteristics or game principles (e.g. a classroom role play involving a political debate). *Gamification* relates to the use of game-like elements in non-game contexts, for example with the aim of increasing engagement and motivation (e.g. using badges or a point system and leader board in a classroom). *Epistemic games* are often digital games, and usually associated with the notion of *epistemic frames*, which foreground a model of learning connected to immersive technologies, and include particular practices and ways of knowing (Schaffer, 2006).

Games and learning may share some important core principles. Even if games might not necessarily be designed with educational purposes in mind, many games are seen as immersive experiential learning environments (Oblinger, 2006). A core characteristic of various games is playfulness, a quality associated with positive social interactions, building up of emotional resilience, imagination, problem-solving skills, and stress reduction (Lieberman, 1977; Nørgaard et al., 2017). Like learning, games are usually social and experiential activities and often compel players to tap into their previous experiences to strategize an action, or to develop new understandings (Oblinger, 2006; Moseley & Whitton, 2014). Being successful in a game play may depend on considering different alternatives or on negotiating ways of solving a particular problem.

Games have been used in formal education, for example to teach concepts in health, biology, mathematical learning, computational thinking, language, geography and in many other disciplinary areas (Bayeck, 2020; Chiarello & Castellano, 2016; Muell et al., 2020; Sardone & Devlin-Scherer, 2016). In educational contexts, games have been part of classroom activity within schools for many years (Farber, 2017), and in recent times the use of game-like approaches in higher education has increased. Nørgaard et al. (2017) argue that educational games and gamification techniques support student's engagement, but often with a focus on outcomes, competition, and extrinsic rewards. They suggest that through a pedagogy of playful learning learners may be taken beyond extrinsic motivation towards recognizing "the importance of openness, curiosity, risk-taking, and failure in learning" (Nørgaard et al., 2017, p. 274). As such, games can play a strong role in learning activity, whilst inviting people's engagement, participation, and interactions with and around a theme, taking players much beyond acquisition of knowledge, or specific

behavioural changes, towards experimenting with practices and social interactions, whilst developing complex systemic understandings of a game environment (Bayeck, 2020; Gee & Hayes, 2012).

Increased use of digital technologies and the Internet, video, computer and mobile applications, led to digital games popularity, and these are now part of most people's lives in one form or another. According to Whitton (2014) the use of digital games often sparks active learning, motivation, meaningful play, placing games as learning tools. Research on digital games and learning might include diverse scenarios, for example, learning with entertainment games, learning with educational games, learning that is inspired by games, learning within games, learning about games, learning from games, learning through game creation, learning within a game community and others (Whitton, 2014). Squire and Jenkins (2004) highlight the importance of "fittingness" between games and the overall educational context, including questions surrounding how and why one plays a digital game, who one is and who they hope to become.

As game-players interact with others, either in massive multiplayer games and whilst simultaneously online, or when physically co-located with materials and strangers in a street-market event, or in small groups of known others—people playing games are often taking up a challenge of engaging in collaborative team activity, with the aim of achieving a shared game goal. In these situations, what we often observe is that players bring different but overlapping skills or knowledge, helping each other whilst sharing ideas, 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). In this case study, we argue that regardless of the specifics of the game design, game play may help simplify complex issues, and allow players to explore learning and complex concepts in formal and informal settings (Bayeck, 2020). Game playing may be used to foster engagement in critical thinking, creative problem-solving, and teamwork, to encourage players to develop skills and knowledge that may lead to solutions of complex social problems (Nørgaard & Paaskesen, 2016).

7.4 FFDP Case Study

The case study reported in this chapter is part of a larger research project, which seeks to understand the structural composition of productive learning networks (Carvalho & Yeoman, forthcoming) through the lenses of the ACAD framework and wireframe. Our main aim is to understand how educational design and learning activity connect and form productive learning networks. As Carvalho and Goodyear (2020) explain, the term *learning network* is used here to describe a class of phenomena for inquiry in educational research, and the use of the prefix *productive*—does not imply an evaluative sense, or characterize the opposite of a network that is ineffective—instead, the intentional meaning of *productive* is to highlight a

network where shared activity is "creative, constructive and concerned with self-realization and identity formation" (Carvalho & Goodyear, 2020, p. 2).

The research design employs a multiple case study approach (Stake, 2006; Creswell, 2003) to support the framing, planning, and gathering of data that is meaningful to the understanding of our particular object of study, in this case, the composition of productive learning networks. Each case study allows the researchers to examine a real case in a real situation, and in so doing, to select a few features to examine in depth (Stake, 2006). Overall, when using case study design researchers place a boundary around a complex and integrated system—to closely examine aspects in the functioning of this system. FFDP was chosen as a case study because it appeared to enact productive qualities as described above, and so we wanted to understand how various design components, and their part-whole relationships, contributed to making this a productive learning network.

In sum, FFDP is part of a series of cases, which include networks in higher education, schools and informal networks, and which builds on our previous research (Goodyear & Carvalho, 2014; Yeoman, 2015). Through this larger project we are also working to further refine analytical tools, to help explore the complex situations in which learning takes place, at micro, meso and macro levels—and within formal and informal learning contexts.

7.4.1 Data Collection

For the analysis of FFDP as a learning network, we drew on multiple data sources. These included an interview with Julia Carvalho as the network founder (conducted via Zoom). The interview was audio recorded and transcribed for analysis. We also had access to online manuals describing the games and blueprints of the games (downloaded from the FFDP website http://fastfooddapolitica.com.br). We examined information published on the FFDP website, on their Instagram and Facebook accounts. In addition, we collected recorded interviews of Julia Carvalho produced by Brazilian TV channels (and freely available on YouTube, for example at https://www.youtube.com/watch?v=CV2Esc0g8YE or https://www.youtube.com/watch?v=plMV_cUtVDQ). And we sourced articles about FFDP published on Brazilian news outlets.

Our research process included "member checking", a research practice that involves searching for informants' contributions after data collection, through invitations for informants to check and comment on the researchers' data or interpretations. As Iivari (2018) suggests, such participatory interpretive research techniques "positions informants as co-analysts and co-interpreters to make sense of both their organizational realities and researchers' interpretations of those realities" (p. 111). Overall, the varied sources of information and the participatory member checking approach helped us build up a rich understanding of this learning network as the phenomenon under inquiry.

7.4.2 *Brazilian Political Structures*

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 it 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 simple game, using a basketball structure, their game invited players to reflect on the structure of the Brazilian government (Fig. 7.1).

At the time, during public protests, government supporters tended to wear red, identifying themselves with the labour party, and those calling for presidential impeachment tended to dress in the yellow colour of the Brazilian flag. The two groups were often positioned at separate physical spaces, visually identifiable by the

Fig. 7.1 Basketball game: Three powers system

clothing colours of supporters. Even in this 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 scene emerged, where questions could be posed, and a strategic and democratic discussion could unfold. It also made evident that both "sides" did not know who would replace the President once the impeachment was completed, and so through game playing, people were invited to a deeper reflection about people's contradictory views of the impeachment process. In Julia's views, the use of the basketball game turned out to be really positive, supporting productive exchanges between the two polarized groups.

7.5 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 7.2). Doing so highlights the coherence of the FFDP vision enacted through a political curriculum, their overarching social values, and the

Table 7.2 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 Open resources and platforms	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. Open education.
Micro	Game sets Classrooms Street sidewalk Spaces of political Protests Online blueprints and manuals	Groups of teachers Groups of students People passing by at a street event	Game mechanics: e.g. Who's Who?, jigsaw, basketball, hangman.

learning "spaces" created by the tools and resources which are used and shared in physical gatherings and online—on the FFDP website, Facebook and Instagram accounts—as the network organizes 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 economic situation of a divided country (macro level). At both the micro and meso levels FFDP embraces openness in ways that respects 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.

7.5.1 Micro Level

From the beginning, and at the micro level, FFDP 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 the 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*) whilst using a jigsaw structure (*micro set design*) (Fig. 7.2). 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.

Through the materials (*micro set design*), FFDP games bring people together, old and young, rich and poor (*micro social design*). 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 helps in broadening 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 (Fig. 7.3) and Julia explains that this particular game is often used as a "calling out" at public events, or a way to attract

Fig. 7.2 Jigsaw game: Cargos e Cargas

Fig. 7.3 A super-sized version of Guess Who: Cara a Cara

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).

FFDP most recent game has been developed in partnership with AMATRA XV (2020). AMATRA XV, or the Association of Labour Justice Magistrates in the 15th Region, is a not-for-profit civil society, formed by members from the judiciary sector (judges and retired judges). Members of this association are people who practice

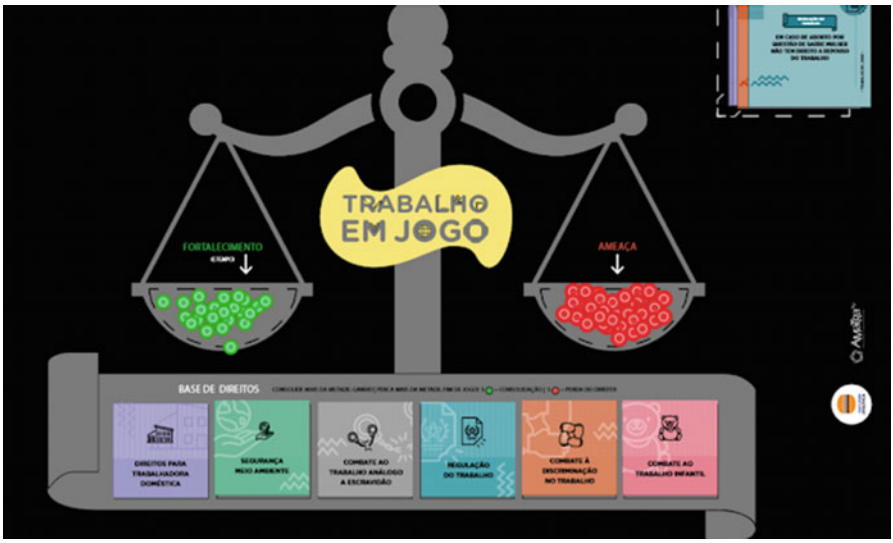

Fig. 7.4 Game of Work

(or have practiced) law, but who are also interested in intellectual development through social action. AMATRA XV promotes understanding of citizenship and labour laws in public schools around the State of São Paulo. In this newly designed boardgame, players are challenged to search for a balance of justice affairs. As such, the Game of Work (Fig. 7.4) foregrounds the importance of Labour Courts in guaranteeing strategic rights, discussing themes associated with the rights of domestic workers; the importance of combating slavery-like work and child labour; the promotion of work regulation, safety and awareness of environmental issues. The game brings carefully chosen real-life cases, which represent everyday scenarios in the world of work, and asks players to play the role of civil society. What is revealed through this game is that some rights in our social imagination are "more relevant" than others. There have been dozens of games sessions played, and in almost all these sessions, the environment and the rights of domestic workers were often the first to be "sacrificed". Brazil is the Latin American country with the largest number of domestic workers (International Labour Organization, 2013) and it was only in 2013, that Brazilian domestic workers were granted access to social security, having their rights recognized (International Labour Organization, 2020). Overall, this game was designed to address the need to understand existing rights, but also to question inequality and social justice. As many other games by FFDP, the Game of Work articulates that to consolidate civil rights in society, people need to question invisible structures and to understand how official public structures work. They also need to notice the importance of supporting collective interests. FFDP partnership with AMATRA XV for the development of the Game of Work illustrates a way that FFDP is expanding their own network, by searching for and forging partnerships and

connections to other organizations that hold similar values, and in so doing, strengthening their own ability for social impact and reach.

FFDP organizes 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 the "behind the scenes" insights 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. FFDP has plans for these new ideas to be (re)packaged and shared with all.

7.5.2 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 whilst having fun. In many respects, FFDP enacts Freire's (1972) 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. In Freire's (1972) own words: "only dialogue, which requires critical thinking, is also capable of generating critical thinking. Without dialogue there is no communication, and without communication there can be no true education" (p. 65).

Those working at FFDP are fierce champions of inclusion and diversity and this is reflected in the attention they pay to the social organization 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

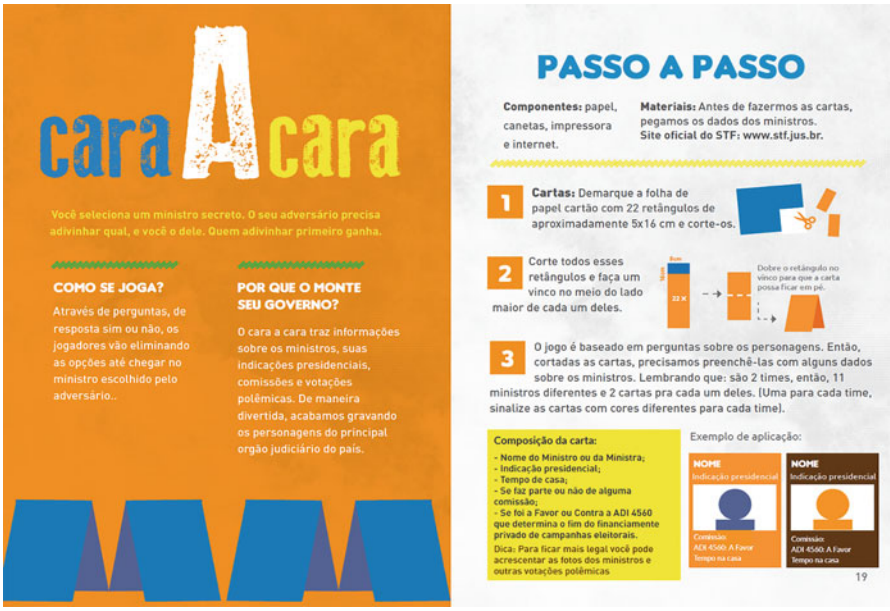

Fig. 7.5 Guess Who (Cara a Cara): Downloadable manual with step-by-step instructions to make your own version of the game

others. Main themes at the *meso epistemic design* include a curriculum geared at learning about: (1) structures of the Brazilian government and the three powers' system—legislative, executive and judiciary, (2) government roles and responsibilities, (3) the make-up and backdrop of pre-election debates, and (4) 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 capitalizes 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 each. Online resources include free downloadable blueprints of the games, including detailed manuals illustrating different ways they can be played (Fig. 7.5). 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.

As Nørgaard and Paaskesen (2016) remind us, if we are aiming to foster an "imaginative society and enterprising citizenship, we need education that embraces the complexity of messy but intentional interactions, playful but serious disruptions, critical but communal discussions, systematic but emerging processes and improvisational but deliberate products" (p. 22) which together might contribute to transformative experiences.

7.6 Facing New Challenges in Times of Social Distancing

With Brazil being one of the most affected countries since the recent COVID-19 outbreak (WHO, 2020), FFDP is now facing new design challenges. Like many education institutions, schools and universities in highly affected communities, FFDP's work came to a standstill in early March 2020. Having to re-think and adapt their pedagogical strategies to the online mode brought new challenges on how to take their game sessions to virtual scenarios. Health concerns imposed novel physical distancing rules, disrupting what is possible in terms of *micro social design*. This has affected FFDP physically located game sessions, which no longer can be realized at open spaces, requiring new configurations for *micro set design*. Overall, COVID-19 restrictions have been requiring deep thought and creativity, to re-design and modify core elements, and offer game sessions that comply with the need for maintaining 2 m distancing.

The move to online learning has been widely discussed, since the COVID19 outbreak (Hodges et al., 2020). But taking game sessions to virtual settings in a developing country can be extremely complex. It involves not only thinking about the re-design of new elements, such as how to play games using digital technologies (e.g. laptops, tablets, or smartphones) (*micro set design*). But it is also about the presence (or absence) of a reliable infrastructure that may successfully support online activity (e.g. reliable WiFi, Internet connection, bandwidth and data access) (*meso/macro set design*). Unfortunately, Brazil's status as a developing nation also means that digital inequality issues are present, and certainly become more evident as COVID-19 restrictions and health concerns pose that everyone needs to work and learn from home. Infrastructure elements that enable emergency remote learning are sometimes taken for granted by those living in wealthier nations, whilst educating and living in a developing country brings a range of extra considerations about equity (Czerniewicz, 2020).

For FFDP this means that adapting games to the virtual realm has not been easy. The young women who run this network are still motivated in trying to figure out how to manage the challenges in set design with considerations about multiple issues, such as bandwidth and streaming of game sessions, and what to do about Internet connections that are not always reliable. These issues need to be at the forefront of their (re)design of the FFDP games.

7.7 Conclusion and Future Directions

This chapter 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). At the micro level, the case study examined how the quality of materials support the development of educational innovation, whilst 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.

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. One way of abstracting core lessons-learned and packaging them for reuse is through the notion of design patterns (Alexander et al., 1977), which we are currently exploring in our research (Carvalho & Yeoman, forthcoming). 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 critically think, learn and teach political matters, and in so doing, to empower learners to take hold of their own future. Like many others living in developing countries, FFDP is currently having to re-design their games whilst carefully considering how to remain as inclusive as possible. FFDP continues to search for productive ways of helping Brazilians move forward.

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Part III
Innovating Networked Learning

Chapter 8
Networked Practice Inquiry: A Small Window on the Students' Viewpoint

Maria Cutajar

8.1 Introduction

Technologies are a facet moreover an integral aspect of our work and life practices. In less than two decades, we shifted from being a knowledge-based society (Castells, 2001; Välimaa & Hoffman, 2008) to a digital services-oriented world (Dahlbom, 2002; Qiu, 2007) and fast moving to a pervasively postdigital existence. Postdigital existence is understood as human and digital technologies in a generative dance wherein and whereby relationships are increasingly discernible as "blurred and messy" (Jandrić et al., 2018, p. 896). Fast and unrelenting techno-social developments and increasingly immersive surroundings accentuate the need for the pursuit of a postdigital perspective in learning design and educational practices (Fawns, 2018) encouraging the development of personal and collective skills and competences "for work, citizenship and self-actualisation" (Dede, 2009, p. 1). This is especially true in higher education (HE) which needs to be ongoingly mindful and responding to wider community and societal needs and developments yet guarding education as a transformational experience (Ashwin, 2020) and a public good (Mayo, 2019; Williamson, 2020). As with other educational sectors, HE exists as part, and because, of an encompassing ecology where the technological, economic and political fabrics are interwoven with the cultural, social and psychological (and in some cases the physiological). Operating at the top end of the education system hierarchy, HE is a key player serving learning and development of people, communities, and society at large (Siemens et al., 2015). Against this backdrop, a networked

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learning approach incorporating inquiry-based teaching methods was devised to take forward a teaching assignment in an encompassing traditional HE context.

8.1.1 Networked Learning and Inquiry-Based Learning

Networked learning (Beaty et al., 2002; McConnell et al., 2012) and inquiry-based learning (Boyer Commission, 1998; Kahn & O'Rourke, 2004; Spronken-Smith, 2012) are both signalled as pedagogical approaches which potentially support and encourage the development of skills and qualities expected of a HE learning experience (Goodyear, 2001). For 20 years or so since its first conceptualisation, networked learning was defined as the use of information and communication technologies for learning promoted by connectedness among learners, learners and tutors, and the learning community and its resources (McConnell et al., 2012). Recently, the Networked Learning Editorial Collective proposed a redefinition of the term extending the earlier understanding to account for socio-technological developments including the heightened discernment of the situationality of experience, and what have long been identified as characterisations of this learning approach. This redefinition describes networked learning as:

> processes of collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action, underpinned by trusting relationships, motivated by a sense of shared challenge and enabled by convivial technologies. Networked learning promotes connections: between people, between sites of learning and action, between ideas, resources and solutions, across time, space and media (Networked Learning Editorial Collective (NLEC), 2020).

Networked learning distinctively attends to connectedness mediated by digital technologies for the creation of learning networks (Goodyear & Carvalho, 2014b). Connectedness is set forth going beyond mere technological connectivity to digital resources and human others for learning. Networked learning is characterised by relational dialogue which alludes to active engagement with others for the construction and development of knowledge, the sensitisation to different world views and the recognition of one's viewpoint (Beaty et al., 2002). Ryberg et al. (2012) note that networked learning upholds democratic values, diversity, inclusion and e-quality. Beaty et al. (2002, p. 589) explain that the "e-quality" characterisation refers to critical reflexivity appraising relational dialogue. They explain that critical reflexivity comes in to examine the knowledge being generated, and identities created. They insist that this orientation inspires students to take responsibility of both their learning and the learning of others within the learning network. This clarification evokes the cruciality of trustful relationships for collaborative, co-operative and collective inquiry, knowledge-creation and knowledgeable action networked learning stands for.

Inquiry-based learning, interchangeably enquiry-based learning, is another strategy promoted for HE teaching and learning. Kahn and O'Rourke (2004) state that this is a generic term referring to different learning approaches proposing learning

through a process of inquiry. Aditomo et al. (2013) affirm that inquiry-based learning may take the form of problem-based learning, project-based learning, and case-based learning. Generally, inquiry-based learning is claimed to bring together learning and researching of real-world settings and situations (Boyer Commission, 1998; Brew, 2010; Healey, 2005) encouraging students' learning engagement and development (Oliver, 2008; Spronken-Smith, 2012). Aditomo et al. (2013) succinctly summarised the potential of inquiry-based learning methods as including the development of metacognitive skills (including knowledge metacognition and self-direction), inquiry and research capabilities (including an explorative attitude, critical and reflective thinking skills and epistemic fluency), and skills to communicate and collaborate with others for learning. The recent networked learning redefinition sets forth inquiry-based learning as a facet of networked learning methods. Notwithstanding this assimilation, for the purposes of this explorative research, the coupling of networked learning and inquiry-based learning approaches in learning implementation is distinctively referred to as 'networked practice inquiry'. This stems from the felt need to hold on to inquiry-based learning processes instantiated as individual learners' pursuits mutually supported as distinct from the notion of collective inquiry pursuit as tendered by the networked learning redefinition.

The intention of a networked practice inquiry venture was to lead students away from traditional face-to-face lecturing methods by encouraging networked learning activeness. The aim was to motivate students to adopt exploratory attitudes for constructing and developing disciplinary knowledge. A networked practice inquiry strategy was hypothesised to concurrently support the development of skills and competences expected of a higher education experience as affirmed in the networked learning and inquiry-based learning literature. Generally, a networked practice inquiry learning configuration was envisaged as potentially expedient inspiring students to engage for learning and wider work and life practice development.

8.2 Research Contextualisation

The research was conducted in a Maltese university context before the covid-19 pandemic crisis. Within this context, blended and online teaching framed by social learning perspectives (such as the case of the concerned networked practice inquiry implementation) are few and rare. This research initiative was an attempt by the author to address this research gap. It also turned out to be an early small-scale response implementing a new institutional vision which declares special attention to the student experience, the involvement of students in the review of formal HE teaching and learning, and the improvement of teaching and learning at the institution stimulated by blended and online learning policy initiatives (University of Malta Strategic Plan 2020–2025: Serving students, scholarship and society, sustainably, n. d.). Furthermore, it transpired to be an initial response to the mounting concerns for students' learning mediated by digital technologies prompted by the covid-19 pandemic and the mass scramble of all HE teaching to the online space.

8.3 Contextualising Literature

The concerned research investigating the student viewpoint of an implemented networked practice inquiry is located well within the networked learning field of study. This section briefly considers previous literature on the student experience of networked learning so setting forth the backdrop of the present research initiative.

Within the networked learning field, there is a burgeoning body of literature on the student experience. Earlier studies highlighted divergent students' access, use and acceptance of networked technologies for learning (Corrin et al., 2010; Goodyear et al., 2005) and variance in the degree to which students buy into the invitation to networked learning (Goodyear et al., 2005; Ramanau et al., 2008). They exposed challenging issues which mitigate students' networked learning engagement. Especially with reference to participation in online discursive activities, researchers showed up students grappling with unfamiliar online discussion methods for learning (Bell et al., 2010), students struggling to adapt being collaborators for knowledge construction (De Laat & Lally, 2004), the oppression to comply (Ferreday & Hodgson, 2008) and marginalisation in being, seeing or choosing differently (Reynolds & Trehan, 2003). Research studies underscore that not all students can be assumed to have the same access to digital technologies (Czerniewicz & Brown, 2010), can be assumed to be skilled users of learning technologies (Hargittai, 2010) and are competent as learners in technology mediated environments (Kennedy et al., 2008; Kirkwood & Price, 2005). Besides, students may be appropriating networked technologies differently for their learning and living lives (Kennedy et al., 2008; Ramanau et al., 2010). Above all, not all students show the same enthusiasm using prescribed learning technologies and the institutional online learning spaces connecting to others for learning (Creanor et al., 2006). Students act and react differently depending on what they understand of the learning situation and the surrounding context (Cutajar, 2017). Problems related to an ingrained knowledge acquisition culture (Finegold & Cooke, 2006), personal identity (Mann, 2010) in active engagement for knowledge construction and knowledge building (Krüger, 2006), and interpersonal relationships in cooperative and collaborative activities for learning and development (Ryberg & Larsen, 2008) may exacerbate students' willingness to connect with peers and tutors for learning. Although some of the unearthed studies go back decades, the divergent picture they portray remains convincingly true.

Recent studies continue to flag the need for critical digital diligence regarding the learning context as understood by the students (Henderson et al., 2015; Nicolajsen & Thomas, 2014). Recent studies illustrate increasing students' entanglements with digital technologies for completing learning tasks (Gourlay & Oliver, 2016) and their 'nomadic' collaborative learning practices (Ryberg et al., 2018a) as they strategically shift their learning efforts across spaces, places, technologies and activities over time (Ryberg et al., 2018b). Students are found relocating learning activity from the intended formal learning environment to familiar social media platforms (Caviglia et al., 2018; Thomsen et al., 2016). Research brings to the fore

students' agency in learning and the forces empowering and disempowering them. Much is attributed to the students' capacity to cope with the cognitive load networked learning methods create (Kerwald & Bentley, 2020), students' capabilities configuring digital learning habitats and resisting power hierarchies in learning (Whitworth & Webster, 2020), and students' discernment of roles and responsibilities in learning (Cutajar, 2018). Studies on the student experience continue to show up a persisting picture of variation. A research study specifically targeting variation led to three critical dimensions structuring students' networked learning experiences: 'technology proficiency' denoting relations to digital technologies for learning, 'learning proficiency' denoting epistemic agency in learning, and 'social proficiency' denoting relations with others for learning (Cutajar, 2014). This variation framework generated from research contextualised in the same Maltese university complex of the present study, was devised as a means for making sense of the complex picture of the students' experiences of formal networked learning. It was an alternative contemplated for framing the research at hand. This research is a new addition to the meagre corpus of research work from the Maltese context on the student perspective. Arising from a southern European context, this exploration also adds to the bigger picture of the student experience of networked learning predominantly drawn by research coming from northern European countries. In its capacity as a small-scale research initiative, the present exploration opens a small window on postgraduate students' viewpoint of a networked learning implementation distinctively incorporating inquiry into personal life and work practices.

