Research in Networked Learning

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Networked Professional Learning

Emerging and Equitable Discourses for Professional Development

Springer

Research in Networked Learning

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Vivien Hodgson
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Foreword

From its early research days to the present day, networked learning has had two core constituencies: that of higher education and that of post experience or professional development. While the work of networked learning researchers and practitioners now takes in other and wider constituencies, the focus on professional development remains both important and significant.

Consequently, we very much welcome to the Springer Book Series on Research in Networked Learning this current collection of chapters and their focus on networked professional learning. This book is not only timely; it is also very topical with its focus on the importance of new approaches to professional learning and, more specifically, to the place of social innovation through networked professional learning. This is particularly important at a time of constant change and complexity when we find we are no longer designing professional learning for known problems and solutions. Additionally, there is increasing awareness that we should be engaging with societal problems or innovations in ways that develop informed digital citizens and digital scholars.

The authors in this new book indicate that work is becoming more and more complex and consequently professional people are needing to focus deeper on particular areas and develop more specialized skills. This often requires the development of abilities to work together in teams and to share knowledge and skills in order to solve complex problems. Continuous development in the workplace through networked learning may be key to achieving this. Such themes as these run throughout the chapters in this book, which brings together an insightful and refreshing collection of ideas and approaches to the design and practice of networked professional learning.

As pointed out by Pedersen, Gislev, and Larsen in Chap. 6, to fulfil the task of education, especially in higher education, learning must balance the old and the new – what the world *is* and what it is *to become* – a sentiment that underpins much of what is written in this excellent three-part collection. The chapters included here encompass new forms of networked professional learning, the impact of professional learning on the academy and on higher education more widely, and, finally, the value creation that networked learning offers education, teaching, and learning

professionals. Taken together, these key features make this book an important read and resource for anyone involved in professional development, whatever their context or situation.

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the study of the conditions for TEL in classrooms and schools through collaboration, networking, and support for teachers and school leaders in their work with the uptake and use of mobile technologies. Her ongoing research projects include studies regarding the uptake and use of mobile technologies and related professional development for teachers and school leaders in several different contexts, such as university teaching, schools, and preschools. One special area of interest is school leaders' leadership as an important aspect of supporting beneficial conditions for the uptake and use of mobile technologies for students and teachers in schools as well as schools as organizations.

Jimmy Jaldemark is associate professor at the Department of Education, Mid Sweden University, Sundsvall, Sweden. He has worked within the field of technology-enhanced learning (TEL) for more than 20 years. He is the leader of a research group called Higher Education and E-Learning (HEEL), which involves scholars from Umeå University and the Royal Institute of Technology, Stockholm, in addition to researchers from Mid Sweden University. The research within this group focuses on networked, mobile, and collaborative aspects of learning in higher education. Since 2013, he has led an international virtual research seminar that embraces issues within the field of TEL in higher education, which he founded. Within the field of TEL, he is also engaged in writing, editing, and reviewing papers in 14 scientific journals. He recently published a special issue in the *British Journal of Educational Technology* with the theme "Collaborative learning enhanced by mobile technologies". He also is a co-founder of a national research school called GRADE (GRAduate school for Digital technologies in Education), which is funded by the Swedish Research Council and affiliated the first doctoral students in 2018. In earlier work, he has focused on various issues, such as participation in computer-mediated communication, designing for learning, educational technology, networked learning, online supervision of student dissertations, social media as a tool for learning, and mobile learning.

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Chapter 1
Networked Professional Learning: An Introduction

Allison Littlejohn, Jimmy Jaldemark, Emmy Vrieling-Teunter, and Femke Nijland

Our Starting Point

People worldwide are facing global challenges that are transforming the world of work (Jakupec & Garrick, 2000). There is an urgent need to take action to reduce inequality by making high-quality healthcare available for everyone, to improve global security through enhanced forms of crisis management, to extend employment through improved schooling and to enable economic opportunity and social mobility through increased access to higher education (World Economic Forum, 2016).