The networked practice inquiry implementation on "The digital dimension of community action and development" was part of an encompassing Master level study programme. The 12 enrolled course participants were professionals working in community social enterprise, the education sector or in some other public/private community work organisation. At the time of the course, all except one student were in full-time employment.

8.3.1 The Networked Practice Inquiry Implementation

A core learning task required students to critically explore some aspect of their work or life practice relating to community action and development with the aim of improving it. This self-selected inquiry project proceeded as an individual exploration. Apart from the opportunities to obtain peer and tutor feedback during work-in-progress presentation sessions, student pairs had to exchange written peer reviews shared online. Other learning tasks prompted students to collaborate with peers for learning and inquiry project development. Themed discussions spreading across the physical and virtual space and supported by guided readings intended to feed into students' inquiry-based learning projects along with knowledge development. On one occasion, students had to work in small groups reviewing case studies of online community projects reported in the literature. Students were also encouraged to connect with peers and tutor using a small selection of digital media platforms to

help appraise them as a means for community action and development. At the time there arose the opportunity of a guest speaker introducing students to smart city learning (Lister, 2020) and an implemented culture trail which students were invited to experience first-hand. This technology-focused exploratory strand was intended as a easygoing conversation among peers. The digital dimension of the course was intended as a seamless course component, and in a small way it invited formal learning activity to spill over in open spaces such as an invitation to connect using Twitter and the smart city culture trail. The assessment was equally distributed on the final written report of the self-directed inquiry project and participation in peer learning activities. Participation varied, but all students successfully completed the course.

Past the course run, this research initiative was an attempt to involve students more intimately deriving a description of this networked practice inquiry implementation from their viewpoint for informing future development. As aforementioned, the conceptual model framing students' networked learning experience by three critical dimensions of variation was contemplated for structuring the current research. However, with further deliberation it was decided to adopt the activity centred analysis and design (ACAD) framework (Goodyear & Carvalho, 2014a) because of its focus more squarely set on learning design and analysis. Besides, as much as a conceptual frame generated from within the same research context may help direct attention to areas of recognised significance, it may also obscure what lies beyond its bounds. The next subsection outlining the research methods shaping this research initiative includes a brief outline of the adopted ACAD framework.

8.3.2 Research Methods

For this exploration of students' viewpoint of the networked practice inquiry course experience, an interpretative approach (Hennink, Hutter, & Bailey, 2011) was assumed. Semi-structured interviews with consenting participants were held 3 months after the end of the course in Spring 2018. The emailed call for research participants attracted 2 of the 12 (17%) students who completed the course. Attempts to recruit more participants using a snowballing strategy failed. The interpretative approach 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 as expert voice in Baker, Edwards, and Doidge (2012)). A small research sample yields a description which is more partial than could have been obtained from a larger data set. Generally, this exploratory research initiative represents a preliminary quest into the Maltese postgraduate student viewpoint of a networked practice inquiry approach to learning but, nevertheless noteworthy.

Interviewed participants were encouraged to describe episodes of their learning enterprise. They were prompted to reflect on how they approached learning tasks, what they saw themselves gaining from these learning experiences, what they found

helpful and beneficial or otherwise, and what they thought would have supported them better for their learning and development. The audio-recorded interviews were transcribed verbatim and emailed to the research participants for approval before the data analysis process.

Data analysis consisted of two main stages. The first stage was comprised of three 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 into a single data tabulation. A coding system was used to keep track of extracted quotations. In this chapter pseudonyms are used to help convey the intimate nature of this work drawing on the accounts of the two participating students.

The ACAD framework (Goodyear & Carvalho 2014a) was brought in during the second stage of data analysis for structuring the descriptive interpretation. As mentioned above, it was chosen because of its focus on learning design and analysis. It proposes analysis of learning design to be considered from three main perspectives bearing upon emergent activity for learning: the set design perspective foregrounding situated spaces, tools, texts and artefacts; the epistemic design perspective setting the spotlight on learning tasks including structuring, organisation and their knowledge building configuration elements; and the social design perspective calling to attention situated course participant interactions for learning. This framework emphasises the design *for* learning and learning as arising from emergent activity in situated (teaching and) learning practice. As Goodyear and Carvalho (2014a) point out, by the ACAD framework "We focus on *what it is that the people are actually doing*, and the tools and resources and social interactions that become bound up in their activity" (p. 58, italics in original text). What follows is the resultant description of students' viewpoints of networked practice inquiry set forth in consideration of the lived experience of the set design, epistemic design, and social design.

8.3.3 Findings

The course implementing a networked practice inquiry approach for exploring the digital dimension of community action and development was portrayed as follows.

8.3.3.1 Lived Experience of Set Design: Learning Spaces, Digital Technologies, Learning Materials

The lecture room is more of a place for sharing thoughts, discussing and debating with others (Sarah, Fleur). It is no longer a place where you silently listen to the

lecturer and you cannot speak (Sarah). Students here can express their thoughts and listen to what others have to say (Sarah, Fleur). Sarah also reflected that the traditional lecture room arrangement does not work:

> those were not lectures where you listen and cannot speak … But the thing was more interactive (Sarah, p. 5)

> We discussed a lot. Only I would have arranged the class better into a circle—I believe in these structures more than the classroom-based so that we can concurrently see the person who is talking. And as a group I believe that we are not shy to talk. We are not against sharing, we share, and we fight in inverted commas. Only that I would have it changed to a round circle-based so to better facilitate the person who is talking. (Fleur, p. 8)

The criticism of the meeting room set-up might have been triggered by the bother of reorganising the row-by-row lecture room arrangement at the start of each meeting. As discovered by Jamieson et al. (2000), this attention to the learning space may have been equally evoked by digital learning experience.

The institutional Moodle-based course portal is not so convenient for being accessed using mobile devices. Part-time students who are trying to keep up with their studies often take the study-work to bed (Sarah, Fleur) and are using mobile devices. Fleur repeatedly stressed the importance of learning design mindful of students' extensive use of mobile devices to access resources and materials:

> Because do not forget, [raising the smart phone] this is what we most frequently use … I mean we need to adapt our Internet reach through the mobile … Nowadays this has become kind of my computer because if I have an email I answer it from here … Because you are not going to take the laptop to bed. But this sits next to your bed (Fleur, p. 1/2).

From what the two participants disclosed of their use of digital technologies, there did not emerge any symbolic meaning-making of devices as Bober and Hynes's (2018) research revealed. These students were simply using the devices they had available as they saw best serving them. From what the participants recounted of the course run, the institutional virtual learning environment (VLE) was not proving supportive to smoothly get on with their study-work using mobile devices. Sarah talked about a feeling of "frustration" when her tablet stalled while trying to post her reply to a forum discussion thread. Such findings sound even more significant and alarming these past months of covid-19 pandemic. With most teaching shifted online, problems related to mobile access have come more to the fore along with the many other facets of the digital divide (Grant & Eynon, 2017) which social justice advocates within the networked learning field (Czerniewicz & Brown, 2010) have long been sounding.

Fleur also pointed out that behind the scenes students were downloading the course resources and sharing them within a secret Facebook group away from the institutional course-site which is more tedious to navigate. The secret Facebook group was claimed by participants as a lifeline for students to support each other not only through the course but the entire study programme. Fleur avowed that peers who did not make the effort to keep connected and active in this invisible online space were losing out:

> 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 group. We feel that who does not use Facebook so much falls behind from the group. I mean, we have a small community as a Masters group on Facebook. Those who do not log in. (Fleur, p. 7)

Thomsen et al. (2016) also report on students taking their peer interactions to a Facebook group away from the institutional VLE. In this study there is exposed the motivation of mutual support. Besides, the students of this study did not totally abandon the formal virtual learning space possibly because of the grading tied to online participation as will be highlighted in the next subsection on the lived experience of epistemic design.

During the interview, Fleur talked about the smart city cultural trail activity. Spontaneously she shared a lot of detail on a similar digital application in her community:

> that of the city trail route. In fact here [at work] we did something similar . . . it started before the Digital Dimension [course]; it was being cooked up so to speak. Now we have completed it. But still it is interesting because she [guest speaker] used a different method. She used the telephone box, certain something in particular. It was different but the same concept (Fleur, p. 10)

There is a suggestion that students are enthused by digital innovation in study courses especially when this resonates to what is happening in their wider work and life practices. Thoughtfully, Fleur pointed out that, considering the fast-changing nature of study content on "the digital dimension", learning materials need to be frequently updated.

The learning materials are claimed by both Sarah and Fleur to be a springboard for the student to discover other resources, discern the enormity of the Internet, and the risk of getting lost in the vast amount of information the Web gives us access to:

> I read what you guided us to read. And, honestly, I did not always read everything. What happens to you too is that you look up something. It leads you to something else. So then, you get lost. You end up reading the other. So, I used to flow. I mean I try to read between meetings. I read, I take notes, so that we then discuss them online basically (Sarah, p. 1).

> We discovered other pages because the pages we were doing we never heard of them before . . . 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 (Fleur, p. 3).

Both Sarah and Fleur talked about the excitement on discovering that the case studies they were reviewing actually featured live websites and hence a sense of authenticity and currency. Sarah also talked about subsequent registration and involvement in a community action she learnt about through the case-study activity. She claimed that this served her for the community work she was doing. Sarah also stressed the importance of learning resources such as those related to online security and safety which helped to boost her confidence using digital technologies in an informed way for professional work practices. On the themes of cyber security and safety, Fleur recommended a field expert to accomplish greater impact as she had personally experienced in a community event:

> I did it locally but others may have never experienced it . . . I think that of the cybercrime it helps [to have field specialist guest speakers] because it is like you are hearing it from the horse's mouth so to speak. To listen to someone whose work is primarily on cybercrime. I mean he relates field experience even if simply a presentation (Fleur, p. 12).

Another recommendation on the course set design was that of organising "weekend workshops" (Sarah). This recommendation calls for more face-to-face human interactions for learning. Considering the surrounding context and the prevailing face-to-face learning experiences (before the covid-19 upheaval shifting most teaching activity to the online space), it was natural that students attended more to the physical spaces, resources and materials—the set design aspects they were used to; and what proved useful for their learning in the past. Still, the emerging picture features extensive use of digital devices, applications, and media integratively part of students' learning and wider life practices. Expressly for learning, students are proactively creating places for epistemically engaging in invisible peer interactions, supporting each other away from the more visible channels promoted by the formal learning course set design.

8.3.3.2 Lived Experience of Epistemic Design: Tasks, Perceived Worth, Mitigating Issues

Indisputably, the networked practice inquiry approach promoted learning tasks which were different from what the students are used to:

> because it was different than the other credits, the other study units
>
> Researcher: What do you see different in it?
>
> Because for us, the approach—when you go to the lecture you listen. And then you do not have like homework. You listen. Then you spend time thinking about the assignment and do some reading. But for me, the fact that I had to write, when it turns out to be something that I had to explore, for me it was tough, you know. I was feeling like "Oh My" (Sarah, p. 3).

> For one, I was not understanding exactly what was happening when we saw "Digital Dimensions". I mean I came to the lecture, from day one, I had to discover what was going to happen through all the sessions (Fleur, p. 1).

The second quotation above also suggests that the theme of the course on community action and development may have added to students' disorientation. The learning tasks were different from what students are used to. Yet several times the participants referred to the "guided readings". It seems that in the context of the networked practice inquiry course, this familiar epistemic engagement took on a new meaning for the students. Listening to what peers have to say alongside the guided readings served as a means for connecting theory to practice (Sarah). The face-to-face meetings are claimed by participants to have served as a springboard to extend the reading effort and the exploration of the study topic (Fleur).

The research participants both referred to the group task of summarising and presenting case studies. Both participants referred to this small group activity as a

prised learning event providing students a source of ideas for the inquiry-based project task (Sarah, Fleur) and work practice development (Sarah).

Participants also agreed that the self-chosen inquiry task served to work on something that goes beyond course assessment requirements. Fleur declared that she spent a lot of time deciding on a project proposal because it potentially led to something useful serving the community. The research participants gave a lot of attention to this task. They both recognised the epistemic value of the task incorporating opportunities to expand their knowledge and to critically inquire wider life practices beyond disciplinary knowledge. But the shifted attitude from customary formal learning methods was repeatedly highlighted as overwhelming:

> 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 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, how much more I could have gained (Sarah, p. 3)

The element of personalisation and the invitation to ownership of learning activity appears to have motivated students to attend more carefully to what they were doing, hence the claimed lack of time for what they wished to achieve.

The peer-reviewing exercise is claimed by Sarah as having served the dual function of obtaining feedback to improve the project work and achieving a better course grade. She also saw the peer reviewing activity serving professional practice skills development:

> For example, in the community we have a lot of consultation proposals. Those are peer review that you read it and give your review. They are a review not a peer review. But you give your review, your opinion. We need to practice them more (Sarah, p. 8).

Peer reviewing is also claimed to help acquire knowledge beyond one's horizon and an opportunity for considering scenarios you would not have otherwise delved into. Peer review "gets you out of your own niche" (Sarah) and potentially serves to learn how things work in different organisations and unfamiliar contexts:

> 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. (Sarah, p. 7)

Sarah also declared that the opportunity of peer reviewing considering alternative viewpoints led her to feel less frustrated and more empathic when liaising with external stakeholders because you have a better understanding of what is happening on the other side. This resonates to Hammond's (2017) assertion that students' endeavour to work together potentially helps "generate empathy across divided groups and communities" (p. 1007).

Grading tied to online participation repeatedly arose during the interviews. Sarah argued that this is unnecessary stress for adults who know that participation (in the online discussions) is a means for learning as well. In a sense Sarah's comments hint at the notion of surveillance and coercion to comply which are detrimental to the teacher-student trust relationship we aim to nurture in networked learning:

> but we are all adults. Now we should know that for learning we need to participate. But I think the marking—obviously because you say to yourself "I want to get a high score because then I do not know if I am going to do well in the project". I think that affected me. And perhaps it also led to more stress (Sarah, p. 2)

In the above quotation and the previous one, there is also a vague affirmation that Sarah would not have bothered were it not for the grading. This might have derived from the inexperience of learning through relational dialogue but may have also stemmed from a perception that for successful formal learning, the effort involved outweighs the benefit for learning. Just as likely, it might have been the pressure that the participant experienced by the educational openness of peer learning.

Research participants recommended that the course module is scheduled in parallel to other study-units which are not so demanding (Sarah) and widening the temporal window permitting students more time for engaging in inquiry processes (Fleur). But reported difficulties of time management and work overload may have been due to the novelty of the networked practice inquiry experience as Sclater and Bolander (2010) concluded from their study of students' experiences of active collaborative learning.

The emerging narrative shows that students closely attend to set learning tasks. They value the guided readings they are used to. But in the context of the networked practice inquiry, this customary task takes a deeper meaning. Students value the idea of an inquiry-based learning task which potentially can be developed into something useful. They are enthused by inquiry learning activities tied to their broader life and work context. But they claim running short of time to engage as deeply as they would have like to. And grading linked to participatory tasks added to the stress. They recognise the learning benefits of the networked practice inquiry set-up requiring them to engage in peer learning tasks moreover individual inquiry-based learning activity. However, as described in the next section, peer learning raises several concerns.

8.3.3.3 Lived Experience of Social Design: Others, Places

Students attach importance to the interactions with peers and the tutor. As evidenced by some of the quotations in the previous sections, students value the divergent face-to-face meetings as a place for people to congregate, express their thoughts on the discussion topic and listen to the views and experiences of others (Sarah, Fleur). They value these interactions so much that they recommend extending them by weekend workshops and involving more guest speakers. The appreciation and enthusiasm for face-to-face discursive activity contrasts to the emerging picture of

students' views of online discursive activity. The permanence of written text raises concerns for students. Sarah confided that if you lack self-confidence, the whole group online discussions are unnerving because you need to be certain about what you are writing and not posting "*xi ċuċata*" [something silly]:

> 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 . . . 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. So I used to choose not to write, or not write that part (Sarah, p. 2).

The prospect of shared written comments in formal learning spaces is not something students look forward to when they are struggling to gain an understanding. Besides, for most students in the Maltese context, English is a second language. In a highly competitive educational context where students are mostly working in isolation to produce end of course module assignments, this reaction is understandable and sobering. Fleur mused that perhaps, if the forums were on Facebook instead of the institutional VLE platform, it would have been easier to participate in the discussions:

> Because I did not have enough time to post. And then I'm thinking, if it was on Facebook, maybe some secret group, maybe I would have had the time. You tell me "Isn't there the same time?" But we use Facebook so much that you start seeing certain pages on which you can write and comment and communicate with others. Perhaps the fact that I had to go to the forums I saw it—it demanded more time to go in from the university webpage and the like (Fleur, p. 1).

This comment not only exposes the accommodation of taking learning discussion to the online places students frequent. It also hints at the relaxation of formality social networking platforms such as Facebook inspire; where it is deemed acceptable for people to express themselves in any way they like and can; however poor, illogical and incoherent the articulation. This contrasts the expectations on the institutional webpages. Of note as well, is Fleur's explicit recommendation of a secret place invisible from public scrutiny.

Participants' comments suggest that the mixed age of the students is potentially another source of pressure to perform in technology mediated places. Sarah suggested that older students might feel pressured to show themselves digitally literate as their younger counterparts. This corroborates Bayne et al.'s (2020) recent affirmation that the myth of "digital natives and digital immigrants" (Prensky, 2001) lingers on. In consideration of the varying ages of peers, Fleur remarked that younger students may experience disappointment if their work is reviewed by a peer:

> There may be people who do not like it. But if you genuinely give constructive feedback you do not have to dislike it . . . maybe we are grown-ups, we have reached a certain age. But maybe with the younger ones, they may be disappointed that a younger peer—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 (Fleur, p. 5)

These comments suggest that, in postgraduate HE courses (which are more likely to bring together students of different age groups), there is need to carefully consider inclusion and diversity issues. This becomes even more critical when learning is advanced in connectedness to peers as much as connectedness to tutors and resources. The latter comment also brings to mind that time and effort need to be spent on learning the art of giving and receiving feedback (Jaques & Salmon, 2008).

The participants agreed that the group work such as experienced during the networked practice inquiry implementation is an opportunity to learn how to work with others. But as Fleur pointed out, it is something students generally fear because people have different working styles and you need to find a way how to work together which does not always play out well. Participants' disclosures underscore the need for group work to be carefully planned and implemented. The research participants both note that the strategy permitting the students to form the work groups themselves helped because they already knew each other well. Fleur explained that in her group they agreed on a subdivision of the task 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 the course experience.

The peer reviewing task was highlighted by both Sarah and Fleur as a novel experience. Both expressed their appreciation of the pairing strategy again left in the hands of the students:

> Peer reviewing helped me a lot. First of all, you need a buddy—for me it worked well because we chose our own buddy . . . The fact that she was my reviewer for the project work helped me because she was highlighting that which I left out. I think that was a good thing (Sarah, p. 7).

This finding concurs with Shivonen's (2020) research results that students are positive about peer reviewing for their learning but they are not so keen on being graded by the peers. The participants of this study flag the fear of peer criticism which can be experienced as unacceptable. Trust (Sarah) and maturity (Fleur) are seen as necessary conditions for the success of peer reviewing as an activity for learning and development. In a wider context where traditional teaching methods and individual learning prevails, peer interactions for learning, knowledge building and value creation need to be carefully considered. Participants noted that informally there is a tendency for students who are close "buddies" to help each other privately. But to actually write a written review of a peer's draft work and attaining a grade for it (Sarah) is not something students are used to. Fleur confessed that behind the scenes students were consulting with each other on the peer reviews before posting them to the more "public" institutional platform. Students are wary and insecure when it comes to cooperation and collaboration with peers for learning in online spaces which carry greater visibility than their close knit of trusted buddies.

In consideration of an even more open space, Fleur reflected on the tutor's attempt to get students to connect on Twitter (as another popular microblogging and social networking platform). She stressed that students need time to figure out

how an unfamiliar technology works. She commented that the fast-paced nature of the course did not permit this. Considering the open nature of this social networking platform it might be that there is more to it. Students may need additional time to also think through open education practice such a communication medium prompts, and the challenges this brings to digital identity and due diligence. For some students this may have been exacerbated by the sensitivity of their professional work in the communities demanding silence, secrecy and keeping a low profile.

The visibility of peer learning processes generates a feeling of surveillance and judgementality. The issue of surveillance arising from the log data automatically generated by the VLE and other institutional student tracking systems (Bayne et al., 2020) did not surface in this exploratory research, but here was no attempt to draw students' attention to this audit trail. The notion of surveillance arose from the perceived scrutiny afforded by those who are considered as more competent others participating in the course. There is exposed a problem of perceived differential; tutors in their position of power setting forth the learning tasks and assessment, and the peers as more digitally literate and knowledgeable. This finding exposes students holding a position of disempowerment. Students surface as insecure and uncertain of their validity in the networked practice inquiry learning environment. There is flagged the need for networked practice inquiry implementations (and networked learning implementations at large) to incorporate greater emphasis on greater equity in peer learning where all learning participants are empowered to be active co-contributors in knowledge creation and knowledgeable action motivated by a sense of shared challenge and trusting relationships enabled by convivial technologies.

In general, technology mediated peer learning interactions, beyond the close knit of trusted study buddies, put students in what looks like a vulnerable position as if ongoingly under surveillance. Concerns increase with peer age variability, the degree of educational openness tied to the place of peer interactions, and the perceived coercion to compliance assessment generates. For the case of the formal learning places, it is the permanence, quality and frequency of shared media exchanges. For the case of public platforms, there is the additional need to learn managing one's digital footprint and curating one's public identity, to become confident using networked technologies safely and securely, and to ascertain a supportive learning network.

8.4 Concluding Discussion

These findings open a small window on the students' viewpoint of networked practice inquiry. Generated from the accounts of two participating students, these findings 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 inquiry attitudes critically analysing,

reflecting and rethinking aspects of their work and life practices as part of their study work, so also giving more reason to assessment tasks. They also see value in group tasks and peer learning interactions, even to develop higher order skills extending to their work and life practices. But students are overwhelmed by the demand on their time. They call attention to pressure, stress and wariness online peer interactions create, especially in trying to show oneself digitally competent and knowledgeable on the subject matter. The networked practice inquiry approach shifts the student away from the comfort of passively attending lectures and working on a summative written assignment away from the scrutiny of untrusted others. Clearly, students question the what-and-how of a learning approach from within the encompassing and surrounding environment. In a small way, students are nurturing connectedness for learning in invisible spaces with those few trusted peers. But peer learning interactions in the more visible online formal learning spaces, and worse still in online public places, exposes them and is perceived as putting them under surveillance.

This small window on the students' viewpoints of networked practice inquiry highlights the problematic issue of educational openness the networked learning environment presents; openness to put yourself in a vulnerable position engaging in relational dialogue for learning within a heterogenous group of critical peers and tutors. The findings of this preliminary exploration expose these postgraduate students as holding a position of disempowerment in the formal learning setting. They expose a sentiment of surveillance deriving from the afforded scrutiny by the perceived more competent others. Students emerge as insecure and uncertain of their validity as networked learning participants. Students appear very much sentient of the "culture of surveillance" which networked technologies exacerbate, and as Bayne et al. (2020) caution, we need to thread with caution because "Visibility is a pedagogical and ethical issue" (p. 180).

These findings call to attention the apparent incongruency between students' acknowledgement of value-added by the networked practice inquiry approach and online peer learning concerns. There surfaces a crucial need to find ways for nurturing more constructive and inclusive attitudes. There is signalled the need for networked practice inquiry implementations (and networked learning implementations at large) to incorporate greater emphasis on equity in peer learning and the creation of positive peer learning environments where all learning participants are empowered to be active co-contributors in knowledge creation and knowledgeable action motivated by a sense of shared challenge and trusting relationships enabled by convivial technologies.

The picture arising from this research initiative needs to be acknowledged as a limited partial description of the students' viewpoint of a networked practice inquiry approach primarily because of the limited number of research participants. Further exploration is required to substantiate and expand this nascent picture. Besides, ongoing research is important for understanding students' perceptions, viewpoints, and experiences as they develop and change temporally, spatially and situationally. Such ongoing research enterprise is important to inform support for students in their higher education learning experiences and the development of competences learning

in groups (Jaques & Salmon, 2008) and with the peers (Boud, Cohen, & Sampson, 2014).

In a world struggling to recover from a crippling health pandemic crisis concurrently confronting life-threatening environmental degradation and huge sustainability challenges, there is a lot on political and executive tables to see digitisation of the higher education area, in particular higher education learning and teaching. Locally, these surface in the new University of Malta Strategic plan 2020–2025 (https://www.um.edu.mt/about/strategy). At European level these are communicated in the new European Union Digital Education Action Plan 2021–2027 (https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en). These are wake up calls for critically engaging in the transformation of higher education teaching and learning, constructively safeguarding the student's experience as a truly transformational experience supporting personal development along with competences for work and life practices. Networked practice inquiry appears to have such potential for making the higher education learning experience "an opportunity to think and dream" (Fleur) work and life practices concurrently personal development as one of the research participants put it. This research initiative implementing a networked practice inquiry and opening a small window on the students' viewpoint is one small step in this direction.

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Chapter 9
The Blockchain University: Disrupting "Disruption"?

Petar Jandrić and Sarah Hayes

9.1 The (Failed) Promise of Technological Disruption

One of the key promises of the Silicon Valley is disruption. During the 1980s companies such as Apple and IBM promised the "disruption" of the paperless office (Sellen & Harper, 2003); in the 1990s the "disruption" of the day was working from home (Daniels et al., 2000); and the early 2000s 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 2010s, the latest 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 (Williamson, 2020).

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Writing about these trends and promises we deliberately wrapped the word "disruption" in quotation marks because their reality 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 disruptions promised by these platforms 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). Technologies are far from neutral in these processes. Already in 2010, Tarleton Gillespie wrote:

> A term like "platform" does not drop from the sky (. . .) It is drawn from the available cultural vocabulary by stakeholders with specific aims, and carefully massaged so as to have particular resonance for particular audiences inside particular discourses. These are efforts not only to sell, convince, persuade, protect, triumph or condemn, but to make claims about what these technologies are and are not, and what should and should not be expected of them. In other words, they represent an attempt to establish the very criteria by which these technologies will be judged, built directly into the terms by which we know them. (Gillespie, 2010: 359)

With an understanding of Uber drivers as independent contractors without any rights to social and health security, and similar moves, the latest platform disruptions arriving from Silicon Valley have contributed to development of new forms of worker exploitation. Technological disruption comes in hand with social disruption, and authors such as Nick Srnicek (2016) are increasingly exploring these latest transformations using the concept of platform 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 are old enough to have worked in various early versions of Internet-supported distance education including e-learning, Technology Enhanced Learning, and others 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). Education has also succumbed to the siren call of platform capitalism, and "[e]ven if online platforms will never replace schools or universities, they will likely have a substantial impact on how education becomes redefined as a public good." (van Dijck & Poell, 2018).

While these technological disruptions have definitely contributed to the 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 and perhaps less exploitatively. Trust is the main prerequisite in human-technology relationships, "yet the inherent untrustworthiness of digital technologies indicates that we should place more value on trust in other human beings. Trust is cultivated from emotion and belief, yet it results in decisions about objective truth. Trust links our past and present (represented by data, information and knowledge) and our future (represented by wisdom)" (Jandrić, 2018: 110). 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 & Currie, 2011).

Yet just as Facebook, Amazon, Google, Uber and Airbnb have been criticized for extractive and exploitative practices, in an increasingly platformized university (van Dijck & Poell, 2018), many teaching staff now hold precarious contracts. Additionally, a form of platform capitalism, increasingly present in universities, has potential to further undermine trust through datafication and algorithmization of teaching, learning, and research. In this vein, Ben Williamson shows that

> 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).

The promise of standardization may inspire trust in many people; after all, one of its key underpinnings is equal treatment of everyone. However, standardization described by Williamson is fully based on big data and algorithmic processing of big data, and these are far from neutral. "One important quality issue is data bias, which appears in different forms. These biases affect the (machine learning) algorithms that we design to improve the user experience. This problem is further exacerbated by biases that are added by these algorithms, especially in the context

of recommendation and personalization systems" (Baeza-Yates, 2016). Therefore, shows Jandrić, "AI systems do not only embed, replicate or reinforce attitudes or prejudices found in data—more importantly, they also recombine them and produce new biases" (Jandrić, 2019: 32). The promise of data-based and algorithm-based standardization, therefore, is an ideological framing for processes which are inherently biased. 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).

These days, there are plenty of critiques of dataification and platformization of education (Williamson, 2020; Williamson et al., 2020). In the early 2020s, we are also witnessing an increasing number of attempts at creating radically different models of techno-administrative disruptions. One of the most active organizations 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 neoliberalization 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".

9.2 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-twentieth 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. Illich does not offer another techno-administrative disruption, but a whole new worldview and radically different social arrangements. Thusly, 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. Illich's 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. In this way, Illich's proposals are fundamentally different from platform capitalist education aimed at standardization and cost reduction.

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" (Hart, 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 to the past, his important insights about connections between education, technology, capitalism and the environment serve as indispensable starting points for analysis. Therefore, it is hardly a surprise that

Illich's work is a permanent inspiration for the field of networked learning (Networked Learning Editorial Collective, 2020; Jandrić & Boras, 2015).

9.3 Uber for Students, Airbnb for Teachers

In 2018 an independent group of scholars 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). Combining 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. In the Woolf University, however, safe transactions are not just about money transfer; instead, they are being used for management of acquired learners' credentials.

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" (2016). A P2P 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 decentralized, so that when information is passed between peer computers (nodes) there is no central point of potential 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 decentralization of data in the ledger that provides tremendous opportunities for many fields (O'Byrne, 2016).

Based on blockchain technology, 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 incentivized to increase positivist quality criteria, students are incentivized to take large student loans and play "safely" while they study, and teachers are incentivized to prioritize administration, research, and funding over teaching. (2) The opaque barrier problem. Students and teachers are incentivized to trust opaque decision-making processes and people 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 organization 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).

In response to the White Paper, David Kernohan critiques its strong focus to technology and asserts that 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). While these and other critiques are certainly valid, it remains to be seen what will happen in practice. 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.

9.4 The Ideology of the Blockchain University

In this section we firstly discuss our interpretation of ideology, in relation to technology and education. 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 organizations and related inequalities, in the onset of platform capitalism.

Blockchain technology is based on the idea of delegating trust away from centralized institutions and placing trust instead into a technical architecture. For instance, instead of being handled by the Student Office, learner credentials are now managed using the Woolf University's dedicated platform. This brings about strong individualization, as individual students and tutors now interact with algorithmic platforms that algorithmically curate content and match different users. Whether this implies that people no longer have to trust in each other is a further point for debate, especially if trust is being placed into networks and algorithms. 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 et al., 2004: 1). This definition is relational (Jones, 2015), because all elements mentioned in the definition are interconnected with each other and permanently transformed. In a recent set

of papers, the networked learning community has updated this definition with a strong accent to emancipation and critical pedagogy (Networked Learning Editorial Collective, 2020; Networked Learning Editorial Collective et al., 2021). 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 and/or significant increase of student fees in most Western countries at the end of the twentieth century there has been a much stronger focus on "employability" and a growing awareness of potential "technological unemployment" (Peters et al., 2019). Ben Williamson describes too, how education is changing in an emerging "platform society", with sociotechnical 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:

> Woolf University 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 romanticized 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 will simply blend into the existing powerful political, educational and economic structures of the society in which we live. That would not be an unusual path—few years ago MOOCs also promised openness and democratization of knowledge, but soon got fully integrated into the neoliberal academia (Knox, 2016).

9.5 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 eluded them, despite paying crippling tuition fees, there is likely to be an attraction too. Such a move, as we argue earlier in this chapter, 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 organize 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. In this sense, the Woolf university is still deeply imbued in the existing logic of platform capitalism (Srnicek, 2016; Williamson, 2020) and does not offer a whole-rounded social Illichean disruption. Unlike Illich (1971), who sought for replacement of the Promethean logic of capitalism based on growth with am Epimethean logic focused to balance between humanity and its environment, the Woolf University has merely applied platform logic on top of existing capitalist relationships. However, the Woolf University also 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.

The Woolf University disruption 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. Applying many principles of networked learning, often without acknowledging their origins, the Woolf university offers an interesting experiment at the fringes of educational mainstream. Looking ahead to future research in this area, we raise the question of whether the Woolf University makes for a return to core academic values, underpinned by a cooperative platform to aid transparency, and based on many principles of networked learning, may really hold the techno-administrational resources we need to begin to rebuild academic trust. If the Woolf University's principles indeed get a wider recognition and application in (higher) education, it will be necessary to seriously examine their role in platform university and platform capitalism at large.

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Chapter 10
A More-Than-Human Approach to Researching AI at Work: Alternative Narratives for Human and AI Systems as Co-workers

Terrie Lynn Thompson and Bruce Graham

10.1 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. Globally, national policies 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; what work-related policies and organizational practices are needed to address these changes; or the learning implications for professional workers as they interact more intensely with various forms of AI. Largely thought to be immune from automation, professional work is now challenged as AI increasingly adds advanced data analytics to augment complex professional decisions, automates tasks, and enables new forms of remote working (e.g. Susskind & Susskind, 2015).

To better inform networked learning scholarship, there is a pressing need to understand: (1) the new competencies and knowledges workers are developing as

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they learn to work with AI; and (2) implications for professional learning within the workplace and higher education (HE). Our aim is to contribute to this conversation by sketching some of the changes AI is provoking in workers' day-to-day practices in order to highlight the fine-grained research and analysis needed to ensure that AI design and deployment is critically informed by an in-depth understanding of how people experience and engage with such algorithmic systems.

Following other approaches (European Commission (EC), 2019; Nilsson, 2010), our working definition of AI is any computational system that carries out a task normally associated with a degree of intelligence when performed by humans. The rising prominence of complex AI systems in the workplace is challenging professional roles and skills as new decision-making processes distribute judgement and responsibility across AI-human systems. Coming to the fore is the trustworthiness of AI outputs, as emphasized in policy recommendations by The High-Level Expert Group on Artificial Intelligence of the European Commission (2019).

Increased use and trust in 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. 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). Critically informed and positive, they drive ethical investment and innovation at all stages of development from research to commercialization as well as robust AI-related education and learning initiatives that foster effective worker-machine interactions. However, negative perceptions, and especially those fuelled by spurious narratives, could lead to public backlash that curtails AI development and further entrenches misinformation and distrust.

Professional workers practice at the intersection of 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". Missing in these narratives is an understanding of the significant changes in *work itself* and the learning opportunities inherent in these new arrangements of work as AI becomes more prominent.

Because work and work-related learning are often inextricably linked, looking at both enables deeper understanding AI and workers' networked ways of learning *and* working. Focusing on examples from several sectors (including HE), we begin by exploring how professional expertise, judgement, accountability, and control are

re-distributed as workers interact with AI systems. Evident in these examples are themes that resonate across different sectors and forms of professional work. We raise questions about what trust and confidence in new AI-infused work practices is needed (or possible) and how is this negotiated. In so doing we draw attention to the complexities of AI-mediated work practices, which invites re-thinking ways to research these shifts in order to generate the evidence needed to inform networked learning practices. Given the early stages of this field of inquiry, we hope to evoke discussion of alternative human-AI narratives suited for the messy—and often unseen—realities of everyday practices and consider the implications for researching these practices.

In this paper we make three contributions to networked learning research. First, we situate networked learning more tightly with work itself. Learning emerges in relation to specific tasks, technologies, and responsibilities: activities and goals in a workplace structure the curriculum of the workplace (Ludvigsen & Nerland, 2018). Attending to the "pedagogy of work"—which we refer to as *networked work-learning*—highlights ways to exploit these learning opportunities and identify emerging competencies. Second, we align with the reassertion of the political and moral aspirations of networked learning to help people build necessary capabilities for constructing better ways of living (Networked Learning Editorial Collective (NLEC), 2020). We therefore focus on how it might be possible to live and work critically, ethically, and productively *with* AI in order to push against reductionist, deterministic, and instrumental conceptions of human-technology endeavours. Third, we build on views of learning as connecting: people; sites of learning and action; ideas, resources and solutions; and across time, space and media (NLEC, 2020, p. 8). We extend the conceptual framing of connectivity within networked learning by engaging in further conversation with more-than-human sensibilities. Rather than human vs. technology, this perspective attunes to human-technology together as the phenomena of interest. In so doing, the focus is on how changes to networked work-learning are produced by a series of complex social and material (digital) relations. Such theorization may offer insights into research needed to untangle the interweaving of AI and work-learning.

10.2 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 professional services

suggest that AI debate and research is in the early stages and does not yet untangle important distinctions and complexities. 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.

AI can do a range of tasks with varying degrees of sophistication: intelligent decision support, classification, prediction, visual object recognition and image processing, speech recognition, natural language processing, and natural language generation. AI is not one thing, and often invisible, resulting in complex changes to work not yet well understood. There is limited evidence of how AI is being used currently and how workers' tasks have changed where this has happened (Frontier Economics, 2018). Professional bodies responsible for profession-specific regulations and codes of conduct are grappling with drastically changing professional work landscapes, ethical dilemmas, and a desire to seize opportunities afforded by AI while also minimizing risk.

A number of questions are posed. 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 judgement, and newly distributed responsibilities for algorithmic-influenced decisions. These sorts of research questions are relevant to HE: not only as a sector and workplace but also as the space where future workers should be learning how to negotiate and critically question complex, fast changing, digitally mediated ways of working.

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 judgement. Although decision makers may be reluctant to depart from algorithmic recommendations (thus further undermining individual judgement and discretion), others argue that not all decisions can be coded (Agrawal et al., 2019). Indeed, the phenomenon of "algorithm aversion" suggests that humans are less confident about accepting and using the results of automated forecasting and prediction (Dietvorst et al., 2015).

As professionals undertake new and different responsibilities for knowledge, understandings of where "expert" knowledge resides become blurred. Lange et al.'s (2019) study of algorithms and high-frequency trading suggests that most of the time "neither the human trader nor the algorithmic machine is in full control", highlighting the constant reconfiguration of worker-algorithmic relations (p. 600). 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 behaviours (Kolbjørnsrud et al., 2016; Mateescu & Nguyen, 2019). In a study of AI-mediated decision-making in a

telecommunications company, Bader and Kaiser (2019) document how the user interface mediates between human and algorithmic decisions. Significantly, they note that a lack of balanced involvement of humans in decisions has negative performative effects due to deferred decisions, workarounds, and manipulations (Bader & Kaiser, 2019). Clearly, workers are now navigating very different social and material relations, presenting significant implications for professional learning within the workplace and higher education.

In the next section we highlight the complexities of these shifts in responsibility and control by drawing on examples from several sectors reflective of current narratives. Foregrounded in these examples are tensions in the openness of AI systems and the data upon which they build; increasing reliance on public-private technology partnerships; contradictory rhetoric about AI and its actual level of uptake in provision of professional services; bias in datasets used for training AI; calls for holding algorithms accountable despite often messy human-AI partnerships; and the need for co-development of algorithms and AI systems.

10.2.1 New Dilemmas of Professional Work

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). Moreover, 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 this example of 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 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 the 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.

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 can be used 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.

Let's consider automation, another area of lively debate. Chatbots are one form of automation increasing in popularity and sophistication. Smutny and Schreiberova (2020) describe chatbots as software that interacts with users "in a natural, conversational way using text and voice" (p. 1). Deployment of the Jill Watson chatbot, as a teaching assistant on AI courses at Georgia Institute of Technology, was intended to provide co-teaching support. Indeed, Eicher et al. (2018) note the importance of humans working alongside the AI system and stepping in, for example, when the chatbot could not handle uncommon cases. However, a significant amount of data and expertise is required to create the conversational flow that people have come to expect as they interact with personal digital assistants (Smutny & Schreiberova, 2020). Such development demands extensive collaboration between computing/data scientists and educators. Although somewhat blackboxed by the chatbot, it is possible to see how "teaching" expertise is *distributed* across spaces and time: it is both automated and not. Here we see an important but subtle shift in the rhetoric of automation of professional workers. As Bayne (2015) suggests, teacher automation does not need to be about replacing or "solving" productivity deficits in teachers but rather can take on a more distributed conception of teaching work that considers how assemblages of "teacher-student-code might be pedagogically generative" (p. 465).

Adding to the complexity of AI are the contradictions in the current rhetoric about AI and its actual uptake in professional work and services. This is evident in 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 are 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). Foregrounded is the importance of attending to everyday practices. Interestingly, Christin (2017) 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.

Despite slow uptake of AI in education, AI technology is increasing the range of applications possible within learning analytics (LA) systems. LA systems are co-workers of sorts, helping instructors analyse student behaviour and performance with some LA automatically tailoring teaching material to individual students. In this way, the expertise and judgement of teaching is now a shared responsibility and distributed across space and time. Amidst troubling narratives of a more pernicious data gaze (aka Beer, 2018) are questions of how this gaze *by* and *on* professional workers amplifies both visibility and invisibility. Brown's (2020) study of five HE physics instructors who used data dashboards (designed to deliver "algorithmically assembled information about students to the instructor") suggests that LA systems can be employed by institutions to surveil faculty as well as students (p. 388).

Brown (2020) reports that the dashboards facilitated data collection about instructors' pedagogical planning and decision-making that threatened their sense of autonomy, opened for the door for unwarranted interference, undermined their existing pedagogical strategies, and enabled unwelcome surveillance. Here, increased digital visibility of work shines a light on a darker side of algorithmic management of professional work.

10.3 Trusting AI Co-workers

From the outset, networked learning has been concerned about the learning possibilities enacted through connections between people, technologies, ideas, resources, and contexts. The examples in the previous section start to raise questions about the knowledge and knowing practices workers are developing as they work with AI, signalling potential areas for research. Foregrounded is the challenge of how workers come to trust (or not) their AI co-workers, something that unfolds through complex connections between people, technologies, professional expertise and judgement. 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.

Addressing these issues is crucial for developing AI systems that workers and the public trust and want to work, learn, and live with. If we do not want blackboxed technologies, Bunz (2017) argues, 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. One might imagine similar scenarios

playing out in HE by students and staff subjected to similarly blackboxed but nevertheless power-imbued algorithms. Successful deployment and use of AI in the workplace rely on human's acceptance of, and trust in, their AI co-workers. Underscored is the importance of understanding the unease towards AI—which includes asking the tough critical questions—and then working to address concerns.

While there is considerable evidence for data-driven algorithms outperforming human experts across a wide variety of domains, it seems humans are less forgiving of errors made by algorithms than by humans (Dietvorst et al., 2015). Better understanding this predilection is important for humans and AI to learn how to work together. Yu et al.'s (2018) research of human-algorithm interaction suggests that during ongoing interaction with an algorithm, humans will assess the apparent reliability of the algorithm and adjust their acceptance of its outcomes accordingly: in this way, "acceptance thresholds are dynamic and user-dependent" (p. 262). Dietvorst et al. (2018) suggest that allowing human users a degree of control, such as the ability to modify the algorithm, may ease some of the tensions between workers and the AI systems with which they interact.

In the light of evidence of human mistrust in AI and algorithmic systems, research is required to understand how an AI system could be configured to become a trusted entity within a mixed human-AI working environment. From a networked work-learning perspective, this entails examining the constantly shifting connections between humans and the myriad of digital actors that comprise AI systems. For example, Robb et al. (2018) identify several factors that impact user confidence: trade-offs between abstraction and detail in the presentation of *algorithm outputs* to different types of user (naïve versus expert); how much explanation of *algorithm operation* is required (again, may be user dependent); need for information on *data provenance* (for data-driven and trained algorithms).

However, it is not merely the functionality of AI at issue. The examples in the previous section illustrate how it is both AI and humans together that enact professional work. Given that many of the current AI narratives set up an ontologically distanced relationship between these complex digital assemblages and human actors, we argue that a more co-constitutive perspective helps to avoid over-simplistic deterministic stances. As Kitchin (2014) states, AI does not "exist independently of the ideas, instruments, practices, contexts and knowledges used to generate, process and analyse it" (p. 2). The need for such sensibilities is highlighted in this next example.

Failure to appreciate the complex material and social environments into which AI systems are enrolled can lead to high-profile disasters, such as the decision to use a computational algorithm to rebalance grades given by teachers (based on coursework) in the wake of cancellation of school exams in the UK in spring 2020 due to the COVID-19 pandemic. Both England and Scotland introduced hand-crafted algorithms based on current and historic performance data across schools and student cohorts (Ofqual, 2020; Priestley et al., 2020) with the aim of ensuring the 2020 grades for English A-levels and Scottish Highers would be in line with past performance (Bedingfield, 2020). However, what unfolded was a reduction of the teacher-predicted grades for many students, often to below that needed for university

entrance. In particular, high-performing students at otherwise poorly performing schools were hard hit. The resulting uproar led to the abandonment of the use of these algorithms. A report commissioned by the Scottish Government acknowledged the difficult and time-poor circumstances in which the model was developed and deployed but highlighted issues with the inequities and lack of transparency in the algorithms; the way emergent events amplified the uncertainty of decision-making; lack of communication and engagement with teachers and parents around the process and algorithm; the perceived arbitrary nature of the approach; and perhaps most disappointing, an erosion of confidence in the Scottish Qualification Authority and damaged relations between some students and their teachers (Priestley et al., 2020). Bedingfield (2020) sums up: "the algorithm has been ditched, and students will be belatedly graded with the original teacher's predictions" (para 3). A stark reminder of how teachers' expertise and judgement is necessary but also must be necessarily re-distributed in conjunction *with* AI systems in thoughtful ways.

This example highlights the difficulties in developing a sophisticated and robust algorithm for complex predictive or decision-making scenarios and, more importantly, how to deploy an algorithm in a way that contributes positively to the work of the professionals using it and the people affected by its outcomes. The lack of transparency in the process was compounded by the lack of involvement of teachers and education specialists in key decisions. Questions remain about how the professional expertise and judgement of teachers in this situation was viewed and performed. Although government was challenged about decisions and processes, the algorithm itself was widely criticized with headlines such as "Ditch the Algorithm" (Amoore, 2020 writing in The Guardian). Although many narratives became polarized around the algorithm, the algorithm did not act alone. It takes humans, technologies, and a range of actors to co-constitute these new forms of work. Professional agency, expertise, judgement, and accountability: these are assemblages of algorithms, interfaces, data, teacher-student-parent relations, educational specialists, statisticians and data scientists, statistical models, and policy.

Quite rightly, Amoore (2020) argues that this type of decision-making involves far more than a series of computational steps. She states that "grappling openly and transparently with difficult questions, such as how to achieve fairness, is precisely what characterises ethical decision-making in a society" and technical questions about data inputs and weighting of features are "political propositions about what a society can and should be like" (Amoore, 2020, para 9/6). Here is an example of an alternative AI narrative. Foregrounded is the importance of connections between learning and the kind of change that it is considered important in the world (NLEC, 2020). Indeed, innovative networked work-learning research may help to navigate—conceptually, ethically, and practically—these fluid social and material relations to better understand and approach the re/dis-assembling of AI-human entanglements.

10.3.1 Making AI Visible

Adding to the challenge of understanding how 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). Some AI systems can now be built by people who have little understanding of the inner workings of such systems and their limitations.

Argued is the need for explainable AI (XAI), seen as essential if workers are to "understand, appropriately trust, and effectively manage an emerging generation of AI systems" (Gunning & Aha, 2019, p. 45) and is meant to afford humans a degree of functional understanding of AI outputs. 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 (2019) 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)

However, an important 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—rule-based systems, case-based reasoning, 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 et al., 2016). The downside is that any "explanation" that arises is still only an approximation to what the AI is really doing. That said, the same may be true for a human expert asked to give an explanation of how they reached a conclusion.

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, even if the explanation is not strictly accurate (Robb et al., 2018). 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. We suggest that deployed AI systems should come under critical performance appraisal in the same way as a human employee.

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).

Eicher et al. (2018) explain that the task of giving a personal response to every student introduction was delegated to Jill Watson, the chatbot employed at Georgia Tech. However, they "realized that while the system's training made the chatbot capable of responding to a phrase like 'will be father for the first time' ... it would not react specifically to something like 'I'm pregnant'" (p. 90). It was at this point that Eicher et al. (2018) realized they were dealing with biased data sets. In creating Jill Watson, they used the common practice of building responses based on posts from previous semesters, rather than trying to speculate about what a student might post. Given that women are a minority group in their computer science programme, one can see how a data set of previous postings could be gender biased.

Eicher et al. (2018) comment: "We are particularly sensitive to this issue ... so much effort is going into providing a more welcoming environment for minorities. We now actively monitor the selection of answers and comments she's [Jill Watson] capable of offering to detect and correct any signs of such bias" (p. 93).

The issue of bias in datasets and algorithms is widely recognized by AI developers and is a necessary part of the public AI narrative on the limitations of AI systems. The onus is now on 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.

10.3.2 An Uneasy Alliance

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, devalue, or exclude 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 (2019) 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 (Partnership on AI (PAI), 2018). Image processing by deep neural networks (Le Cun et al., 2015) is a strong success story for AI, promising to cope with examining large volumes of medical imaging data for signs disease, and even 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. Workers therefore need to be part of the design and development of responsible human-AI interaction in ways that do not minimize human intelligence or capabilities. AI narratives are beginning to reflect the need for increased co-development involving educators, AI technologists, data scientists, workers, and the various publics they serve (e.g. Luckin & Cukurova, 2019).

We have drawn on descriptive accounts to foreground some of the complexities of AI-mediated work and how expertise, judgement, control, trust, and accountability are being re-distributed as workers work and learn with AI systems and intensified datafication practices. However, generating research evidence to inform networked work-learning scholarship, demands innovative approaches to attune to the narratives, nuances and often hidden, yet situated, interactions between humans and algorithms. This is where we turn next.

10.4 Researching with More-Than-Human Sensibilities

In this article we draw on a more-than-human orientation to untease and describe connections between people, technologies, ideas, resources, and contexts. These connections are of interest to networked learning research. Much of the current discourse around AI systems reinforces the binaries of human vs. machine, worker vs. AI, and human vs. artificial intelligence. Workers and AI systems are often portrayed as somehow connected, but separate, entities. And yet, many current

and promising uses—and robust critical questioning—of AI systems in the provision of professional services seem to be about how AI systems and humans work together.

We suggest that more-than-human sensibilities provide a way to conceptualize, attune to, and study the complex interactions that unfold between AI systems, workers, ways of working, workplaces, policies, and public narratives. Networked work-learning practices are seen as distributed across multiple networks and changes to work and professionalism as a series of complex social and material (digital) relations. AI systems introduce a myriad of new actors and connections into these networks: in many instances, new assemblages emerge. Understanding the larger shifts and the ethical implications demands sensibilities, theory, and methodologies to see human-technology together as the phenomena of interest. This leads to more-than-human accounts that offer a new and more inclusive account of what it means to be human in an increasingly technologized world.

Such conceptual and methodological work is an important contribution to be made by social sciences. It is beyond the scope of this article to articulate the many ways such research might be undertaken. Our focus has been to outline potential areas for research and possibilities for conceptualizing new questions. Bucher's (2016) technographic approach and heuristics for interviewing objects (Adams & Thompson, 2016) open up possibilities.

Throughout we have pointed to how prevailing AI narratives are powerful actors and the importance of exploring and advancing alternative, more nuanced, narratives. One challenge is the small number of similar and potentially misleading narratives that dominate public debate. Indeed, prevailing AI narratives are seen to contribute to some of the mistrust and unease about these powerful technologies (Lemay et al., 2020). The narratives about AI prevalent in public discourse inevitably shape the deployment of AI in the workplace as well as the kinds of research questions that are considered important to study. Research focused on examining AI-human interactions in work and learning needs to take these narratives into account.

10.4.1 Changing AI Narratives: Re-assembling Actors

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 report by The Royal Society (RS, 2018) summarizes 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 possibilities of AI in the provision of professional services are vital to successful deployment.

More-than-human sensibilities align with methods such as controversy mapping (e.g. Venturini, 2010) or networked ethnography (Ball et al., 2017). These approaches enable the researcher to examine and articulate how narratives, and therefore, knowledge about AI emerges and moves via complex social, technical and political constellations of actors, texts, and technologies as a form of assemblage. There is also a place to utilize innovative participatory research methods to enable new AI narratives to emerge through two-way public dialogues. This is consistent with the ethos of networked learning and its stronger focus on inquiry and action. One possible approach is *mini-publics* (Escobar & Elstub, 2016): assemblies of citizens brought together to learn and deliberate about the use of AI systems and the impact this has on confidence in the changing provision of professional services in order to inform public opinion and decision-making. Mini-publics create spaces for the public to learn about and experience AI first-hand, actively shape the direction in which technology progresses, and interact directly with social science and computer/data science experts. Work by the RS (2018) illustrates how it may be possible to re-craft compelling narratives about AI that accurately reflect "the underlying science and its possibilities while acknowledging scientific and social uncertainties" (p. 20).

Our aim is to spark discussion about new research directions that engage with alternative human-AI narratives suited for the messy—and often unseen—realities of everyday AI-mediated professional work practices. There is a substantial role for networked learning research and practice in this space. Indeed, the *Automating Society* report (Chiusi et al., 2020) emphasizes the pressing need to enhance algorithmic literacy and strengthen public debate on automated decision-making systems and has included this as a key policy recommendation to the EU parliament. There are opportunities to enable people to work with data-enabled, AI-powered systems in ways that give them a better understanding of their collective entanglements with AI and networked work-learning practices. In so doing, it may be possible for human workers to critically know their AI co-workers, in the same way they know human colleagues—their strengths, weaknesses and biases—and vice versa.

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Chapter 11
Exploring Enactivism as a Networked Learning Paradigm for the Use of Digital Learning Platforms

Magda Pischetola and Lone Dirckinck-Holmfeld

11.1 Introduction

In formal educational settings, it is widely recognized that students experience greater ownership of learning through authentic situations and experiences, and therefore they should be offered activities aligned with their needs (Hannafin & Hill, 2002; Niemi, 2002). Following these ideas, some traditional teacher-centred practices have gradually been considered obsolete, such as the focus on instructional objectives (Irzik, 2001), task-oriented approaches (Jonassen, 2001), teacher-controlled activities (Brophy, 1999), and in some fields a linear approach to materials creation with logical pre-designed sets of actions (Dollard & Christensen, 1996).

In the past decades, social constructivism has been adopted as the dominant framework in educational environments (Davidson-Shivers et al., 2018; Elander & Cronje, 2016), and even more with the opportunities that digital technologies have offered for people to interact, create and collaborate. Based on the dialectic between knowledge and action, and with a focus on artefacts as culturally grounded mediating instruments, social constructivism takes a step away from the more traditional objectivist view of an organized and static world (Li et al., 2010). Knowledge is not considered as the process to disassemble, analyse and recompose an object, but rather as the discovery of properties, qualities and entities of the world, accessed through experimentation and social interaction (Irzik, 2001). This view has

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encouraged the establishment of learner-centred environments where students interact with the world and receive constant feedback from it. The foundational idea of the student-centred approach is that individuals learn through the engagement with others, rather than in isolation, and knowledge is constructed through human, social and cultural interaction (Crotty, 1998). Therefore, students should be engaged in rich inquiry-based environments where dialogue is facilitated through small group activities and teacher's mediation, in an approach that begins with learners' ideas (Shapiro, 1994). In educational settings based on these conceptions, finding innovative ways of using technologies is part of the students' learning path (Hillman, 2014).

However, social constructivism presents some shortcomings that are rarely approached in the literature. By building on a dialectic way of conceiving human action, it falls short in overcoming the objectivist dualism between the body and the mind (Pischetola & Miranda, 2019). This has a consequence, for example, in a lack of recognition of the importance of emotional demands in teaching and learning processes (Shapiro, 2005). Moreover, social constructivists engage in epistemological assumptions, but do not focus on exploring the ontological premises that underpin their pedagogical framework (Irzik, 2001; Van Den Berg, 2013). Partially, this comes from the constructivist tradition, where sense-making is considered a core activity of cognition and a drive for human action (Wong et al., 2001). Partially, it is also due to shallow misinterpretations in the literature, which have reduced social constructivism to a number of key ideas for teaching practices (Davis et al., 2008; Light, 2014).

In this paper, we will propose enactivism as an alternative theoretical framework, which is in dialogue with social constructivism, but takes into account a more complex and non-dualistic philosophy of learning, by focusing on systemic relations and dynamic networks. Rooted in systems biology and phenomenology, enactivism makes it possible to overcome the dualism that separates individual inner cognitive activity and external environment (Hurley, 2001) and to support the conceptualization of cognition as situated and embodied (Merleau-Ponty, 1962; Varela and Maturana, 1974).

In line with the networked learning perspective, we understand that recognizing the complex, networked, and sociomaterial character of educational processes is a political intervention in itself (NLEC, 2020). In fact, while public policies on educational technologies have mainly addressed learning outcomes as something that can be controlled (Biesta & Osberg, 2010) and forecasted (Heinsfeld & Pischetola, 2019) in a deterministic way (Oliver, 2011), the networked learning paradigm calls for action research and empowerment (Jones, 2019). The ultimate goal of enactive teaching and learning practices is to re-establish a focus on human relationships and collaborative forms of inquiry, in order to enhance not only better educational practices but also "better ways of living" (NLEC, 2020). By focusing on the multiple interactions between mind, body, and the environment, enactivism delves into the fundamentally networked nature of learning.

11.2 Theoretical Background

Despite the great success that social constructivism has had in changing pedagogical practices, and even more when these are supported by technologies and digital environments, some authors have underlined a few critical aspects, which we will present briefly as the starting point to introduce enactivism as a more ecological and entangled view of cognition and learning.

First, the social constructivist paradigm exhibits limited innovation in terms of philosophical and epistemological assumptions. Worldly knowledge is the product of social interaction; however, the world is considered independent from our mind. Begg (2002) underlines that this pronounced focus on cognitive knowledge, even when socially and culturally constructed, takes away the attention from the role of subconscious and intuitive knowledge. In the same line of thought, Miranda and Pischetola (2020) explain that social constructivism is often based on an assumption of a dualistic relationship between reality and knowledge. The emphasis on centrality of the individual (e.g. in the student-centred model) disregards the complex environment of interactions that occur in the learning process, where the individual is only *one* element of the network. In the same way, digital tools and learning platforms are seen as dissociated from pedagogical practices or learning processes, enhancing an instrumental role of technologies towards teaching practice (Pischetola, 2020).

Second, it is worth noticing that the interpretation that has been made of social constructivism, especially in relation to digital technologies, has partially distorted its fundamental beliefs and placed more emphasis on the subject, rather than on the *relationship* between subject and situated action. Thus, the context has become an accessory, an element which is always mentioned in educational research, but which often lacks a clear definition (Dohn et al., 2018) and in practice it is considered secondary to pedagogical choices (Pischetola & Heinsfeld, 2018). In this way, literature has increasingly produced contributions on "active learning", using this term merely as an antonym of traditional teaching methods (Biesta, 2013) and without offering a deeper understanding of what elements constitute "activity" (Dall'Alba, 2005). Li and collaborators (2010) argue that this is due to a lack of philosophical consistency in literature, as many researchers do not know the differences among a variety of approaches within social constructivism, nor their epistemic assumptions. From this partial and biased understanding, much of the focus of current learning theories, which refer to active learning or active pedagogy, is set on individual engagement, student's protagonism, and learning as a spontaneous process. Holton (2010) recognizes a romantic vision in these pedagogical approaches, which reduces the complexity of learning into unguided discovery, problem-based activities and simulations.

A third problem lies in the way the epistemic assumptions of social constructivism—such as scaffolding, socio-cultural mediation, and relational aspects—have been used in educational research as abstract and representational categories (Fenwick et al., 2011). In this perspective, the concept of learning based on

interactions and relationships has become merely a representation of possible dynamics, which is focused on connections, rather than raising concrete efforts to understand sociomaterial entanglements among different actors (NLEC et al., 2021). The main problem with representationalism is that it makes the material world inaccessible for living organisms (Barad, 2007), as it inevitably creates a dualism between what exists and what is represented (Latour, 2005). Moreover, representations entail categorizations and associations that are very specific to the context from which they emerge. The work of Latour (2001, 2004) shows how controversial representations can be when the logic behind them is revealed, and claims for recentring research around the fluid character of networks. In response to this limitations, more and more authors are calling for an ontological approach to pedagogy (Barnett & Bengsten, 2017; Dall'Alba & Barnacle, 2007), one that can help us see the process of knowing as entangled to the process of becoming and meaning making (Fenwick & Edwards, 2014; Wenger, 1998). Especially when considering the role of digital technologies in educational setting, we see the need to endorse these proposals.

11.2.1 Origins and Unfoldings of Enactivism

As a label, "enactivism" emerged originally 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. Autonomy is the central mechanism that allows an autopoietic system to function. This initial view evolved rapidly from the biological field into a theory of human cognition and action. In 1991, Varela, Thompson and Rosch criticized some assumptions of the cognitive sciences, namely the dominant computational model of mind, and the related conception of cognition as independent from perception. Drawing on these first steps, this biological perspective of enactivism conceived mental processes as *more-than-brain* kind of processes. The emphasis was put on the organism's ability to exercise an action on the environment and was followed by a theory of mind defined as social or *situated cognition* (Gallagher, 2005, 2017; Ratcliffe, 2007).

The work of several phenomenologists has also contributed to dismantle the cognitivist idea of minds as grounds of coherent adaptive behaviours and logical inferences (Ward et al., 2017). The role of sensorimotor knowledge and bodily structures is the central focus of enactive theories that give attention to *embodied cognition*. Maurice Merleau-Ponty (1962) argued that the cognitive relationship to the environment depends on bodily interaction. As such, embodiment contributes to structuring thoughts and experiences. Hubert Dreyfus (1992) underlined that phenomenology could offer a more flexible, active and engaged conception of intelligence than cognitivism, by taking the emphasis away from representations and putting it on the interactions of mind, body, and environment.

In the following sections, we will present more accurately these two points of convergence of enactive theories—situated cognition and embodied cognition—to explain how they relate to the networked learning paradigm.

11.2.2 Enactivism as Situated Cognition

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 (Bateson, 1977). Drawing on these concepts from complexity theory and systems biology, the situated approach to cognition has at its core the idea of sense-making process in the interplay between the organism and the world. Both the organism and the environmental meaningful structures emerge from autopoietic dynamics (Ward et al., 2017).

Knowledge is measured by action on the environmental structures, and action itself is guided by perception (Noë, 2004). 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. Brains participate in a system, along with all the environmental factors (Gallagher, 2017), which define the situated emergence of knowledge.

On these grounds, the organism and the environment are not only interdependent, but co-dependent. According to the principle that Morin (2014) defines as "self-eco-organisation", an autonomous living being does not exist apart from its biophysical environment. Ecological examples range from the organization of animals in social groups to spatial patterns that can be found in plant distribution. In the humanities, different topics have been studied through a perspective of self-eco-organization, such as the origin and development of languages, human history, and the development of scientific processes and epistemology (Banzhaf, 2003).

The idea of self-organization is based on a conception that looks as a paradox: our autonomy is inseparable from our dependence on the environment. In an autopoietic system, the more autonomous an organism seeks to be, the more environmentally dependent it has to be (Varela and Maturana, 1974). The difference between interdependent and co-dependent organisms is explained also in systems theory, where apart from the way the parts interact with each other and exchange information with the external environment, other elements are said to characterize a living being, such as non-linearity, unpredictability, and emergence (Von Bertalanffy, 1950). The fact that all the components of the system co-depend from each other to evolve makes it impossible to understand a system by analysing its parts separately. This dynamic and complex view can be summarized in the famous Gestalt aphorism "the whole is greater than the sum of the parts".

Bateson (1977) defines the interactions among elements of a system as "a dance", which shows the "pattern that connects" all the existing living systems. In this sense, a core concept that the author brings to the enactive theoretical perspective is the one

of "co-evolution": the ability of a system to modify and be modified, in a relational and reciprocal way, through the interaction between systems.

Situated cognition, therefore, is dynamic and environmentally coupled. Coupling depends on complex patterns of interaction between the organism and the environment, which is constituted not only by discrete objects, but by relational networks. Cognition and environment co-emerge through experiential learning, with two premises: (1) people and context are inseparable and (2) change occurs from intentional tinkering affecting emerging systems (Fenwick 2000) and can be associated to the process of learning itself (Bateson, 1977).

11.2.3 Enactivism as Embodied Cognition

As we mentioned before, embodied cognition is also a phenomenologically inclined approach and understands thinking and cognition as grounded in bodily actions (Gallagher, 2005).

For the French philosopher Merleau-Ponty (1962), the space between the self and the world would not be 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. There is no more distinction between "inside" and "outside" the subject, as if a learner encountered knowledge as something detached from him/herself. Even reflection is an embodied practice that brings together body and mind (Varela et al., 1991, 27). Merleau-Ponty sees perception as a creative and participatory activity, a dialogue between the living body and the world (Abram, 1988). The phenomenology of perception and action involves skilful coping, corresponding to the awareness of human agents of what is ready-to-hand in the environment (Bannell, 2019).

On this account, enactive research stresses the inseparability between concrete bodily experience and mental processes (Damasio, 1994; Gangopadhyay & Kiverstein, 2009; Shapiro, 2004), and seeks evidence of this inseparability from the grounding of abstract concepts 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, 220). The body is what simultaneously separates us from the environment and places us in relationship to it (Budd, 1998). As such, the senses do not merely send information to the brain, but they participate in cognition. The sensing body is an active form that continuously improvises its relation to the world (Abram, 1997).

By emphasizing that only an embodied entity is capable of interacting dynamically with the environment, enactive philosophy of mind underlines that specific

bodily sensations produced by an interaction with the environment influence the quality of such interaction (Ward et al., 2017). In this perspective, cognition becomes also embedded and extended beyond internal effects (Clark & Chalmers, 1998; Clark, 2008), and qualities related to subjective experiences open the path for a discussion about consciousness. In fact, according to Chalmers (1996, 4), explaining phenomenal qualities of the mind-body-environment experience, or *qualia*, is "the very problem of explaining consciousness". It is worth to mention that this view moves one further step away from classical cognitive science, as it conceives mental states not only as representations, but as "representations in action" (Ivanov, 2016).

Recently, feminist poststructuralist and postcolonial studies have inherited the enactive interest for material and embodied experience (Barad, 2007; Haraway, 2008; Mol, 2002), and have moved critically beyond descriptive perspectives, towards concrete materiality, assemblages, and performative enaction (De Jesus, 2018). A research focus, for example, has been established on how the role of the body in knowledge making is dismissed in technology-mediated environments (Balsamo, 2000). Boler (2002) explains that with the constitution of a clear boundary between inner and outer, between the self and the world, there would be no possibility of shared material existence. This ideal of reality reflects a "repression" of materiality and the body and allows to pursue only partial knowledge of the world. In this sense, according to Boler (2007, 141), a central question to ask educators is: "whose goal is it to transcend the body and what may be lost in this migration to new spatial imaginaries?". In fact, states Boler, thinking and knowing are never "free-from-body" processes of an autonomous and isolated being.

To sum up, rather than conceiving the mind as a self-contained entity, enactivism considers it as an emergent and embodied phenomenon. Perception-action-perception compose a circular way of knowing the world (Hurley, 2001), a perspective that considers the perceiver in constant interaction with the environment. To say it with Dreyfus (2014, 259), "in our most basic way of being—i.e. as skilful copers—we are not minds at all but *one with the world*".

11.3 Enactive Pedagogy and Networked Learning

The two enactive characteristics of the mind presented above—*situated* and *embodied*—can be related to the educational philosophies and learning theories ascribed to the traditions of Pragmatism and Activity theory. For the purpose of this paper, we will look at this encounter and underline the most relevant cross-field concepts for supporting the networked learning paradigm (see Fig. 11.1).

By drawing on insights of well-known educational theorists, we will focus on two specific concepts that emerge from this theoretical analysis: *practical action* and *agency*.

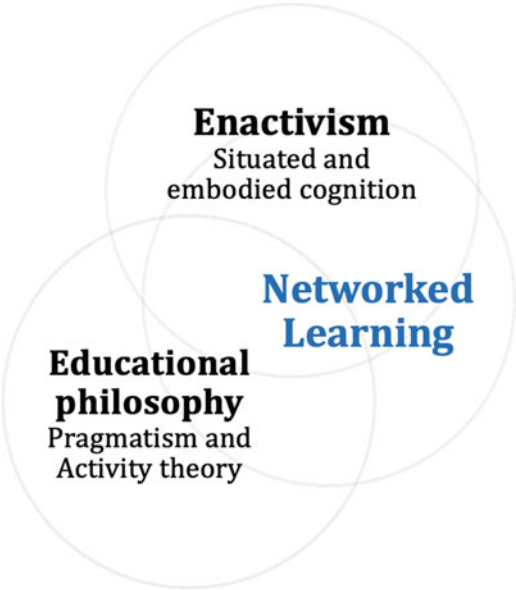

Fig. 11.1 Dialogue between enactivism, educational philosophy, and networked learning

11.3.1 Practical Action

The first philosopher to introduce enactivism in education was the pragmatist John Dewey in his work "How we think" (2014 [1910]). Dewey's approach is naturalistic, as he asserts that individuals adapt to the environment, form habits and experience uncertainty when these habits do not function (Miettinen, 2000). 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). This perspective is clear in the way he defines the human experience. Dewey (1925) asserts that there are two kinds of experience, which may be or not be interconnected. A primary experience derives from a practical action, which consists in the material engagement with the physical world. This is the ordinary experience, and often it does not come to mean anything because we are distracted, lazy or tired (Wong et al., 2001). However, sometimes an experience acquires a different quality, it "runs its course to fulfillment" (Dewey, 1934, 35) and it becomes a secondary experience, which can be considered a reflective one. In fact, this deeper experience is caused by initial disturbance and uncertainty about the practical (inter)action with the environment. A situation of crises generates a new investigation and generates inquiry, which implies different stages of reflective thought.

It should be clear, say Wong and collaborators (2001), that the Deweyan idea of experience does not translate into mere increase of field trips, projects or hands-on activities. In fact, the reflective and deeply educative experience is also an aesthetic encounter, where emotional quality and dramatic intensity are involved.

The basic assumption that drives Dewey's and other pragmatists' thinking is that we are all active participants in our social world (Simpson, 2009) and by our action we simultaneously create our social identity (Emirbayer & Mische, 1998). If the observer is not separated from the observed (Dewey, 1917), meaning-making practices are agentic, that is, they are constituted in real-time actions (Simpson, 2009). This is also why pedagogy and didactics are so complex, giving the fact that practices that might be agentic to some students are not agentic to others. In line with enactive perspectives, this reasoning explains that new possibilities for action emerge from complex systems, and thus "cognition occurs in the possibility for unpredictable shared action" (Fenwick 2000, 263).

Another theoretical contribution to the enactive concept of practical action comes from Cultural Historical Activity theory, which builds on the idea that the human mind is social in its very nature (Lave, 1988). Knowing is something that people *do together*, rather than in isolation with their own brain. Here, the concept of activity "bridges the gap between the subjective and the objective" (Kaptelinin & Nardi, 2006, 31) and 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". A strong focus on situated cognition arises, while consciousness is seen as mediated by artefacts, tools and signs (Vygotsky, 1978). This provides also a way to theorize a distributed characteristic of knowing, by looking at the materiality of learning and consider each mundane activity as a fragment of knowledge (Bruni et al., 2007).

However, in this theoretical approach, activity also has a narrower meaning, when it refers to a specific level of subject-object interaction. Kaptelinin and Nardi (2006, 64), for example, present a hierarchical structure, where activities are a response to a motive based in biological and psychological needs. They define a three-level structure composed of activities, actions, and operations, which correspond to motive, goals, and conditions. Movements depart from activity towards an object, through actions and operations. For example, for a person to become skilled in driving a car (activity), at the beginning every step in the process (action) such as ease the gas pedal, move the gear, give more gas, is fruit of a conscious planning and decision-making. However, practice and time will transform these actions into more fluid and unconscious operations (Kuutti, 1995). In this hierarchical and fragmented structure, we can see the persistence of dichotomic thinking that separates individual and social levels of analysis, and a lesser focus on embodied forms of knowledge (Simpson, 2009). Such a hierarchical structure makes invisible everything that occurs in-between object, actions and operations and the way that these different levels of analysis entangle with each other.

In an enactive perspective, we would understand activities, actions, and operations in a more horizontal way, comprised in the broader concept of practical action.

11.3.2 Agency

Another key concept in the enactive perspective on learning is the one of agency, and what is central to human agency is intention. Pragmatists have connected it to the constant reconstruction of one's own orientation towards emergent events. As such, agency is what drives the capacity to imagine, evaluate and reflect on past, present, and future actions (Emirbayer & Mische, 1998). From a Deweyan perspective, experience is not a psychological phenomenon, but rather the result of continuous participation and engagement with objects, situations and events that compose our environment (Jackson, 1995, 194). Dewey uses the term "transaction" to explain this transformative relationship of the human being acting on the world, and the world acting on the human being (Wong et al., 2001).

In Activity theory, human agency is defined both as "the ability and need to act" and "the ability to produce an effect (. . .) according to an intention" (Kaptelinin & Nardi, 2006, 242). The first definition is related to a thing (natural or cultural) and the second to non-human (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 human intentions, which have been built into the system (though many systems fail). Finally, the human being also produces an effect according to an intention, but what radically divides them is the human ability to act according to his/her own cultural needs. Human beings' agency cannot be separated from their intentions. As such, we should always consider practice and theory as intertwined. On the other hand, technology does not have intentions in the same sense, and therefore it does not *do* something by itself, other than mirroring values and design patterns that were embedded in it by humans.

Recent sociomaterial approaches such as Actor-Network theory (Callon, 1987; Latour, 1987) and feminist new materialism (Barad, 2007; Haraway, 1991) have extended the notion of agency to non-human actors, by focusing on heterogeneous assemblages that are participating in the production of knowledge. As such, knowledge is embedded not only in visible artefacts (Vygotsky, 1978), but also in invisible infrastructures (Winograd & Flores, 1986), rules and habits (Star, 1999).

Practical action and agency are both present in the early definition of networked learning developed in the JITOL project (Steeples & Jones, 2001) and confirmed by Goodyear et al. (2004), which has served as a common definition ever since. 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" (McConnell et al., 2012, 6). This definition underlines the entangled perspective of learning as dynamic and complex activity enacted by learners, teachers, digital tools, platforms, 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, 240). In Fig. 11.2, we offer a visualization of this framework.

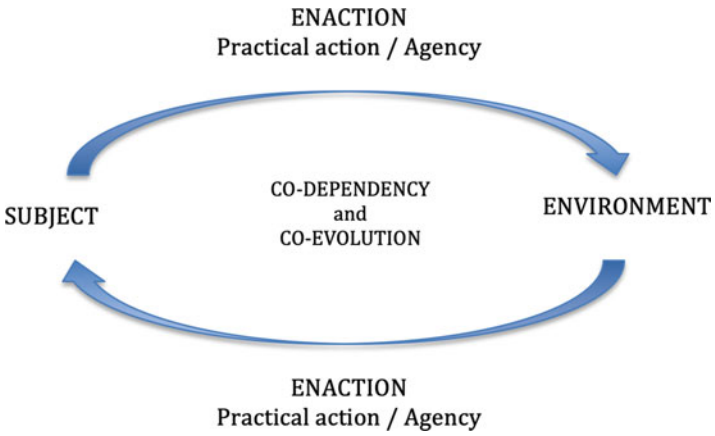

Fig. 11.2 Relationship of subject and environment in enactivism

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 constantly changing system, where the relationships that the living organism establishes with the environment also feed and shape its own dynamics. In this multidirectional interaction, the reciprocity between organism and environment is responsible for the changes in the system's structures, without losing its organization. In an ecosystem, multiple interconnected and entangled relations occur (Fenwick et al., 2011), which are not only situated but unique. All the elements of an environment—student, teacher, interactions, technical objects, climate, place, historical moment, emotions, brain, body, disciplines, events, society, community, relationships, connections—are part of a complex network that characterizes the unique context for learning (Miranda & Pischetola, 2020).

If we apply this 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 embodied and situated actions take place.

11.4 A Research on 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 and re-interprete the process by 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.

11.4.1 Digital Learning Platforms in the Compulsory School in Denmark: Context

In 2014, the Danish Government established that all Danish municipalities should purchase and implement digital learning platforms before the end of 2017. Instead of centrally creating one national learning platform, 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 was 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 overemphasizes and details the learning objectives leading to a fragmentation of school subjects, 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.

11.4.2 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). Implementation of digital infrastructure is often seen from the point of view of teacher training efficiency and/or teachers' satisfaction, rather than taking into account their values and visions (Tamborg, 2019). However, a growing body of research has shown the crucial importance of teachers' pedagogical values (Priestley et al., 2018; Tondeur et al., 2019) and epistemic beliefs (Pischetola, 2020) for the use of digital platforms in teaching. In the following, we will move from a perspective that focuses on beliefs to a relational approach, that takes into account individual teachers' values *and* patterns embedded in the researched platform. For the purposes

of this chapter, we will especially take a closer look into the experiences from one of the participating schools, where the second author acted as a researcher. The research question driving the study is:

> *How does situated and embodied cognition emerge from a participatory process where teachers engage with a digital learning platform?*

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 organized through two workshops. The first workshop, a future workshop (Jung & Müllert, 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. 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, in this case: a given school, historical moment, educational reform, the school management and teaching and learning culture, the affordances of the room for sharing and elaborating, and not least the contributions of the participants, teachers, and facilitators.

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 to the teachers in the second workshop in order for them to choose a tension to work on and to design an intervention. The teachers' interventions ran through two months and the participants created 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 in a very detailed manner. A final evaluation of the learning outcomes of the project was conducted.

11.4.3 Results

An infrastructure is not given but becomes an infrastructure through its use, in sociomaterial configurations with its functionalities (Bygholm & Nyvang, 2009; Nyvang & Bygholm, 2012). Starting from this premise, we could observe that when the first workshop took place, the digital learning platform seemed to be an obstruction for the teachers in order for them to do their work. In the way the participants described the features and the platform layout, it was very evident that there was a separation between an "inner" and an "outside" world, as if the platform was something detached from their practices. As such, the teachers found it very time-consuming to follow the routines for describing learning goals and learning tasks, as

well as the assessment of the pupils' performance in an absolute scale on pass/not pass. These actions were not usually comprised in their way of working and did not make much sense within their ordinary habits. Moreover, the teachers were very concerned with the values about teaching and learning, which the learning platform presented.

The main problem identified in the critique phase, 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 enhances 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 growth"; "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, 117).

In the vision phase, the workshop provided a necessary space of reflection for the participants to build meanings together. The teachers visualized their ideas for a digital learning platform arguing that it 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'". On the other hand, as the school has to use the learning platform, the design-workshop was used also 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 with the portfolio function, and how to use the learning platform to strengthen the teacher-pupils-parent dialogue about pupils' progress using a function for visualizing different variables (e.g. social, emotional, and subject knowledge) in a spider web.

11.5 Discussion

In a political programme that has clearly separated the environment (digital learning platform) from the subject (teacher, pupil, parent), the participatory workshops have acted as a tool for enactment and imagination, as they provided a chance for "embodied action-taking" (Malafouris, 2013).

A focus on the enactive emphasis on situated and embodied cognition allows us to make an analysis of meanings embedded in both the social setting where the

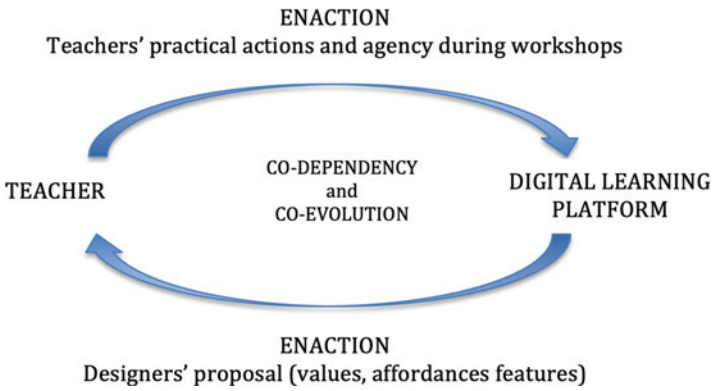

Fig. 11.3 Relationship of teachers and digital platform within the enactive frame

research was undertaken and the physical experience that was provided through the workshops (see Fig. 11.3).

At first, a common task of discussing critically the digital platform inspired the teachers to exchange viewpoints, value each other's ideas and think about ordinary actions as starting points for relevant reflective moments. In this enactment, the participants formulated a shared understanding of the learning platform and the built-in values for child development, teaching, and learning. It became very present for the participants that the design of the learning platform was conflicting with their professional identity and engagement as teachers. This confirms results from previous studies that indicate the great importance of pedagogical values and epistemic beliefs in teachers' perceptions (Pischetola, 2020; Tamborg, 2019). By sharing emotions and feelings, they also became more comfortable with their arguments and clearer in their intuitions. Perception characterized the critical phase and allowed teachers' ordinary experience to transform practical action in material engagement. In the workshop, the (both intellectual and physical) space that was separating the teachers from the implemented digital learning platform proved to be a hybrid space of continuity and circularity, as Merleau-Ponty (1962) would have described it. And it constituted in the research a very fertile ground to transform an ordinary experience into a secondary form of experience (Dewey, 1925), one that requires and instigates active engagement with the given situation.

In the second phase, teachers experienced embodiment by beginning to actually use the learning platform in a coupled and symbiotic sort of way. By exploring its features and possibilities in a different time-space than the daily working routine, the teachers discovered some features that would suit their pedagogical goals, and even invented new ones according to their needs. In this process, they had to reinterpret the designers' proposal of the platform and participate in new sense-making procedures, related to their own process of self-reflection. This agentic engagement with the platform incentivated participants' pedagogical creativity. As such, their agency was expressed not merely by their practical actions, but by their intentions and desires, as well as by the wish to produce an effect on their work environment.

This intervention is an example of how to understand enactive modelling. According to Holton (2010, 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 direct 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 the intervention, the researchers did not decide which roles and features 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 and Ræbild (2017), the re-enactment provided insights into some functions which they partially could use and some they could skip, which led to a more positive attitude towards the learning platform.

This proves, as say Wong et al. (2001, 325) that the notion of "learning by doing" often attributed to Dewey, is incomplete. It should also be mentioned that knowing the world *is* doing, as the ideas that become concrete through actions are the ones that constitute deep and relevant experience. In fact, practical activities are necessary to translate abstract concepts into meaningful experiences (Kaptelinin & Nardi, 2006). Following the structure of a future workshop, the intervention created a flexible space for exploring and trying out the different interpretations of the learning platform and related issues. It seems that these organizational features were meaningful for this group of teachers and created a most needed room for sharing and negotiating their becoming.

11.6 Conclusion

Learning platforms are important infrastructures in the networked environment as they mediate the interactions of the participants, teachers, pupils, parents, school administrations, and other actors. The relations between the participants and the environment are a dynamic and emerging relation of autonomy-dependency, or a symbiosis, as it is understood in systems theory (Von Bertalanffy, 1950). 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 school system. Change will possibly occur through the sociomaterial interaction of the actors that are present in a unique time-space situation. As such, enactivism shows the mutual co-shaping and emergence of subject (made of brain/body/senses) and environment. The process described in the research shows us that meaning resides neither in the brain nor in the artefacts, but in the process of re-enactment of the digital platform in a specific context. The idea of cognition as the emergence from an ecosystem is not merely a

metaphor (Fenwick et al., 2011) or a representation (Ivanov, 2016), but an actual way to look at the ontology of knowing (Pischetola, 2021). From an educational point of view, this means making visible material dynamics of knowledge emergence and exploring practical ways to expand and deepen learning.

Another essential principle of the use of an enactive frame in education is the provision of multiple perspectives on any situated problem. This is a very important lesson learned from the experience of participatory workshops with teachers. Despite the participants' encounter and common effort of meaning-making, each teacher ended up with different ideas and possibilities for their pedagogical interventions on the learning platform. A multiplicity of meanings reflects a multiplicity of beings, which expands towards who teachers are *becoming* (Dall'Alba, 2009). When we concentrate our attention on this ontological dimension of teacher professional development (Fenwick et al., 2011), we understand that there are many open possibilities for the future of teaching. A wider range of possibilities corresponds to a wider range of ways of being, in a transformation that entails "interrogating and re-shaping assumptions about what it means to teach" (Dall'Alba, 2009, 36).

Finally, from an implementation point of view, the example we have given with our study demonstrates that the insertion of a new digital learning platform takes place in an ecological living system made up of humans, non-humans, things, and societal entities. For the teachers to accept, appropriate, act and re-enact such a learning infrastructure, it is of great importance to establish spaces for reflections, as the ones that future workshops provide, and to support (alternative) enactments of more hidden affordances of the digital learning platform. Applying an enactive analytical framework to learning platforms showed us both the situated and the embodied aspects of information exchange and creativity emergence within a network or an ecosystem. In this sense, networks can be seen as alive and ever-changing organisms that are composed by many elements constantly interacting. Such enactive analysis allowed us to "explore the network ontologically" (NLEC et al., 2021), where the process of learning takes place in a unique situation (Merleau-Ponty, 1962) and has the transformation of the network itself as an outcome (Bateson, 1977).

In conclusion, we affirm that having enactive models 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, as well as to the wider society. A pedagogy grounded in these principles can be a drive for developing autonomy and agency, as it considers learning as more than just a rational and cumulative activity, and opens up for participation, engagement in a process of inquiry, and ultimately imagination.

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Chapter 12
A Framework for the Analysis of Personal Learning Networks

Nicholas S. R. Fair

12.1 Background

Although a long-established physical phenomenon, it is particularly since the evolution of the World Wide Web in the early 1990s 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 1920s (e.g. Bott & Moreno are cited in Scott, 2017). However, it is over the past 30 years that networks have grown in importance and application across diverse academic fields, including social sciences (e.g. Castells, 2011, vol. 12; Law, 1992, 2008; Rainie & Wellman, 2012), mathematics (e.g. Scott, 1988), and education (e.g. Siemens, 2005a, b; 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 15 h per week online (Ofcom Media Report: Children & Parents, 2016). Both active and passive social media use has led to social media networks becoming an influential part of how many individuals form their identity and their relationships to others (e.g. BBC School Report, 2016; Davies, 2015), earn an income (e.g. emarketer, 2016), or feel excluded or isolated (e.g. O'Keeffe & Clarke-Pearson, 2011; Luxton et al., 2012). However, social media networks are just the most visible of a myriad of networks in which we exist, both online, such as forums, class groups, Teams chats. . .etc., and offline, such as family and friendship groups, clubs,

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neighbourhoods. . .etc. In short, networks have become the defining framework for modern life, inextricably part of the activities of living, learning and working to such an extent that it becomes increasingly unproductive to consider an individual separately from the networks to which they belong.

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 cannot be fully understood in isolation from the other. Applied to education, this means that learning, as a process, cannot 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).

Within education, the networked learning community is the only branch to have fully recognised this sociotechnical relationship and the increasing centrality of networks to daily life and study. Many researchers (e.g. Siemens, 2005b; Downes, 2007; Kop & Hill, 2008; Carvalho & Goodyear, 2014; Moses & Duin, 2015; Van Waes et al., 2016; Jordan, 2016; Krutka & Carpenter, 2016; Trust et al., 2017; Visser et al., 2014) have explored networks over the past 15 or more years; however, there remains a lack of empirical data in relation to PLNs in particular. It is therefore timely and important that research which aims to map and analyse the size, use and interaction preferences of the PLNs of diverse individuals is undertaken, in order to identify any meaningful patterns within and between these networks. In light of the rapid and fundamental changes to the HE landscape resulting from the response to the Covid-19 pandemic, the insights and evidence from this PLN research can be used to help underpin the necessary conversations concerning the most appropriate HE pedagogies for this new landscape, as well as being meaningfully applied to HE networked learning design. The application of effective digital pedagogies and learning design at this time may, in turn, help avoid the potential risk of a disconnect between students' educational expectations for online learning and the online and blended learning experiences they actually receive from their HE institution. Such a disconnect, if not avoided, may have negative consequences for learning gain, student engagement and satisfaction, and the British Teaching Excellence Framework ratings, which directly impact HE funding.

12.2 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 or need for 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 & Ibert, 2005). 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), rather they are centred on an individual.

Now we know what a PLN is not, what actually is it? In line with others (e.g. Siemens, 2005b; Downes, 2007; Kop & Hill, 2008; Carvalho & Goodyear, 2014), this research conceptualises a Personal Learning Network in its broadest form—that any type of interaction undertaken by any individual, for any purpose (formal, non-formal and informal learning and/or personal pleasure), can present an opportunity for learning. Hence, all daily interactions with technologies, people, information and services autonomously undertaken by a single individual embedded in their wider personal contexts form the network. Hence, a PLN is simultaneously a learning artefact (and therefore capable of becoming a unit of analysis) and a real-world tool which "*foster[s] interaction amongst and a learning process 'within' its participants*" (Rusman et al., 2016).

Consequently, 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 and interactions with the different people, technological devices, services, and information resources that an individual chooses to use to assist with any learning activity in all learning contexts for the purposes of achieving any form of learning outcome.*

PLNs are (largely) autonomously built, maintained and used by the creator, but are also heavily shaped by the wider sociocultural 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.

12.3 A Framework for the Analysis of Personal Learning Networks: The Design

This section presents the theories, principles, existing research and design rationale which underpin the Framework. Firstly, the Framework for the Analysis of PLNs aims to enable the answer to three basic questions:

1. What can be learnt about three aspects (size, use and interaction preferences) of the PLNs of diverse individuals and groups?
2. What are the impacts of the wider shaping effects of gender, life stage, ethnicity, region of residence, main activity and attitude to technology on these three aspects of PLNs?
3. How can these findings inform HE networked learning pedagogy and design?

Traditionally in learning network research, it has been difficult to meaningfully compare individual network maps at the microlevel due to large network variations, where the networks will contain nodes that are unique to the individual and their context (e.g. Participant 1 interacts with Person Name A, while Participant 2 interacts with Person Name B—we will return to this theme later). This limits within-project comparisons of the networks of individual participants, and between-project comparisons of networks generated by different research projects. Furthermore, research which maps individual networks also tend to be constrained by small sample sizes, making meaningful generalisations from individual networks to larger groups problematic (e.g. Moses & Duin, 2015; Van Waes et al., 2016; Jordan, 2016).

Similarly, when studying whole networks at the macrolevel (consisting of the relationships between multiple individuals in a community), traditionally it has also been difficult to account for the shaping effects of the 'personal' factors which lead to individual differences in network behaviours, attitudes and connections (e.g. Krutka & Carpenter, 2016; Trust et al., 2017; Visser et al., 2014). This Framework has been designed to address the research questions by overcoming these traditional challenges in learning network research by adopting design principles which can bridge the gap between the micro- and the macro-scales of 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 (Fig. 12.1).

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; differences in digital literacies; and differing motivations to use technology. The literature (e.g. Pew Research Center, 2018; Ofcom, 2017; Orton-Johnson & Prior, 2013; Davies et al., 2012; Daniels et al., 2016; Witte & Mannon, 2010; Robinson et al., 2015) predicts that observable differences in PLNs based on Life Stage (age), Gender, Ethnicity, Country of Residence, and attitude to technology (position on the Digital Resident-Digital Visitor spectrum (White & Le Cornu, 2011)) should be evident. Learning from a trial version of the Framework further indicated that the Main Activity on the day of reporting (e.g. studying, working, caring, volunteering, leisure) is likely to have an impact on a PLN as well. Hence, these six external shaping factors form the 'Personal' aspects of the PLN Framework.

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 (e.g. Vygotsky's Zone of Proximal Development (Vygotsky, 1978)). In addition, also stemming from Vygotsky's work,

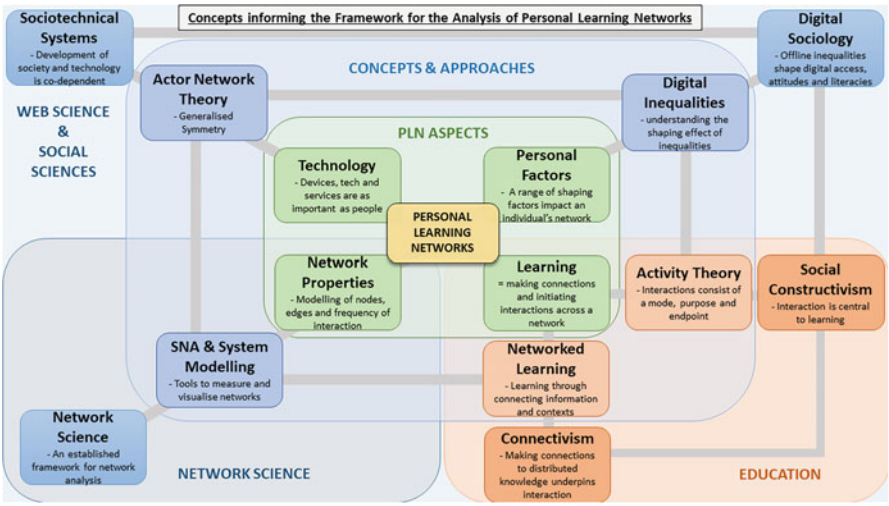

Fig. 12.1 The interdisciplinary concepts informing the design of the framework for the analysis of PLNs

Activity Theory introduces the importance of the mediating artefact, or device, when undertaking interactions (e.g. Engeström, 2001; Carvalho & Goodyear, 2014). Next, drawing from a second learning theory—Connectivism (e.g. Siemens, 2005a, b; Downes, 2005, 2006)—and from the field of 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 people must be made and patterns of relationships across learning contexts and knowledge domains identified. The conceptualisation of learning as involving interactions for a meaningful purpose undertaken through a mediating device (including face-to-face) across a network of connections to people and information informs the 'Learning' aspect of PLN research.

Next, Web Science suggests that it is impossible to understand a phenomenon without understanding that it has both a social (human) and a technical (non-human) aspect, and that these cannot 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. This informs the conceptualisation of an interaction as being equally meaningful whether it be with a human other or with a non-human endpoint.

In addition, Network Science (and Mathematics) also provides a toolkit for the empirical analysis and mapping of networks—Social Network Analysis (e.g. Granovetter, 1977; 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, 2000; Checkland & Scholes, 1990; Davies & Ledington, 1991; Wand, 1996) introduces the idea of abstraction and generalisation for modelling networks across different domains. Together, these concepts and approaches inform the 'Network' aspects of PLN research.

Taken together, the understanding of PLNs provided by this range of theories allows for a full conceptualisation of PLNs as an ego-centric interaction network consisting of an Interaction Mode (the medium through which an interaction is conducted), an Interaction Purpose (an intentional activity) and an Interaction Endpoint (a human or non-human other). The Framework views learning as simultaneously individual (i.e. autonomous and uniquely shaped by contextual factors—'Personal'), social (i.e. involving meaningful interactions with human and non-human others—'Learning') and networked (i.e. involving the making and maintaining of diverse connections—'Networks'). In other words, a Personal Learning Network features meaningful interactions across consistent network paths involving a Mode, a Purpose and an Endpoint.

Consequently, a Framework for the Analysis of PLNs has been developed which structures formal network analysis around a conceptualisation for the mapping of *individual* PLNs based on an interaction path from the Ego to a Mode, which is used for a Purpose, to interact with an Endpoint (see Fig. 12.2).

However, the Framework needs to go further if it is to successfully account for the impact of the external shaping factors on PLN size and use (and bridge the gap between micro- and macrolevel network research), by enabling the aggregation of individual PLN maps for direct analysis and comparison. Hence the Framework proposes two further approaches adapted from System Modelling. The first is that the researcher, based on a rigorous review of the literature, must define the node sets (Mode, Purpose, Endpoint) that feature in the network in advance of going into the field—a form of Abstraction. This is the process which has been detailed in this section so far and summarised in Fig. 12.2.

The second System Modelling approach is the identification and definition of generalised nodes within those Node Sets—referred to as Generalisation. 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 node sets identified and abstracted from the literature (Mode, Purpose, Endpoint), generalised nodes such as Smartphone (as opposed to 'iPhone10') and Face-to-Face (to encompass all non-digital interactions, including with non-humans, e.g. reading a newspaper) form part of the Interaction Mode node set; Gathering Information and Collaborating and 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, for example.

The advantage of a Generalisation approach is that by defining the generalised 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

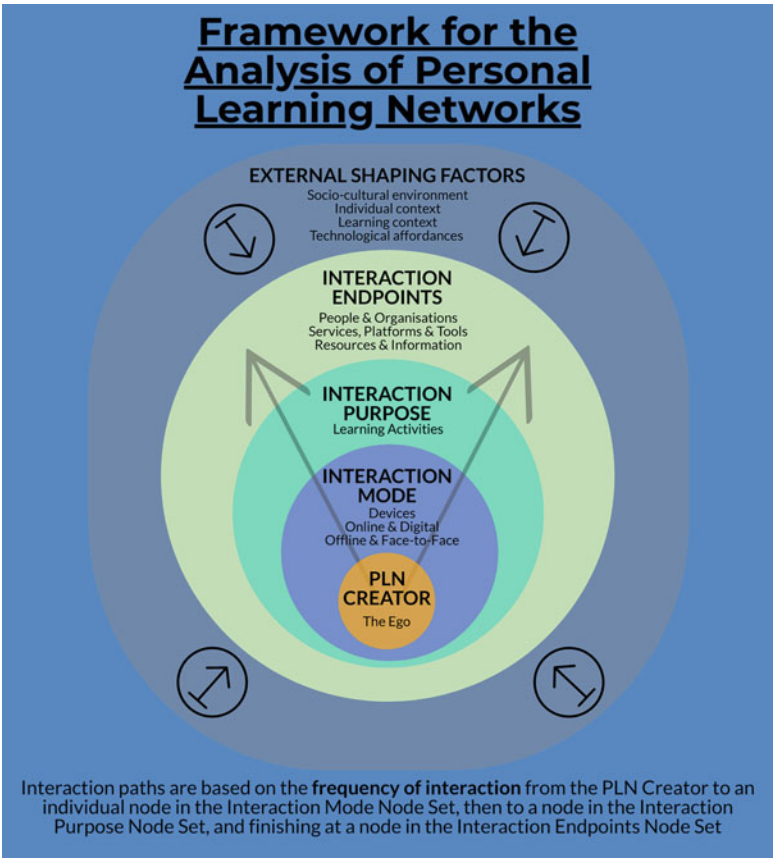

Fig. 12.2 The Framework for the Analysis of Personal Learning Networks

respondents at the network scale. This means that individual PLNs can be directly compared and aggregated. Importantly, it also means that individual PLNs can be aggregated into subsets, according to a range of shaping factors (e.g. life stage, gender, ethnicity. . .etc.), thereby allowing the significance of the effect of these factors on the size and use of PLNs to be statistically analysed.

However, this solution does require considerable research to enable evidence-based choices over what to include/exclude from the network, what abstractions to make and how to generalise nodes in a reasonable way. In addition, 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.

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 abstracted

node sets (Interaction Mode, Purpose and Endpoint). This ensures continuity between the networks of individual respondents, meaning that PLNs at the individual level can be meaningfully and robustly analysed based on the number of nodes and the number of interactions in the network. For group and whole sample levels, at large sample sizes, mean number of nodes and mean number of interactions can be used for statistical analysis. In this way, it is envisioned that the Framework will contribute to bridging the gap between the micro- and the macrolevels of network analysis, and potentially open new possibilities for Networked Learning research.

12.4 Methodology

The Framework was used to inform the design of an online, closed question, quantitative survey, hosted on iSurvey as the sole form of data collection. 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 and browsing; gathering information; communicating and collaborating; creating and sharing; socialising; and gaming/hobbies/sport), to an Interaction Endpoint (too many to list, but which includes a range of humans and non-humans). It is important to note that Post-event Recall was, therefore, a potential limiting factor to this methodology, as was sample bias resulting from the use of an online survey.

In a novel approach to sampling and data collection, this survey was hosted on the 'Learning in the Network Age' MOOC (University of Southampton/FutureLearn https://www.futurelearn.com/courses/learning-network-age, which is open for learner enrolment on a continuous basis). The MOOC was written and produced by this author, in collaboration with others, specifically for this research. This provided a large, self-selecting, non-probability sample from a finite universe of MOOC learners. Furthermore, a unique, bespoke, automated analysis and mapping tool was commissioned to immediately turn the survey results into an individual online PLN map as well as generate the aggregated PLN maps for the whole sample and sample subsets (see Fig. 12.3). Participants could view their own PLN map and view and explore the aggregate maps online immediately on completion of the survey.

The use of the MOOC for data collection successfully returned a sample of 842 individuals from 92 different countries and 20 different ethnicities, but it also meant that further sample bias was inevitable. Clearly those who do not/cannot 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 to undertake self-directed online learning, or who do so using other MOOCs and platforms, or who have no interest in an 'education' MOOC are excluded from this sample.

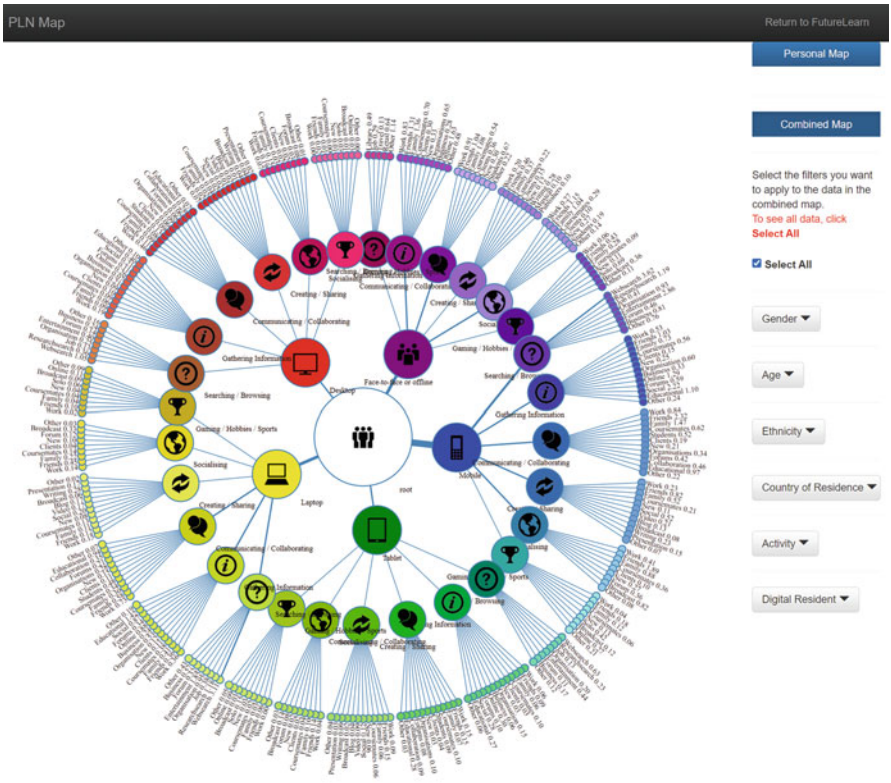

Fig. 12.3 The aggregated PLN map for the whole sample ($n = 842$). Please explore this network map for yourself on: https://mooc.it-innovation.soton.ac.uk/: password: 3563636 > Combined Map > Select All (note: this map remains a live tool and will change with every survey completion)

12.5 Data Analysis

The purposes of the data analysis are to robustly answer the first two research questions (see above) in particular. Data analysis consists of two main methods—the online PLN network maps produced by the bespoke mapping tool from the survey responses (see Fig. 12.3), and the raw .csv survey responses themselves. The raw data was cleaned (of incomplete and missing responses), grouped and coded (for ease of analysis) and where necessary transformed and aggregated (in SPSS), to provide datasets suitable for descriptive analysis and statistical significance testing.

Concerning the three PLN aspects (size, use and interaction preference), aggregated PLNs for sample subsets were visualised using the network map outputs of the bespoke online mapping tool (see Fig. 12.3). Network Size can be seen by the number of nodes in the network map. Network Use is visible as a percentage of total interactions (percentages are displayed as tool tips on-screen with mouse-over hover). Network Preferences are observable as thicker/thinner edges (connections)

between network nodes representing a higher/lower amount of activity along that path. Preference is also visualised in the descriptive analysis of the cleaned raw data as a mean number of interactions (see the bar carts below). Concerning the impact of the six shaping factors on each aspect of a PLN (Mode, Purpose, Endpoint), the data was divided into the relevant subsets and corrected for variance (5% trimmed means) and skew (bootstrapped). Network Size was measured by testing the significance of any differences in the mean number of nodes for a sample subset. Network Use was measured by testing the significance of any differences in the mean number of interactions.

Statistical significance testing was conducted in SPSS using a univariate (1-way) ANOVA test for network size and a multivariate, repeated measures Mixed ANOVA test (2-way) featuring within-subject variables (the mean number of interactions with Mode, Purpose and Endpoint) and between-subject variables (the six external shaping factors) to compare means between different sample subsets. The tests returned significance values (at a confidence level of 95%, $p < 0.05$) for the main effect of the within-subject variable under test, the main effect of the between-subject variable under test and the interaction effect of the within- and between-subject variables. Where Mauchly's test of sphericity was violated, either Greenhouse-Geisser or Huynh-Feldt corrected significance values were used (Field, 2009). This analysis allowed an assessment of the significance in observed differences in the mean number of nodes and interactions to provide a detailed and granular understanding of how a PLN is impacted by the wider context in which its creator resides.

12.6 Results

The network map you can see above (Fig. 12.3) provides a visualisation of the aggregated PLN for the entire sample.

It mirrors the Framework in that the PLN creator (the ego) sits at the centre and interactions proceed in paths 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), where the numbers indicate the percentage of total interactions made along that single interaction path. 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—for example, the edge connecting the group ego to smartphone (blue) is thicker than those to any other Mode nodes (first ring) meaning that phone interactions are the most frequent and therefore also the most preferred.

The MOOC-based data collection methodology resulted in a total sample size, after cleaning and removal of significant outliers, of 842 respondents from 92 different countries and 20 different ethnicities and from the full range of ages, positions on the Digital Resident—Digital Visitor spectrum (White & Le Cornu, 2011) and main

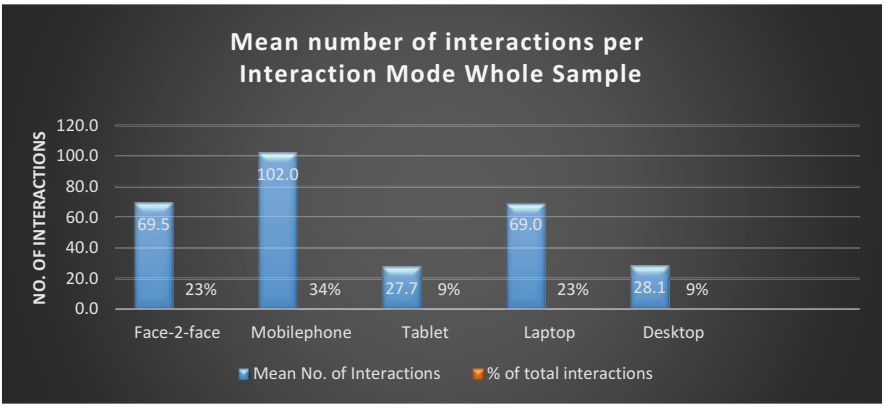

Fig. 12.4 Mean number of interactions and percentage of all PLN interactions by Interaction Mode

daily activities (Working, Studying, Caring and Volunteering or at Leisure/Free time), were returned. In total:

- 58% of respondents were female ($n = 491$);
- 37% were in Early Career (aged 26–45) ($n = 310$);
- 62% were of White ethnicity (White British, American, Irish, Any Other White) ($n = 530$);
- 61% were resident in Europe ($n = 509$);
- 43% classed themselves as a Digital Resident (position 0–3 on the Digital Resident-Digital Visitor spectrum) ($n = 365$);
- 71% were either working or studying as their main activity ($n = 595$).

Excluding significant outliers, results for the whole sample indicates that regardless of who we are, where we live, and our contexts, attitudes and activities (external shaping factors) our PLN will consist of an average of just under 62 nodes (mean network size (untrimmed) = 61.9) from a maximum possible network size of 335 nodes as defined in the Framework. We will use this network to make on average just over 296 interactions every day (see Fig. 12.4—network use). We have a strong preference for digital interaction modes making 77% of all daily interactions through a device and just 23% face-to-face (i.e. non-digital). We also prefer to interact 47% more often with smartphones than with any other mode (network preferences). Our PLNs, and our interactions, are clearly multimodal, but also demonstrate clear preference patterns.

Furthermore, we use our PLN to interact for a range of purposes, with the most preferred being gathering information (28% of all interactions and 22% more often than any other interaction purpose) (see Fig. 12.5).

In addition, we use our PLNs to interact almost equally as much with non-human endpoints (such as social media platforms, educational software (possible sample bias here), web search engines, and forums/chatrooms/blogs) as we do with human endpoints (such as friends, family and classmates) (see Figs. 12.6, 12.7 and 12.8).

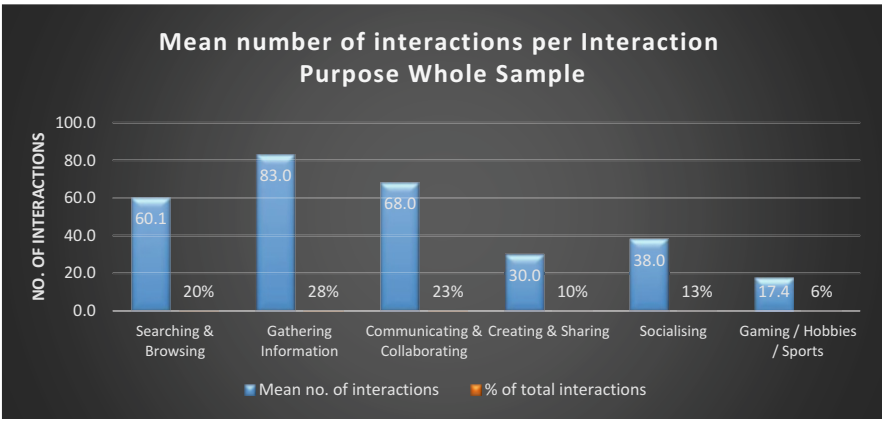

Fig. 12.5 Mean number of interactions and percentage of all PLN interactions by Interaction Purpose

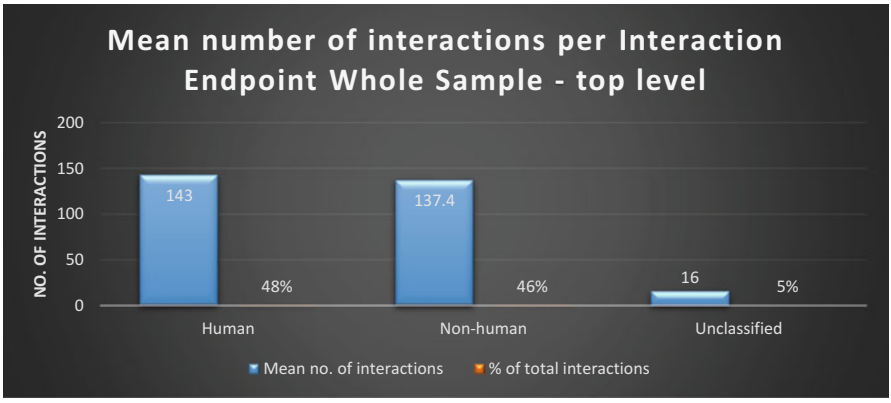

Fig. 12.6 Mean number of interactions and percentage of all PLN interactions with Humans and Non-humans

Across the entire sample there is a clear preference for smartphone interactions for the purposes of gathering information from friends or from social media platforms. This has interesting implications for networked learning design, which will be discussed later.

However, the Framework also allows the whole sample to be analysed according to the six external shaping factors and their associated subsets. These can be tested to see if one's gender, life stage and ethnicity, or where one lives, what one is doing and how one thinks about technology will significantly alter one's PLN. The data allows an analysis of Personal Learning Networks against three main network aspects: Network Size, Network Use and Network Preferences.

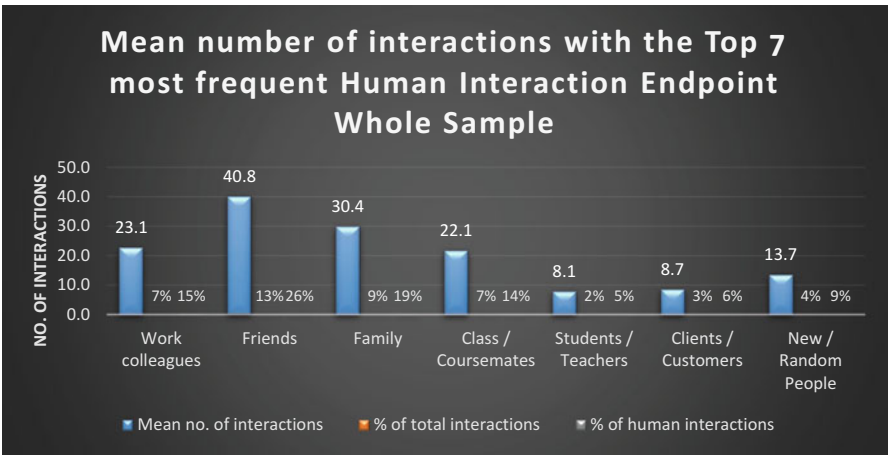

Fig. 12.7 Mean number of interactions and percentage of all PLN interactions with Human Interaction Endpoints

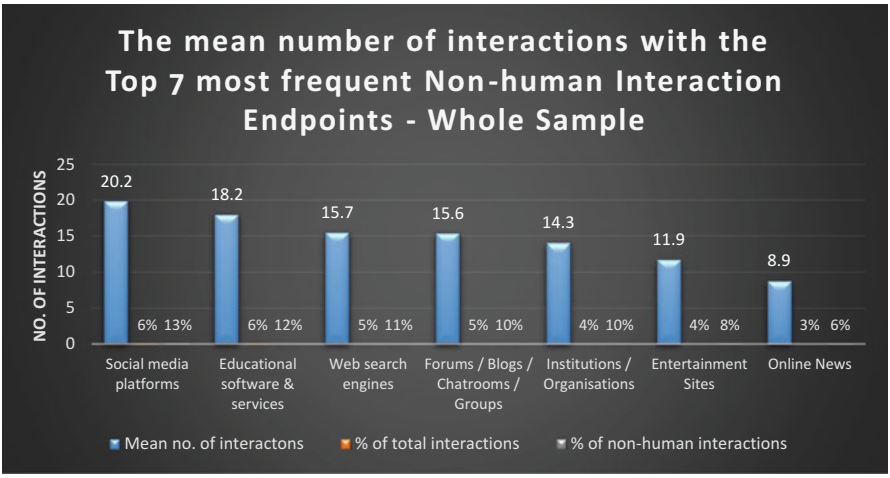

Fig. 12.8 Mean number of interactions and percentage of all PLN interactions with Non-human Interaction Endpoints

12.6.1 Network Size

First, Network Size is measured by the mean number of nodes for each subset. This data was analysed using 1-way ANOVA tests of significance on 5% trimmed means with bootstrapping to test the hypothesis that each external shaping does not impact the size of the network. The results indicate that:

- Gender *does not* significantly impact the size of the network (mean number of nodes: females = 59.2, males = 59.4—transgender and do-not-state were removed for analysis due to low sample size).
- Life Stage *does not* significantly impact the size of the network (mean number of nodes: Childhood (Under 18) = 43; University (18–25) = 59.7; Early Career (26–45) = 59.7; Late Career (46–65) = 60.6; Retirement (Over 65) = 62.8).
- Ethnic Group *does not* significantly impact the size of the network (mean number of nodes: White = 57.5; Black = 61.5; Asian = 62; Mixed Ethnicity = 64.6; All other ethnic groups (inc. Hispanic) = 67.5).
- Region of Residence *does* significantly impact the size of the network (mean number of nodes: Africa = 47.1; Europe = 57.8; North America = 58.3; Oceania = 58.9; Central, Southern and South-eastern Asia = 60.4; Western Asia = 64.1; Latin America and the Caribbean = 71.6; Eastern Asia (China, Japan, Hong Kong, South Korea and Taiwan) = 77.8).
- Main Activity (on the day of reporting) *does* significantly impact the size of the network (mean number of nodes: Leisure/Free time = 51.8; Caring (inc. childcare) and Volunteering = 56.2; Studying = 60.5; Working = 64.4)—simple tests of contrast indicate this significance is only between those at work and those at leisure.
- Attitude to Technology *does* significantly impact the size of the network (mean number of nodes: Digital Visitor = 49.6; Neutral = 56.7; Digital Resident = 67.2).

Hence, while gender, life stage and ethnicity do not affect the size of the PLN that an individual is able to create and use, where the individual lives, what their attitude to technology is, and whether they are at work or enjoying free time will impact the size of their network.

To summarise, the impact of the six external shaping factors that were analysed can be seen in Table 12.1.

Table 12.1 The impact of context on network size

External shaping factor	Impact on the size of a personal learning network (all aspects)
Gender	None
Life stage	None
Ethnic group	None
Region of residence	Very high
Main activity	High
Attitude to technology	Very high

12.6.2 Network Use

Secondly, Network Use is measured by the mean number of interactions (5% trimmed and bootstrapped) undertaken by a subset. This data was analysed using a Repeated Measures Mixed (2-way) ANOVA test of significance based on the combination of main effect of each external shaping factor (between-subject factor) on the mean number of interactions with a Mode, Purpose or Endpoint (within-subject factors) and whether there was an interaction effect between factors. The results indicate that:

- Gender *does not* significantly impact interactions with Interaction Mode (choice of device). However, Gender *does* significantly impact interactions for Interaction Purposes, and with Top-level Interaction Endpoints (see Fig. 12.9), Human Endpoints and Non-human Endpoints.

  Males are more active in the network generally making on average 22% more network interactions daily (female interactions = 270.9; male interactions = 328.2). Although gender does not impact the devices used for interactions, it does affect the purpose of those interactions, with males Gathering Information and Searching and Browsing significantly more frequently (+26% and +33% respectively). Gender also affects with whom/what interactions occur, with males making 19% more interactions with non-human endpoints than females overall, including, for example, 21% more social media platform interactions and 48% more interactions with forums/chatrooms/blogs. Males also make 34% more interactions with their class/coursemates than do females. Interestingly, the *only* category where females make more interactions than males is between student and teacher and/or teacher and student. Overall, gender has a high impact on PLN use.

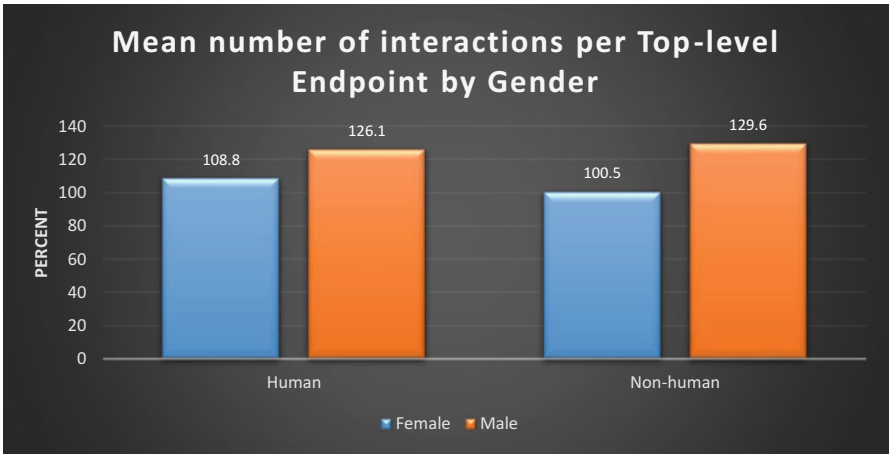

Fig. 12.9 Differences in mean number of interactions with humans and non-humans by gender

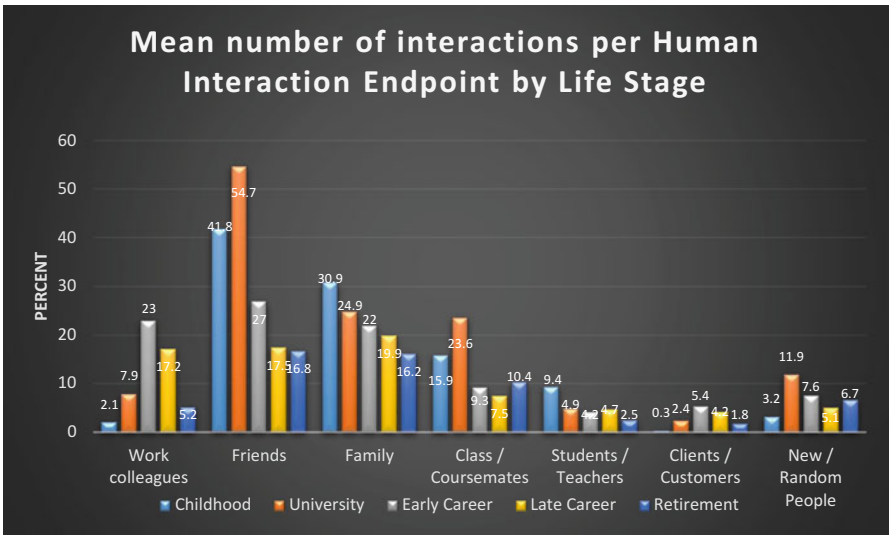

Fig. 12.10 Differences in mean number of interactions with humans by life stage

- Life Stage *does* significantly impact interactions with Interaction Mode (choice of device), for Interaction Purposes, and with Top-level Interaction Endpoints, Human Endpoints (see Fig. 12.10) and Non-human Endpoints. Simple tests of contrast indicated that there were significant differences between the University life stage and the Late Career and Retirement stages, but not between the University stage and Childhood and Early Career.

  Life Stage significantly impacts PLN use in all aspects, with the differences mostly observed between earlier life stages (Childhood, University and Early Career—Under 18–45) and later life stages (Late Career and Retirement—45+). After an initial increase in interactions from Childhood (mean interactions = 289.5) to University (mean interactions = 372.7), the number of interactions undertaken daily decreases steadily over working life and into Retirement (mean interactions = 203). Individuals in the University stage are the most active in their networks, undertaking 25% more daily interactions than the second most active group (Early Career). Those at the University stage also interact considerably more for Searching and Browsing and Socialising than any other life stage (+48% and +57% more than the next highest stages) and interact more frequently with Friends (+31%), Class/Coursemates (+48%) and New or Random People (+55%) than the next most active groups (see Fig. 12.10). Furthermore, those at the University stage interact with social media platforms 46% more often than any other life stage and make 55% more web searches. Overall, Life Stage has a very high impact on PLN use.
- Ethnic Group *does* significantly impact interactions with Interaction Mode (choice of device), for Interaction Purposes (see Fig. 12.11), and with Top-level Interaction Endpoints and Human Endpoints, but *does not* significantly impact

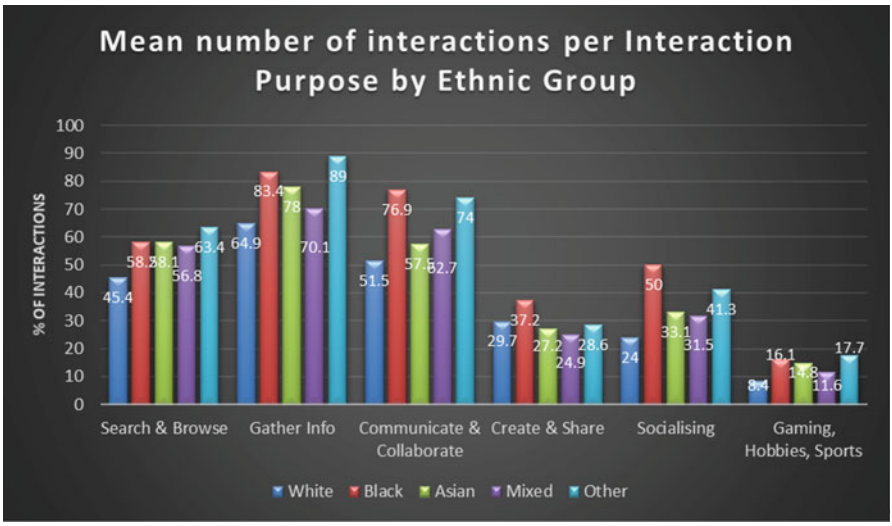

Fig. 12.11 Differences in mean number of interactions for different purposes by ethnic group

interactions with Non-human Endpoints. Simple tests of contrast indicated that there were *only* significant differences between the Other ethnic group (Hispanic, Any Other ethnicity) and the White ethnic group.

Ethnic Group has a limited significant effect on the number of interactions in a PLN, only if the PLN creator is of White ethnicity or Other ethnicity. Those of White ethnicity are the least active of the ethnic groups, making 27% fewer daily interactions than the most active group (Africans) and 10% fewer than the next least active group (Asians). Those of the Other ethnic group make 70% more smartphone and 55% more face-to-face interactions than do the White group. They also interact 44% more frequently for the purpose of Communicating and Collaborating and 110% more for Gaming/Hobbies/Sports than do the White group (see Fig. 12.11). Those of Other ethnicity make 65% more human interactions, including 80% more Family and 181% more Class/Coursemate interactions than their White counterparts. They also make 25% more social media platform interactions and perform 38% more web searches. However, these dramatic results may stem from the far larger sample size for the White group ($n = 529$) than the Other group ($n = 68$), which consequently includes many more individuals from the later Life Stages who make fewer daily interactions. Statistically, as Life Stage has a far larger impact on all aspects of a PLN than does Ethnic Group, the results presented in this section must not be overstated. Overall Ethnic Group has a low impact on PLN use.

- Region of Residence *does not* significantly impact interactions with Interaction Mode (choice of device), for Interaction Purposes, and with Top-level Interaction Endpoints, Human Endpoints nor Non-human Endpoints.

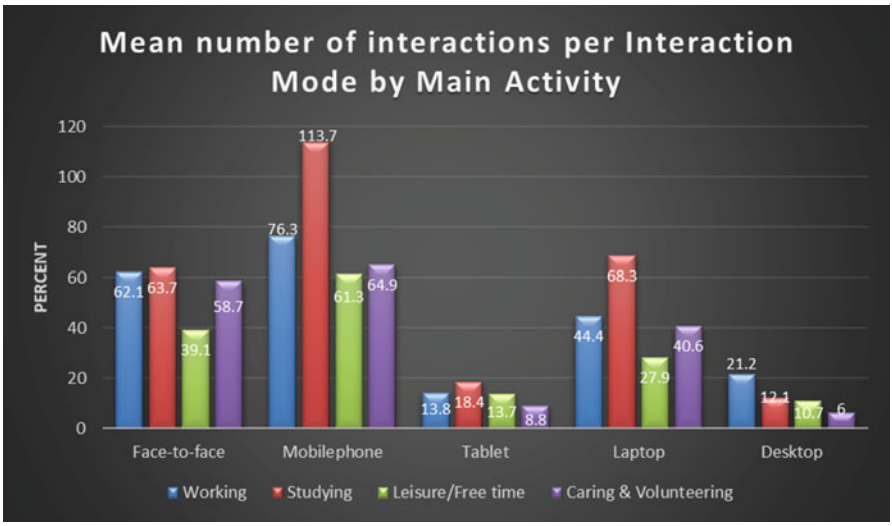

Fig. 12.12 Differences in mean number of interactions for different devices by main activity

Overall, Region of Residence has no impact on the use of a PLN.

- Main Activity on the day of reporting *does* significantly impact interactions with Interaction Mode (choice of device) (see Fig. 12.12), for Interaction Purposes, and with Top-level Interaction Endpoints, Human Endpoints and Non-human Endpoints. Simple tests of contrast indicated that there were significant differences between all main activity groups except the Working and Caring/Volunteering groups.

Those who were Studying were the most active in the network, making 30% more interactions than the next most active group (Working) and 52% more interactions than the least active group (Leisure/Free time). Individuals who were Studying made 49% more smartphone and 54% more laptop interactions than the next most active group (Working) (see Fig. 12.12). Interestingly, those who were Studying made the most number of interactions for the purpose of Socialising of any group, with 103% more daily interactions for this purpose than those who were enjoying leisure and free time. Equally, they interacted 88% more with Human endpoints (inc. 75% more Friend interactions) and 74% more often with Non-human endpoints (inc. 66% more interactions with social media platforms), than individuals at Leisure. Overall, Main Activity has a high impact on PLN use.

- Attitude to Technology *does* significantly impact interactions with Interaction Mode (choice of device), for Interaction Purposes, and with Top-level Interaction Endpoints, Human Endpoints and Non-human Endpoints. Simple tests of contrast indicated that there was a significant difference between Digital Residents and Digital Visitors, but not between Neutral and either Visitors or Residents.

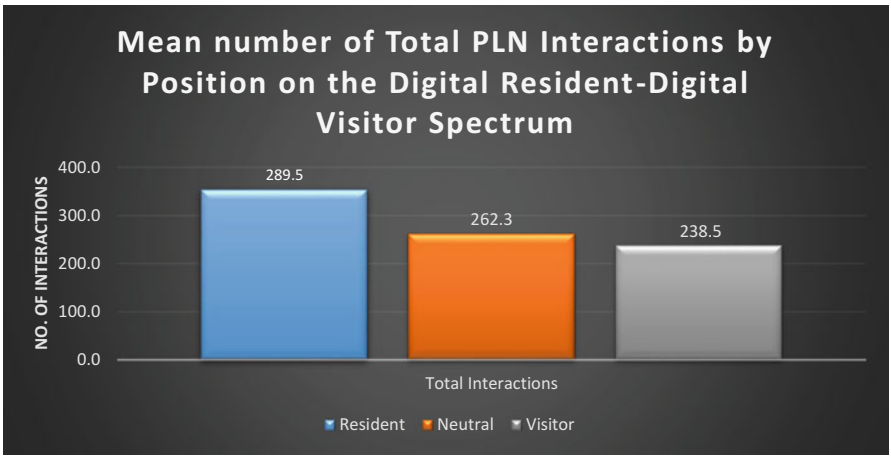

Fig. 12.13 Differences in mean number of total interactions by attitude to technology

Table 12.2 The impact on network use

External shaping factor	Impact on the use of a personal learning network (all aspects)
Gender	High
Life stage	Very high
Ethnic group	Low
Region of residence	None
Main activity	High
Attitude to technology	High

Those with the most positive attitude to technology (Digital Residents) were the most active in their networks, making 21% more interactions those with a more negative attitude to technology (Digital Visitors) (see Fig. 12.13). Notably, Residents made 85% more smartphone and 86% more laptop interactions than Visitors. They also interacted 96% more frequently for the purpose of Creating and Sharing and 119% more for Socialising, making 76% more Friend interactions and 194% more social media platform interactions than Digital Visitors. Overall, attitude to technology has a high impact on PLN use.

To summarise, the impact of the six external shaping factors that were analysed can be seen in Table 12.2.

12.6.3 Network Preferences

In contrast to the results for network size and network use, which show a moderate to high degree of variation between sample subsets across all aspects of the network (Mode, Purpose, Endpoints) resulting from the effect of each of the external shaping factors, Network Preferences are much more homogenous in most cases.

Firstly, the descriptive statistics (including the bar charts) allow the identification of interaction patterns within and between subsets. The analysis indicates that regardless of all Gender, Life Stage, Ethnic Group, Region of Residence, Main Activity and Attitude to Technology subsets, smartphone interactions are *always and by far* the most preferred Mode (the only exceptions being for people in Retirement or those living in Oceania who prefer face-to-face interactions the most). This striking pattern clearly indicates how embedded, central and important the smartphone is to daily interactions and the vital role it plays in a PLN. Smartphone interactions are normally followed in preference by either face-to-face or laptop interactions. Desktop and tablet interactions are *always* the least preferred Modes. These almost universal preference patterns suggest that our PLNs are multimodal, but that our preference for specific modes is consistent across very diverse groups.

Equally, for all the subsets examined, Gathering Information was the most preferred reason for interacting with a PLN for all subsets except Childhood (who prefer Communicating and Collaborating). This was normally followed by either Searching and Browsing or Communicating and Collaborating. These three interaction purposes constitute between 69% (Childhood) and 80% (Digital Visitor) of all interactions undertaken by any sample subset. The higher this proportion, the narrower the range of interactions undertaken. Creating and Sharing and Gaming/Hobbies/Sports were almost always the least preferred reasons for interacting (except for those in Retirement, those of White ethnicity and those resident in Africa or Eastern Asia who Socialise less than they Create and Share). Again, these similar preference patterns for why diverse individuals choose to interact indicates a surprisingly high level of consistency across groups.

Turning to Human and Non-human endpoints, the majority sample subsets preferred to interact more with Humans than with Non-humans, although there was greater variation here than with the other aspects of a PLN. The exceptions to this pattern are Males; those in Retirement; those of Asian ethnicity; those living in Africa, Western Asia and Central, Southern and South-eastern Asia; those Studying; and Digital Residents. However, this only amounts to 8 of the 27 subsets that prefer non-human interactions (30%). Furthermore, in most cases, the preference was for Human and Non-human interactions almost equally (e.g. see Figs. 12.6 and 12.9)—notable exceptions being those in Childhood who much prefer Human interactions (+39%) and those in Retirement who much prefer Non-human interactions (+27%). This interaction pattern indicates the symmetry between and equal importance of the Human and Non-human actors in the network (as suggested by Actor Network Theory).

In terms of the specific Human endpoints, the results indicate a greater degree of homogeneity again. For all the sample subsets the preference was always for interactions with Friends followed by Family (except for those in Late Career and those Caring and Volunteering, who prefer Family interactions above Friends). Similarly, with the Non-human endpoints, the same range of endpoints repeatedly proved the most preferred, with just seven endpoints making up the Top-5 most preferred Non-human endpoints of all sample subsets. These were:

- Social media platforms
- Educational platforms (e.g. a VLE or MOOC provider—hence some sample bias here)
- Institutional/Organisational platforms
- Web search engines
- Forums/Chatrooms/Blogs
- Entertainment sites
- Online news

However, when it came to the actual order of preference within the Top-5 of any individual subset, there was much greater variety in preference patterns. Very broadly speaking, social media platforms were overall the most popular Non-human interaction endpoint, recorded as most preferred in 11 of the 27 subsets (41%).

In summary, clear similarities in interaction preference patterns can be seen in the device we like to choose, the reasons why we interact and the people with whom we interact. Less clear, but still observable similarities can also be seen for interaction preference with non-humans and the preference for non-human over human endpoints. Overall, Network Preference shows a remarkable similarity across diverse groups.

12.6.4 HE Students

It is now possible to build up a detailed picture of the PLN of a typical HE student by combining the results for University Life Stage and Studying Main Activity in particular, along with the other shaping factors. The typical HE student has the most active PLN of any point in their life. If that student is male, he will be more active in the network than his female counterpart; if African or Asian more active than if European; if resident in Asia more active than if living in North America; if positively inclined towards technology more active than if having a negative attitude to technology. The typical student interacts most with their smartphone, followed by their laptop. They undertake most of their interactions for Gathering Information, Searching & Browsing and Communicating & Collaborating, with their preference being for interactions in that order. However, they also undertake markedly more interactions for Socialising than at any other point in life. The typical student prefers to interact more with non-humans than with humans, although this may not remain true for female students. Human interactions with Friends and Class/Coursemates are more numerous than at any other life point and more numerous than when they are working or enjoying free time. The same is true for interactions with New or Random people. The typical student will also have more interactions with social media platforms and web search engines than at any other point in life.

Furthermore, there is an observable difference when the typical student transitions from Childhood to University, and between mainly studying and mainly working. When moving from Childhood, the PLN shows a considerable increase in size and the number of smartphone, laptop and tablet interactions increase massively too. Face-to-face and desktop interactions decline. Equally, a preference for Communicating and Collaborating is replaced by Gathering Information and Searching and Browsing, while the amount of Creating and Sharing also increases dramatically. Interactions for Gaming/Hobbies/Sports declines sharply. A preference for Non-human interactions replaces a preference for Human ones. Interactions with Friends, Class/Coursemates and New or Random people increases noticeably, while interactions with Family and Teachers decline considerably. Social media platform interactions rise dramatically. Together this demonstrates the importance of mobile-friendly online learning and Social-constructivist, Connectivist and peer learning pedagogies.

In addition, when transitioning from Studying to Working, overall interactions decline and the network becomes less active. Interactions with all Modes decline, except desktop use which rises considerably. Equally, Socialising and Searching and Browsing decline sharply, while Communicating and Collaborating increases. Human endpoints return to being the most preferred interaction endpoint, while naturally, Class/Coursemate interactions fall and interactions with Work Colleagues rise dramatically. Together these changes before and after University indicate that HE students are the most active networkers of all life stages and that people and technologies are deeply intertwined in their everyday student lives (as suggested by Sociotechnical Theory).

Finally, it is interesting to consider those Modes, Purposes and Endpoints with which HE students undertake the fewest interactions. Desktops are a minor part of a typical student's PLN and Gaming/Hobbies/Sports are not popular reasons to interact. More interestingly, interactions with university teachers are very low, so too are interactions with libraries and library systems (fewer interactions than in Childhood and Retirement), presentation software, such as Powerpoint (fewer interactions than all life stages except Retirement), and writing software, such as Word (fewer interactions than Early Career and Retirement).

In summary, the PLN of a typical University student mainly involves interactions with smartphones to gather information from friends and social media. Their PLNs undergo growth, important changes to usage and shifts in interaction preference patterns on entering University. However, they are underused for important educational activities such as interacting with teachers, libraries, and presentation and writing software. This suggests potentially fertile ground for further implementing networked learning pedagogies into HE teaching and learning design. Indeed, HE Institutions and networked learning educators are critically placed to nurture and foster these PLN changes in positive educational directions, while simultaneously taking great care to mitigate the impact of any differences in size, use and preference present in the PLNs of diverse individuals. This is all the more critical since the Covid-19 pandemic and the emergency transition to online delivery.

12.7 Conclusion

The Framework for the Analysis of Personal Learning Networks presented here has helped shed robust, empirical light on the size, use and interaction preferences visible in PLNs. The *size* of a PLN is impacted by where we live, what we are doing and what we think and feel about technology, but not by our gender, stage of life or ethnic group. On the other hand, the amount of *use* we make of a PLN is much more heavily influenced by our gender, life stage, main activity and attitude to technology, but much less so by our ethnicity and where we live. The external shaping factors, in most cases, impact the number of interactions we choose to make with different devices (inc. face-to-face). They also affect the number of interactions we make for different purposes, as well as the number of interactions we choose to have with people and things.

In contrast, the interaction *preferences* we express through our PLN interactions are considerably less impacted by the six external shaping factors that were analysed. Regardless of gender, life stage, ethnicity, region of residence, main activity or attitude to technology, we tend to prefer to use devices in roughly the same ways to undertake interactions for similar purposes by interacting with similar human and non-human endpoints. In short, how diverse people from across the world build and use their PLNs shows some variation in size, considerable variation in the amount of use, but interesting homogeneity in interaction preferences.

In addition, PLNs undergo changes in size, use and preference patterns for HE students, but these changes are not necessarily for formal educational purposes. There is an opportunity here for HE institutions (HEIs) to foster network growth and use in positive ways. The results and analysis made possible by the Framework provide educators with a degree of confidence and a body of evidence to apply when designing networked learning activities, courses and programmes in the future. This is important because, in a future HE landscape dominated by ever-increasing amounts of online and blended learning, HEIs now have an increased responsibility to nurture student's use of and engagement with networks and technologies in educationally effective ways.

It is not the intention of this chapter to discuss in any further depth the implications of these findings, as the author would prefer to leave that to you, the reader. To some readers broad themes may have become visible, including the scale and extent of the sociotechnical reality in which we are embedded, the multimodality of our daily interactions, and the impact of our individual contexts on the size and use of our PLNs. Others may have found themselves thinking about the impact the results may have for teaching and Networked Learning design and how the findings can help educators to tailor networked learning activities to mitigate against some of the differences in PLNs and/or exploit some of the similarities and patterns identified, in order to provide even more effective networked learning to HE students. Many other thoughts may have occurred to many other readers too. This author would very much enjoy hearing those thoughts and would encourage you, the reader, to share them by connecting via N.S.Fair@soton.ac.uk, @nic_fair, nicfair.co.uk, or linkedin.com/in/nicfair and adding a new node to your PLN.

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Chapter 13
Conclusion: Conceptualizing and Innovating Education and Work with Networked Learning

Nina Bonderup Dohn, Stig Børsen Hansen, Jens Jørgen Hansen, Maarten de Laat, and Thomas Ryberg

This book is focused on new ways of conceptualizing and innovating education and work through networked learning. The body of the book is structured into three main parts, each addressing a different aspect of the overall focus. The parts are: *Professional Learning*, consisting of three chapters; *Learning Networks' Development and Use of Digital Resources*, also with three chapters; and *Innovating Networked Learning*, including five chapters. A further chapter, preceding the main parts, presents an overview of the way the term 'networked learning' has been used in papers presented at the International Conference on Networked Learning (NLC) since the early conferences. In this way, the chapter works to set the stage for the contemporary discussions of networked learning in the main parts.

In this final chapter, we articulate a set of themes emerging from the book's chapters as issues to be investigated in the future. In the first section, we present a summary of the main points made in each of the individual chapters. This serves both as a guide for the reader interested in specific aspects of networked learning and as a basis for our identification of emerging themes. In the second section, we highlight these emerging themes, focusing on *design for collaboration in networked*

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learning; complexity of online networked learning in physically located environments; *the nature of learning and cognition*; and *politics and ethics in networked learning*.

13.1 Summaries of Issues and Perspectives in the Chapters

13.1.1 Intro

The book's first chapter is *Tracing the Definition of Networked Learning in Networked Learning Research* by Murat Öztok. It serves as an intro to the book—and to the field of networked learning research—as it provides a qualitative outline of how the term 'networked learning' has been used by participants at NLC over the years. Öztok constructs the outline through a discourse analysis of all papers explicitly using the term in the conference proceedings from 2004 to 2018 (266 papers out of 412). The analysis finds anchorage in the initial definition of networked learning put forward by Goodyear et al. (2004); in particular in the role which this definition accords to the three concepts of *technology*, *connections* and *network*. Öztok highlights that networked learning researchers consistently approach technology as a means for mediating connections (rather than something to be used for its own sake), that connections are, in general, theorized from a range of socioculturally inspired learning theories, and that, consistent with this, the overwhelmingly majority of papers associate 'network' with community. Öztok points to areas which he finds underdeveloped in the papers, such as the conceptualization of learning and alternative frameworks for understanding what networks are. He proceeds to discuss the recent revised definition of networked learning advanced by the Networked Learning Editorial Collective (2020). He argues that the definition, though providing clarity on a number of counts, still bypasses the fundamental questions of what learning is and what networks are and fails to adequately reference social justice and equity issues. Similarly, he points to ways in which the remaining chapters in the present book provide new perspectives on the central concepts of technology, connections and network. The chapter is a valuable contribution to the book's overarching theme of *conceptualizing education and work with networked learning*, both for the overview it provides of past and present understandings of networked learning, and for its articulation of questions that are still not answered, despite their significance for the design of appropriate networked learning possibilities.

13.1.2 Professional Learning

Part 1 addresses the book's overarching theme of *conceptualizing and innovating education and work with networked learning* within the area of professional learning. The focus is on the facilitation of educators' professional learning, and—

through this—on the resulting possibilities for development of educational programmes. The three chapters thus provide insights on innovating education in a dual perspective: They take on the issue of designing for learning at the secondary and tertiary level (where the educators teach) in the context of the educators' innovative work on developing designs.

The Part opens with a chapter authored by Daniela Gachago, Jolanda Morkel, Izak van Zyl and Eunice Ivala, *From Design Thinking to Design Doing: Experiences from an Academic Staff Development Programme for Blended Course Design*. The authors' reflection on how to promote a design thinking approach during a professional development course for university lecturers on blended learning leads them to key insights for networked learning. They argue that design thinking promotes problem-solving and interdisciplinary collaboration aimed at tackling complex or wicked problems. This approach is explored as an alternative to professional development often driven by supply-based solutions during one-off seminars taught in a one-size-fits-all manner. The authors report a positive reception of the course by their participants who engaged actively in blended course design and experimentation in a playful manner. The study also uncovered several concerns, one of which was the tension between development of creative agency and direct application in practice. This finding emphasized the need for creating a safe place for experimentation and collaboration. The chapter is significant for networked learning, both in providing a concrete example of a design thinking approach within professional learning and in pointing out the concerns of trust and creativity which will be relevant to innovative educational formats in general.

The second chapter is focused on *Designing for Boundary Crossing and ICT-Based Boundary Objects in Dual VET*. In this chapter, Marianne Riis and Anna Brodersen explore teachers' use of ICT as mediating artefacts for boundary crossing activities in the context of Danish Vocational Education and Training (VET). They argue that networked learning is a relevant perspective when promoting connections between learning at school and the workplace. Yet knowledge of pedagogical use of ICT in this context is limited. Riis and Brodersen used interviews and design workshops to explore and refine a design model to facilitate teachers' planning for boundary crossing. They found that the teachers use a range of ICTs, but that their potential for boundary crossing is not fully utilized. The participating teachers perceived the design model as useful, but traditional transfer-based pedagogies seemed to dominate their thinking. Teachers further expressed a need to know more about ICT and its affordances for boundary crossing. The chapter contributes to networked learning research in conceptualizing networked learning's potential in boundary crossing and transfer as well as highlighting hindrances in practice as regards realizing this potential.

No Size Fits All: Design Considerations for Networked Professional Development in Higher Education is the third chapter in this Part, written by Nicola Pallitt, Daniela Gachago and Maha Bali. In this chapter, the authors develop a framework of design considerations that can be used to analyse, contrast and design networked professional development in the context of higher education. A networked perspective is used to focus on relationships and collaboration while promoting openness,

learner collaboration, and self-directed and authentic learning as part of professional development. Reflecting on their own practices as academic developers, the authors challenge the one-size-fits-all approach, often at play in practice if not in theory, in professional development. Instead, they promote recognition of disciplinary and institutional contexts. Their research leads them to identify three main tensions (advocacy and usefulness; choice and agency vs. institutional expectations and rules; and certification, volunteerism and unpaid labour), which they discuss. These tensions are important to take note of in educational design for networked learning in general, as are the chapter's insights on the dimensions of course design and the considerations applying to each of them.

Overall, design thinking and doing emerge as a central theme in this section on professional learning. Rather than providing a professional development course focused on the delivery of content, the chapters advocate an active learning pedagogy based around notions of design. The design approach is a way to actively engage professionals in developing their own practices with a focus on developing agency and ownership rather than following strict institutional expectations or rules (Pallitt et al., Chap. 4). Such a design approach helps to keep professional learning authentic and centred around issues experienced by practitioners in their practices. The networked approach supports professional learning in being collaborative and fosters a culture of community learning and identity development through a process of becoming (Riis and Brodersen, Chap. 3). It was found that this process is best served in a safe and playful environment combined with the need to develop skills to foster creative agency (Gachago et al., Chap. 2).

13.1.3 Learning Networks' Development and Use of Digital Resources

The book's overall theme of *conceptualizing and innovating education and work with networked learning* is concretized in Part 2 for learning networks, with a focus on collaboration on the development and use of digital resources. The long-term aim of the collaboration is facilitation of learning and empowerment for the target group of the resulting digital resources. Between them, the chapters investigate learning networks in work within a single institution, across several institutions, and outside the formal educational system.

In their chapter *Investigating Teachers' Use of Educational Tools as a Collaborative Space for Networked Learning*, Morten Winther Bülow and Rikke Toft Nørgård present a study on teachers' planning and remix practices as regards creating educational materials with the use of an educational tool, CourseBuilder. Teachers' planning practices are design practices, what Goodyear (2015) called *preactive teaching*. This engages a planning mode of thought where tools and methods are put into action to create designable things such as educational materials. Bülow and Nørgård argue that participating in the collaborative design space of

CourseBuilder provides teachers with opportunities of (1) shaping their own teaching practices, (2) producing reflective, meaningful and valid educational materials, while (3) being supported in their professional development and reflection. However, the case study showed that the collaborative design space did not in itself sufficiently support teachers in changing their collaborative course planning patterns. The chapter points out that it is not enough to offer tools and opportunities for collaboration; it is necessary to develop frameworks that support collaboration at a deeper level. This, in turn, requires a better theoretical understanding of how and why teachers collaborate as regards educational materials and how this can be utilized to develop a meaningful collaborative design space. The study is significant for Networked Learning in that it investigates teacher's collaboration on knowledge construction of course planning in a networked learning community. It shows the potentials of networked course design. Furthermore, the teachers' participation led to an evaluation of a specific learning tool and learning environment as potentially supportive of networked learning.

The chapter by Ann Hill Duin, Isabel Pedersen and Jason Tham, *Building Digital Literacy Through Exploration and Curation of Emerging Technologies: A Networked Learning Collaborative* is a study of the use of the repository *Fabric of digital life* in relation to instructor discussion, instructional development and students' building of digital literacy. The *Fabric of digital life* tracks the emergence of embodied computing platforms and is both a collection of emergent technologies and a learning database with instructional resources with the aim of supporting students in developing digital literacy. The background for the development of the repository is the recognition of a large gap in students' digital literacy: Despite consuming a growing range of technologies, students appear unaware of their lack of control over the impact that networking, devices, data, and processes have on their lives. This gap is addressed through the project *Building digital literacy* which is a networked learning collaboration utilizing the *Fabric of digital life*. The chapter reports on the process of building the *Community for collective intention* with instructors and research assistants from different universities together with archivists and editors from the Fabric. This Community aims to foster instructional development and to promote connections between people, sites and contexts. The chapter's relevance for Networked Learning can be seen from both a learning perspective and a development perspective. From a learning perspective, students can benefit from interacting with the collections of immersive technologies as a means to building digital literacy. From a development perspective, instructors and researchers worked together to design resources in order to shape student journeys in learning.

Lucila Carvalho, Pippa Yeoman and Júlia Carvalho present a study of the learning network *Fast Food da Politica* in their chapter: *It's Your Turn! Supporting Social Change Through Networked Learning and Game Playing*. The network is a non-profit Brazilian organization designed to promote social action in Brazil, focusing on empowering people to take hold of their own futures. The network is inspired by Freire's pedagogy and aims to educate people to practice freedom and, in particular, to participate in their life practices in ways that contribute to transforming their own world for the better. The goal is to engage people in conversations about

political systems and thus to deal critically with reality. The case study examines the organization as a learning network at three levels: its strategic vision (meso level) supported by specific social arrangements and fun game tasks (micro level) to address the social, political and economic situation of Brazil (macro level). The game tasks of the learning network concern the mechanisms of the Brazilian political system and are designed to bring many different people together to play, discuss and learn. The focus of the case study is understanding how the games support people's engagement in learning. The relevance to Networked Learning is twofold. First, the chapter investigates a learning network based on networked learning values of participation, co-creation and knowledge building. Here, the study offers insights on how game elements support participation within the learning network. Second, the chapter utilizes the analytical framework of Activity-Centred Analysis and Design (Goodyear & Carvalho, 2014) which identifies key structural elements in a learning network, to explore how this particular learning network operates and how the different design elements align in practice.

13.1.4 Innovating Networked Learning

Part 3 contributes to the book's overall focus on *conceptualizing and innovating education and work with networked learning* through a focus on how networked learning itself can be innovated and (re)conceptualized within education and work. The Part progresses from investigations of specific new technology-mediated educational formats to the development of more general perspectives on networked learning. The latter centres on novel conceptualizations of the learning process, while also addressing the implications which these conceptualizations hold for innovating networked learning.

The first chapter in Part 3 is *Networked Practice Inquiry: A Small Window on the Students' Viewpoint* by Maria Cutajar. The chapter reports findings from a small-scale study of students attending the course *The digital dimension of community action and development* which was part of an encompassing Master level study programme. The course adopted a Networked Practice Inquiry approach as its pedagogical foundation with the intention of leading students away from traditional face-to-face lecturing towards more activity oriented networked learning. This was undertaken with the hope of motivating students to adopt an exploratory attitude for constructing and developing disciplinary knowledge. Two students' lived experiences were subsequently studied through an interpretative approach leading to insights into tensions experienced by the students. On the one hand, students were motivated by critically analysing, reflecting and rethinking aspects of their work and life and saw a value in group tasks and peer learning interactions. However, they were also overwhelmed by the demands and pointed to the pressure, stress and wariness peer interactions can create. Further, they felt vulnerable and uneasy about having to share thoughts and enter into dialogue with others, in accommodation to the explicit aspirations of the course's pedagogical underpinnings. The chapter is an

interesting extension of Cutajar's previous work (Cutajar, 2018) and raises issues also pointed out by Hodgson and Reynolds (2005) and Perriton and Reynolds (2014) concerning how pedagogical demands or requirements around openness, dialogue, sharing and collaboration do not always sit comfortably with students, i.e. students may feel unfamiliar with and disturbed by a networked learning pedagogy. Thus, the chapter contributes to networked learning research by exploring also the flip-side or the darker sides of valued networked learning principles, such as dialogue and collaboration.

The next chapter in this Part is entitled *The Blockchain University: Disrupting 'Disruption'?* Here, Petar Jandrić and Sarah Hayes explore the mission of Woolf University, a currently dormant attempt at making the first blockchain-powered university. The title of their contribution expresses both hope and pessimism regarding the initiative. Their pessimism finds its expression by framing the initiative as another avenue of platform capitalism, promising to disrupt existing industries. This is known from e.g., AirBnB upending the accommodation rental market, but with untoward and often unforeseen consequences. Alternatively, Woolf University can be framed as an attempt at bringing to life some of the visions that Illich formulated in *Deschooling Society*. Illich was critical of key institutions and took the school as a paradigmatic example of a social structure that needed challenge and reform. His vision was fairly specific and arguably is mirrored in the design of Woolf University. Illich's vision was set apart from prominent, contemporary platforms by being highly critical of the capitalist setting of the provision of education and other fundamental goods. At the time of writing, it remains an open question whether Woolf University will instantiate some of the unfortunate consequences of platform capitalism, such as precarious forms of employment, or it will achieve what Jandrić and Hayes join others in calling the oldest idea in Higher Education: scholars supporting each other. Either way, the blockchain university is certainly an innovative networked learning format and the chapter contributes a timely analysis of the potentials and risks this format faces.

In the chapter *A More-than-Human Approach to Researching AI at Work: Alternative Narratives for Human and AI Systems as Co-workers*, Terrie Lynn Thompson and Bruce Graham discuss different conceptualizations of the new types of work situations which integrate human and AI systems. The authors argue that networked learning scholarship needs to understand, firstly, the new competencies that are developing as workers learn to work with AI and, secondly, the implications for professional learning within the workplace and higher education. In the current AI-debate, little attention is paid to the fine-grained details of how AI is adopted in practice and how it affects what Thompson and Graham term networked work-learning. Furthermore, much of the AI-debate is wrapped in a basic Human versus AI narrative, reinforcing binaries of human vs. machine, worker vs. AI, and human cognition vs. artificial cognition. In these accounts, workers and AI systems are portrayed as connected, yet separate. To counter these narratives and to strengthen the analytic attention to the complex interactions unfolding between AI systems, workers, policies, and public narratives, Thompson and Graham suggest a more-than-human approach. This includes viewing networked work-learning practices as

distributed across multiple networks and a series of complex social and material (digital) relations. The chapter is a very welcome contribution to an area within Networked Learning that sparked intensive debate during the conference and in the final plenary but has received less attention in writing. Similar to discussions of Learning Analytics (De Laat & Ryberg, 2018) networked learning researchers seem to shy away from engaging empirically or design-wise with examples of AI. The more-than-human approach proposed by Thompson and Graham serves as a good entrance point into future empirical studies of AI in work and higher education.

Magda Pischetola and Lone Dirckinck-Holmfeld explore a set of background assumptions at work when thinking about learning in their chapter *Exploring Enactivism as a Networked Learning Paradigm for the Use of Digital Learning Platforms*. While the authors are sympathetic towards social constructivism for its emphasis on the importance of discovery through social interaction, they argue that enactivism is called for to overcome a dualism between body and mind. They show how this resonates with several aspects of more recent approaches to cognition as extended, but argue for relying primarily on the work of Varela and Maturana to propose a theoretical framework that sees cognition as situated, embodied and enacted. This contrasts with e.g., abstract mental modelling being the central theoretical term when understanding learning. The many different kinds of things that make up the environment of an organism emerge clearly as that organism's networked architecture of learning. On this background, the authors analyse data from a study on the introduction of a new learning platform. They single out participatory workshops as a crucial avenue for making the learning platform a genuine part of the teachers' environment, rather than an adversary or being in their way. By engaging in what is called enactive modelling—which contrasts to mental modelling—teachers not only learn by doing, but the 'world is done' through their actions. This constitutes an important new perspective on Networked Learning, both as regards its conceptualization as embodied and 'enworlded' and as regards the resulting implications for how to innovate networked learning in practice.

The final chapter in Part 3 is *A Framework for the Analysis of Personal Learning Networks*. Here, Nicholas Fair explores a key theme within Networked Learning research, namely that of conceptualizing, understanding and analysing networks in the context of learning. His innovation of networked learning is anchored in a new method for network analysis. Two guiding ideas inform the development of this method. First, humans find themselves in a myriad of intermingling online and offline networks of very different character. Second, a person's set of networks—their personal learning networks (PLN)—are carried over as learners enter new institutional contexts, such as higher education. Fair explicates how the concept of a personal learning network is designed to overcome challenges with studies of networks at both micro- and macrolevel: The method allows for comparison of the otherwise highly contextualized networks of individuals, while offering a way of describing how personal preferences influence network behaviour—a challenge with macrolevel network studies. Networked interactions are analysed in terms of interaction mode, interaction purpose and an interaction endpoint. Based on quantitative data from students participating in a MOOC (*Learning in the Network Age*), Fair

shows how a PLN mapping tool can visualize generalized personal learning networks and describe e.g., size and interaction preferences. Further, PLN data can point to how for example gender, life stage and attitude to technology impacts personal learning networks. Understanding the character of personal learning networks can prove crucial for future design for learning in higher education. At present, the data suggests that existing PLN are underused for important educational activities, such as library use and interaction with teachers.

13.2 Emerging Issues for Future Research Within Networked Learning

In this second section, we look at issues emerging for future research within networked learning. These issues emerge from points taken up in the chapters, as summarized above, and indeed from discussions at the 12th International Conference on Networked Learning (NLC2020) itself, which formed the outset for this book.

13.2.1 Design for Collaboration in Networked Learning

Design for collaboration is both a theme in this book and an emergent theme for future research. Being able to collaborate to solve problems together, as well as engaging in relationships that provide access to such collaborations, have become fundamental to keep up with change and innovation around us. The notion of learning in the wild has been put forward to describe such collaboration in informal learning that happens outside formal classes. This learning is often spontaneous and can be organized in public digital social media or open practices where users 'pose questions and other users provide answers, where crowds of participants comment, correct, agree and/or argue about the answers' (Del Valle et al., 2018, p. 158). The recent community discussion on the definition of networked learning also emphasized the need for collaboration and expressed the importance of human relationships to foster learning as well as a commitment to collaborative inquiry and joint action in the face of shared challenges (Networked Learning Editorial Collective, 2020).

The chapters in this book thematize collaboration in different ways and together represent various approaches to a pedagogy of design for collaboration. From this perspective, the overarching question that the chapters provide different answers to is: How can we design for collaboration in ways that increase good and effective collaboration practices? An important emerging issue for Networked Learning is the need for frameworks to support our theoretical understanding of what constitutes

good and effective collaboration as well as to inform designs targeting collaboration in practice. Below we point to six central questions that we see as systematic design aspects which must be taken into account in the development of such frameworks:

- Why collaborate—what are the goals and focus areas of collaboration?
- Who collaborates—who are the participants in collaboration?
- What skills are needed—what are collaboration skills?
- How can collaboration be supported—what supports collaboration?
- Which tools afford collaboration—what are collaboration tools?
- Where should collaboration take place—which environments and design spaces afford collaboration?

Collaboration is a defining feature of good practice in networked learning because of its many potentials. The question of 'Why collaborate' thus has multiple answers: Collaboration has the potential of enhancing problem-solving and innovation; of benefiting the development of social relations; of connecting people and information; of creating a unity of purpose between people; and of supporting the evolvement of shared language, knowledge, and values. From an educational perspective, a key aspect of collaboration is the more general potential for supporting the participants' mutual and individual learning. Fundamental to realizing this general potential is developing designs for collaboration practice focusing on enabling others to learn. An example of such a design is found in Chap. 2 by Gachago et al. Here, the authors discuss how being engaged in active collaborative learning fosters joint problem-solving, and, more specifically, how their approach to design thinking promotes educators' interdisciplinary collaboration aimed at tackling complex or wicked problems.

Another answer to the 'why collaborate' question is the goal of supporting designers in developing their design practice through their engagement in a collaboration practice. That would be the answer from the designers in Chap. 6 by Duin et al. This answer can, however, be further queried as regards purpose: why is developing design practice significant—what is the focus area and long-term goal? In this specific case, the designers (who were also the researchers) invited instructors from two technical communication societies to collaborate with the aim of developing an understanding of digital literacy and to utilize this understanding in creating instructional units to support digital literacy. Students were also asked to engage in different ways: to examine the resulting learning objects, to contribute by archiving single objects and to curate new collections. The perspectives of these different participants will provide at least two different answers to the further query of why developing design practice is significant. In the perspective of the learners, the goal is the benefits to their learning that the resulting designs will allow. In the perspective of the designers as researchers, the goal is to investigate how a learning community can be developed and supported.

The answer to 'Why collaborate' can also be rooted in more elaborated pedagogical theories. Chapter 7 by Carvalho, et al. describes a learning network designed to promote social action in Brazil that is inspired by Freire's pedagogy. The goal of the learning network is to engage people in conversations about political systems and to

deal critically with reality. In Chap. 9, Jandrić and Hayes, inspired by Illich, discuss collaboration within a university setting and how an organization can support collaboration—or cooperative working—between students and between students and teachers. In both of these latter cases, the answer to the why-question is to empower participants and benefit social development.

As is evident for all these chapters, the question of 'Why collaborate' is inherently bound up with the second question of 'Who collaborates': Different kinds of participants will be differently placed—and differently inclined—to entertain and pursue goals of collaboration. This point is significant in understanding the problems which Riis and Brodersen's report that teachers had when developing designs for students' boundary crossing. The teachers were not used to thinking of boundaries as 'learning assets' (Wenger-Trayner & Wenger-Trayner, 2015) and, correspondingly, of boundary crossing as an aim in itself. Therefore, their designs for students' collaboration with participants involved in the boundary crossing were limited. This of course also affected the teachers' own collaboration in the project, specifically their collaboration on how to use technology to foster relationships between different groups encountered by the students in their boundary crossing.

The question of 'How can collaboration be supported' is the question of how to shape involvement, i.e. how collaborators can be supported in sharing, designing, and working together in ways that make their practice better. This question is picked up rather well with the design lenses presented throughout this book. This is so because having a design approach that is aimed at actively involving participants puts the focus squarely on the practice that people have in common. This works as a common ground which brings learners together and allows them to start making meaning together. An example of this is given in Chap. 4 where Pallitt et al. use design frameworks to promote self-directed and authentic learning as part of professional development to help teachers reflect on their own practices and learn from each other.

As indicated, the six design questions must all be taken into account when targeting collaboration in practice. We illustrate this point for Chap. 5 by Bülow and Nørgård, and at the same time exemplify the three remaining design questions. The chapter investigates teachers' roles as collaborative designers (the who), where teachers take up the role of becoming developers, co-developers or remixers of own or others' educational materials (the why). As regards the question 'What are skills of collaboration', the chapter points to three skills: (1) knowledge sharing, (2) gauging the necessary time, resources and personnel to be engaged, (3) navigating the constraints and affordances of technology. The question 'Which tools afford collaboration' is central in the chapter, as a specific tool is chosen as the prime support of collaboration (which answers the support question). The tool is the CourseBuilder which offers a framework for designing, sharing, redesigning and resharing educational materials. It supports the teachers in taking on the role of educational designers to combine elements from various digital materials to make up an entire course, which can be shared with classes, groups of students and colleagues. CourseBuilder therefore also becomes the answer to the question of 'Where should collaboration take place?' because it includes an online design space which supports teachers'

collaboration on and remix of educational materials. The design space can furthermore accumulate teachers' design knowledge over time as they design, share, redesign and reshare educational materials. In this sense, the design space can reflect the history of the projects and materials. However, as Bülow and Nørgård note, the collaboration between the teachers involved in the project was less than expected. This points to the danger of assuming that a tool in itself is enough to support collaboration, i.e., of conflating the two questions of 'How can collaboration be supported?' and 'Which tools afford collaboration?'.

Looking ahead, the different ways in which the design-focused chapters of this book approach the six design aspects of collaboration spark a wider interest in investigating at least two areas: (1) How the six design aspects are present and integrated into existing collaboration projects and practices in general. (2) How future design research can contribute to develop knowledge about the six design aspects of collaboration, how they interrelate, and how an understanding of them can help improve collaboration practices.

13.2.2 Complexity of Online Networked Learning in Diverse Physically Located Environments

As indicated in the Introduction to this book, NLC2020 was one of the first conferences to be converted into an online format in response to the COVID-19 pandemic. Many discussions at the conference revolved around the experience of participating 'together apart'—being together in the online live sessions, but geographically apart across the globe in different time zones. The complexity of this was an issue repeatedly pointed to, along with the multifaceted nature of the complexity. The logistic challenges of participating in sessions at odd hours of the day (and night) are obvious, as are, probably, the resulting issues of integrating conference participation with family routines and obligations. Perhaps less obvious are the possibilities which the divergence in physical locations offered as regards making use of local physical resources in conference presentation, rather than having to pack and relocate all necessary material for participation in a physical conference. Taking this a step further, all participants had direct access to their own network connections to people and things physically present in their lock-downed locations, in a way which one usually does not. The networked experience of the conference thus dispersed through a network of networks centring on each participant's co-located ego network (Marin & Wellman, 2014). Or, allowing more explicitly for the role of non-human resources in the physical environment, a more precise formulation would be: Centring on each participant's co-located entanglement of socio-material resources. This contrasts clearly to what is the case in physical conferences.

At the same time, the fully online immersion with peers was also treated as an escape from the narrow lock-downed physical world, as many of the conference delegates, while adjusting to mostly working from home, realized they missed the

deep conversations and shared reflection on topics close to their interest and research. The conference acted as a space to fill this void and was seen as a welcome re-connection with the scholarly conversations we all used to have so frequently at conferences and events. This shows the potential of online synchronous formats, when used in interactive ways, rather than as an asynchronous broadcasting avenue. The risks for learning involved in the latter was the focus of Lesley Gourlay's keynote address at the conference, *Why the online lecture is not a lecture: Presence, absence and performance*, which criticized the tendency (during COVID-19 lock-downed teaching, but also in the online part of flipped classroom teaching) to substitute the live lecture with an online video recording. This neglects that the live physical lecture, even when totally teacher-centred, is still intensely interactive because of co-presence and ephemerality.

These considerations resonate with points made in several of this book's chapters and constitute an important issue emerging for future research, i.e. the complexity of online networked learning in diverse physically located environments. Chapter 8 by Cutajar highlights several of these complexities: It speaks to the logistic challenges of integrating a part-time online course with 12 participants' dispersed full-time work. Conversely, it shows that such an online course can function as a reflective retreat from full-time work. Finally, it joins other studies (see e.g., Dohn & Kjær, 2009; Smith, 2012) in underlining the potentials for learning and knowledge sharing involved in anchoring online course work in participants' self-defined inquiry into the work or life practices of their physically located contexts. The case study presented by Carvalho et al. in Chap. 7 points to the opposite move, namely how online resources and discussions can support a learning network spanning Brazil, in particular feeding into and informing physically based learning activities throughout the country. Between them, the two case studies thus illustrate how significance shifts and transforms across contexts, as participants' repeatedly background and foreground the different contexts which they participate in. The philosophical points in Chap. 11 by Pischetola and Dirckinck-Holmfeld help conceptualize these moves and shifting anchorage points as 'different embodiments and sense-making processes. Pischetola and Dirckinck-Holmfeld's enactivist emphasis on the situated and embodied character of learning stresses the co-dependence of learner and environment, where the learner is only one element in an entangled network. These points underscore the significance of investigating the resulting complexity of situated participation in several contexts (physical, virtual and hybrid) at once, where the body is only physically located in some of them.

A somewhat different conceptualization of the complexity is found in Fair's understanding of the Personal Learning Network (PLN). Focusing less on the situated and embodied character of learning and more on the interweaving of diverse resources and settings, Fair articulates the ego network of learning as the individual's choice of connections to people, devices, services, and information resources. His framework for analysis of PLNs, explicating interaction paths involving mode, purpose and endpoint, is well suited to capture the complexity from the individual's point of view. It also points to a further important aspect for future research: investigating ways in which higher education can support learners in negotiating

the complexity by recognizing and nurturing their PLNs to a larger extent than is presently the case.

Taken together, the analyses proposed by Fair and by Pischetola and Dirckinck-Holmfeld indicate the need for future investigation of how individual perspectives of self-regulated choice and enacted perspectives of co-dependence can complement each other—or even be integrated—in an understanding of the complexity of online networked learning in diverse physically located environments. In delving into this, previous work presented in the anthology edited by Carvalho, Goodyear and De Laat on *place-based spaces in networked learning* will be worth revisiting. The anthology holds insightful analyses of how concrete socio-material entanglements of specific physical places present affordances for individual learners' learning as well as for learning networks' communication across different locations (Carvalho et al., 2017). Conversely, early studies of the 'fractured ecologies' (Luff et al., 2003) that result when the body is located in one physical context and communication takes place in another, virtual, context, may challenge us to develop our understanding of the embodied living of networked learning, from both the individual PLN perspective and the enactivist co-dependence perspective. The work of Dohn (2014) on the significance of learners' tacit knowledge in primary contexts may here be drawn upon to investigate how learners make sense of the shifting foreground/background of their online and physical settings.

A further question concerns when and how physical presence is preferable to meeting up online from different physical locations. A fact that emerged at NLC 2020 and has become even more salient in the months following the conference is that there has to be a clear value add to make the journey and time investment of face-to-face (f2f) gatherings worthwhile. This new reality is now often referred to as the 'new normal'. But an important issue for future research is what this new normal entails in practice for individuals, groups and organizations. Will it enhance our participation, engagement and experience of learning and working together? How can we develop an informed framework for guiding decisions about meeting f2f or 'doing it online'? Certain things don't work well in Zoom for example. Online meetings are mostly experienced as focused and purposeful and people turn up for the meeting and log-off once the meeting is over. However, there is little or no room for the one-on-one catch-ups in between agenda items or during breaks. On the whole, the opportunity for serendipity which f2f meetings facilitate well is harder for online networks to offer spontaneously. Serendipitous learning, for instance through online social media, has been studied (Kop, 2012; Pardos & Jiang, 2020; Saadatmand & Kumpulainen, 2014), but it seems that our new reality prompts different questions about how to value and appreciate the power of serendipity in f2f and digital settings (Björneborn, 2017; Reviglio, 2019). Similarly, the new normal may require us to reflect differently on the social architectures that guide our future learning designs. Previously, research in this space has been done in order to understand, for example, to what extent f2f and/or online settings facilitate getting to know each other, improvisation, collaboration, knowledge construction and engagement in discussions (Ellis et al., 2006; Jeong & Hmelo-Silver, 2016; Stodel et al., 2006; Yu & Yuizono, 2021), but it is likely that the strict requirements for

online participation in the wake of COVID-19 will have led to more pervasive and widespread experiences of learning in online and hybrid situations. Research into these experiences should extend our understandings of the complexities of learning in both online and f2f situations (and combined).

13.2.3 The Nature of Learning and Cognition

Studies of learning are naturally intertwined with more general theories of cognition. For example, in the philosophy of mind, the thesis of extended cognition propounded by Clark and Chalmers (1998) seems to have both predecessors and developments in the fields of learning. Dewey's (1938/1986) central concept of an organism with tool-based distance receptors questioned ascribing crucial importance to having our skin or skull be a fundamental limit in an account of cognition; so did similar observations by Merleau-Ponty (1962) and Polanyi (1966). Likewise, Vygotsky's notion of mediation and his claim that human cognition and activity is shaped by cultural tools broaden the very idea of cognition (Vygotsky, 1978). From the 1980s, learning scientists were both deeply inspired by, and critical of, a computational model of the mind (Falkenhainer et al., 1989; Gentner, 1983). Lave's (1988) critique of such models developed into the understanding of situated learning (Lave & Wenger, 1991), an idea that has been hugely influential, not least within Networked Learning research, and led Sfard (1998) to speak of two basic metaphors of learning. Following on from Öztok's point in Chap. 1 that the field of Networked Learning must develop a clearer understanding of what learning is, we propose the raising of more fundamental questions about the nature of learning and cognition as a central theme for future research. Significant in pursuing this theme will be an investigation of the coherence and commensurability of the different philosophical underpinnings of the learning theorists upon which Networked Learning research draws. Hansen (2020) here argues that an important heir to Dewey's focus on an organism in an environment in many respects is the overall framework of actants in networks, proposed by Latour (1987); a framework which has been utilized in many papers at NLC over the years, but hardly ever in explicit recognition of its relationship with Dewey's pragmatist approach. Engaging Latour's framework through the lens of Dewey's pragmatism offers the field of networked learning a significant role in developing a philosophical understanding of the agency which all sorts of things can have in learning.

Latour's framework is a clear forerunner to what is now called the socio-material perspective, represented in this book in Chap. 10 by Thompson and Graham and their more-than-human approach to understanding AI in relation to networked work-learning practices. Their contribution opens to the complexity of not only understanding human learning, but to understand how learning and work change and unfold when work and decision making is distributed between humans and various implementations of AI. Ideas of distributed cognition obviously are not new and have been explored earlier by, for example, Hutchins (1995). Further, such ideas

serve as an undercurrent in most sociocultural theories about learning; unsurprisingly so, given their ancestry in the above-mentioned Vygotskian point that there are inextricable connections between cognition and cultural tools. However, a dawning question is whether we need to extend our thinking when the 'tools' themselves become systems that 'learn' from our interactions with them, and whether they should be viewed as intelligent actors in their own right, be viewed as intelligent agents by proxy (programmed by others), or whether they should be understood as actants similar to human agents.

The current paradigm of '4E cognition'—cognition as embodied, embedded, enacted and extended—is a contemporary approach to describing the organism's interrelatedness with the world (Newen et al., 2018). It is frequently portrayed as a relatively recent development, but in point of fact it draws on much previous research. In Chap. 11, Pischetola and Dirckinck-Holmfeld argue for reverting to its significant predecessors represented in the concept of autopoiesis and enactivism as put forward by Varela et al. (1974) and subsequent work. In the early 1990s, Varela and colleagues (1991) joined the then growing criticism of the computational theories of mind and, like many others, they saw this theory as integral to cognitivism and therefore rejected the latter position. Pischetola and Dirckinck-Holmfeld follow them in this rejection and instead rely on their more biologically informed theoretical apparatus. Given the concepts of autopoiesis and enactivism, Pischetola and Dirckinck-Holmfeld discuss how this apparatus can contribute to and refine approaches such as socio-constructivism and situated learning, and, of course, research in networked learning. However, it is important to realize that cognitivism is a moving target (Gentner, 2019) and is no longer adequately captured in the computational theories of mind hailed by cognitivists in the last decades of the twentieth century. Both the concept of computation and the understanding of logic has changed and been refined. Cognitivism should therefore remain a conversation partner in developing the philosophical underpinnings of learning, also for the field of networked learning.

Quite as important as creating coherence in philosophical underpinnings, however, is the elaboration of the concept of networked learning itself. As noted by Öztok in Chap. 1, the field remains subject of both definitional work and development (Gourlay et al., 2021; Networked Learning Editorial Collective, 2020). A significant tenet in this work is the drawing in of predecessors as part of establishing a narrative of the field. In this vein, the importance of the work of Illich is emphasized both by Riis and Brodersen (Chap. 3) and, as mentioned, by Jandrić and Hayes (Chap. 9) as a way of framing their contributions. In the context of analysing ICTs in Danish VET, Riis and Brodersen thus see boundary objects as excellent examples of convivial tools, one of Illich's key terms of art. Jandrić and Hayes' analysis of the prospects of The Woolf University similarly focuses on whether or not it succeeds in embodying the values that informed Illich's vision and design for networked learning. In this way, the heritage of networked learning is enlisted for the purpose of offering a trajectory for future work in the field. This resonates with the Networked Learning Editorial Collective's recent suggestion that the notion of convivial tools be seen as an important concept for networked learning,

in their paper inviting a current re-definition (Networked Learning Editorial Collective, 2020).

Öztok's contribution in this book (Chap. 1) also adds a piece to the narrative of the field. Looking at the history of networked learning as an academic field with a series of writings from the biennial conferences, Öztok analyses how the original definition proposed by Goodyear et al. (2004) has been further conceptualized by the community. Öztok finds that the literature does in fact remain within the admittedly quite wide bounds set by the definition. Discussions of how technologies allow for promoting connections are a stable of networked learning, while methods of studying networks and concepts of learning display great variety.

13.2.4 Politics and Ethics in Networked Learning

Ben Williamson's keynote address at NLC 2020, entitled *Networked Learning Bodies: Making Learners Machine Readable Through Psychometric Data, Neurological Data and Biodata*, burst discussions of politics and ethics in networked learning wide open. While sentiments can be difficult to gauge accurately, a lot of the response in the simultaneous chat suggested a dominant pessimism concerning a range of new technologies being deployed in the context of learning. The community's response to Williamson's account of recent developments thus underlined the values of, e.g. autonomy and curiosity, and voiced deep-seated concerns about marketization and certain kinds of behavioural measurement and design. This skepsis towards the introduction of these new technologies into the domain of learning and education makes for a contrast to the more optimistic engineering approach to the humanities that Dewey espoused. As described by philosopher of technology Mitcham, Dewey '...repeatedly calls for the application of science not just *to* human affairs but *in* them to make them more intelligent... The solutions to the problems of technology is not less but more, and more comprehensive technology' (Mitcham, 1994, p. 38).

Since Dewey, overall optimism and pessimism about technology has fluctuated in different areas of academia as well as in discussions of learning. The early days of the internet saw political theorists express faith in the potential of networks to further political reform (Castells, 1996/2002). Meanwhile, Noble (1998) was taking an overtly critical stance to the introduction of what he saw as industrial production principles into higher education. Within the area of educational technology there are also marked differences in the perception of technologies, from enthusiastic and positive accounts to cautious, critical and pessimistic stances (Poritz & Rees, 2017; Selwyn, 2011). The Networked Learning community here strives to offer balanced, critical as well as constructive accounts of *how* technologies can have politics, and how power struggles play out in implementations of technology in education. Rikke Toft Nørgård in her keynote address, *Designing for Computational Creativity and Technological Imagination with Teachers Across and Within the Disciplines*, thus pointed to the risks which current education-political tensions in defining the field of

computational thinking hold for education and educators. However, she also gave concrete examples of the possibilities which computational creativity offer to teaching and learning when technological imagination is allowed and fostered. As discussed, Jandrić and Hayes in their contribution (Chap. 9) hold up current technological developments against visions and values from early proponents of networked learning. Their assessment is that the technology in question holds a liberating potential but also embodies an advanced platform capitalism. A similarly nuanced perspective is evident in Chap. 7 by Carvalho et al. where the authors explore how a learning network furthers awareness of political structures in Brazil, fostering knowledge and inviting participation in an otherwise tense and polarized political milieu. Such detailed studies are an important complement to the widespread 'grand narratives' of technological development.

Critical discussion of AI applications is gathering momentum in many research fields. Whereas previously AI was mostly an issue discussed by philosophers and computer scientists as well as an element in fanciful projections by futurologists, nowadays political and ethical questions related to AI are being analysed and debated as an integral part of work processes and social practices (e.g. Umbrello & van de Poel, 2021). Although AI systems are not (yet) completely autonomous agents, they can with increasing success do things that have been thought primarily to belong to the domain of humans: prediction, speech and image recognition and use of natural language. This means that a class of actants are emerging that humans have to work with, listen to and negotiate with in different contexts. The domain of a large range of human activities is therefore likely to undergo change in decades to come. Transparency of decision-making processes and accountability are key topics when decisions are delegated to AI or supported by decision systems (Binns, 2018). Education is unlikely to be exempt from such developments and influences. In their discussion of AI in work settings, Thompson and Graham thus also refer to chatbots and AI in educational contexts, highlighting among other things the unjust character of algorithmically based predictions of grades (Chap. 10). During the COVID-19 pandemic, such predictions were initially made to pass for actual grades, and the predictions were widely criticized for being biased against students from poorer schools. At any rate, various kinds of AI are likely to feature more dominantly in the learning networks that both researchers and learners will encounter in the years to come.

The question is how we address these issues from a networked learning perspective, and in particular, how we balance between conceptual critique and actual engagement with AI implementations. As highlighted by De Laat and Ryberg (2018), the networked learning community has tended to engage with fields such as learning analytics and AI predominantly from a conceptual, critical perspective. This kind of work is very important and highly valuable, but other studies illustrate that there is also a value to engaging with such technologies from a more playful, experimental perspective. An example is the work reported in Bayne (2015) and Ross (2017) on their project with automatic teaching utilizing a Teacherbot. Pointing to concrete playful examples to balance overall pessimism speaks to the concerns raised by Thompson and Graham that much public and academic debate revolve

around 'grand narratives' and imaginaries of what AI will and can do for either good or evil. Instead, they call for more detailed empirical accounts of how these technologies are adopted within work and education and how they affect concrete actants in practice. It would be interesting to see more empirical work as well as playful, reflexive and critical experimentation with such technologies.

13.3 Concluding Remarks

With this concluding chapter, we have homed in on the ways in which the body of the book speaks to the overall theme of *conceptualizing and innovating education and work with networked learning*. In the first section, we articulated the contribution of each of the book's Parts and their respective chapters: Part 1 addresses the conceptualization and innovation of *professional learning* with networked learning; Part 2 similarly does so for *learning networks developing and utilizing digital resources*; and Part 3 looks at how *networked learning itself* can be (re)-conceptualized and innovated. Preceding the Parts, a first chapter traced the conceptualization of networked learning's basic terms in past conference papers. In the conclusion's second section, we identified a set of issues emerging out of the chapters—and indeed of the conference of NLC2020 itself—as focus areas for future research: *design for collaboration in networked learning; complexity of online networked learning in diverse physically located environments*; *the nature of learning and cognition*; and *politics and ethics in networked learning*.

These issues are emerging in the sense that their relevance and timeliness, and the need to take them on in future work, stand out from the book's discussions. They are, however, also variants of questions whose investigation is ongoing within the field of networked learning and has been so for several years. This is clear when looking at the conference themes in Call for Papers for past Networked Learning conferences as well as at the themes in the Call for Papers for the next one, to take place on May 16–18, 2022, at Mid-Sweden University. The latter Call thus mentions *Collaborative* (and cooperative) *learning* as an overall focal point. Among the conference themes are: *Conceptualizations of networked lifelong learning as a blended, boundless or hybrid phenomenon* and *Learning on the move: places and spaces for networked learning* (articulating aspects of *complexity of online networked learning in diverse physically located environments*); *Ethical perspectives on Networked Learning* and *Roles of artificial intelligence, big data and learning analytics in Networked Learning* (echoing *politics and ethics in networked learning*); and *Philosophies for Networked Learning* and *Situating Networked Learning conceptually, historically or systematically* (in line with the way *the nature of cognition and learning* presents itself as an emerging issue). We look forward to continuing the debate about these significant topics in Sweden in 2022!

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