These global challenges are complex and solving them requires changes in how people work (Beck, 2000). Large-scale, complex problems need to be broken down into smaller objectives, each of which requires deep, specialist knowledge to solve. This change in the organisation of work has at least two consequences; first, professionals become more specialised, and, second, individual specialists need to collaborate together to solve problems. One example of specialisation is nursing, where professionals are moving from general nursing to specialist roles as midwives, occupational therapists and trauma specialists. These specialists collaborate in teams, groups or networks with each individual applying his or her specialist knowledge to solve a multifaceted problem. These interrelated trends—increased specialisation, new forms of organisation and the evolution of work practice—are having a dramatic impact on how people work (Littlejohn & Margaryan, 2013). At the same

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time, these trends emphasise the need for professionals to continuously learn new forms of practice and ways of working. The co-evolution of work and learning is distinct from traditional career trajectories, where people learn up front the professional knowledge needed to follow a vocational pathway (Billett, 2001). Thus, new forms of professional learning are needed to support this agile and flexible expansion of professional practice.

There is widespread recognition that professional learning takes place not only through formal routes, such as workshops, classroom learning or other organised forms of learning but is also an integral part of work (Eraut, 2004, 2007, 2011). People learn through working with others, asking colleagues questions and observing more experienced colleagues and other forms of unintentional learning. Ideally professional learning would be integrated into work, rather than being offered as a form of training in parallel to work (Felstead, Fuller, Jewson, & Unwin, 2009; Tynjälä, 2008). Through the integration of work and learning, professionals can develop new forms of practice in efficient and effective ways. The digitisation of work opens up opportunities for the integration of professional work and learning through professional networked learning (Huws, 2014; Littlejohn & Margaryan, 2014).

There is already evidence that professionals learn in online, informal networks, yet networked learning has been largely invisible to professionals, managers and organisations as a form of professional development (Milligan, Littlejohn, & Margaryan, 2014). One reason could be because learning in networks tends to be informal and not formally recognised as professional development. Another reason could be because networked learners tend to learning through work or through observing others, and in these situations, learning may seem invisible (Eraut, 2000). Alternatively, networked learners may stray across traditional boundaries as they learn (Daniels, Edwards, Engeström, Gallagher, & Ludvigsen, 2013).

This book, *Networked Professional Learning*, critiques the potential of networked learning as a platform for the forms of professional development needed to solve global challenges. The use of the network as a medium for learning expands beyond the notion of 'Professional Development' which often is considered as formal, structured learning towards a more fluid and embedded form of learning for work which we term Networked Professional Learning.

The book draws together the work of 35 experts across 6 countries spanning 3 continents, including Australia, Denmark, Israel, the Netherlands, Sweden and the UK. The book will be of interest to researchers in the area of professional and digital learning, higher education managers, organisational human resource professionals, policymakers and students of technology-enhanced learning. A unique feature of the text is that it not only provides examples of Networked Professional Learning, but it questions the impact of networked learning on work practice in ways that allow for continuous learning and development.

The book is structured into three sections that explore networked professional learning from varying perspectives, questioning what are legitimate forms of networked professional learning (Part I on Networked Professional Learning across the

Professions), how new forms of professional learning impact the Academy (Part II on Higher Education) and what is the value creation that Networked Learning offers education professionals (Part III on Teacher Education).

Part I explores networked professional learning across a number of professions, focusing on troublesome themes, such as innovation and new forms of professionalism, boundary crossing and the legitimacy of the 'invisible learner' within the network. Universities have played an important role in providing forms of professional development. Thus, the second question focuses on how evolution of Networked Professional Learning is influencing Higher Education. This question is explored in the second part, by examining key themes including the role of Higher Education in professional development and the necessary changes in teaching practices and mind-sets. The third part of the book situates Networked Professional Learning within a broader educational, economic and social context, raising questions around the development and roles of the teachers of the future. Each section is outlined below:

Part I: Networked Professional Learning Across the Professions

To solve global challenges and generate innovative solutions, professionals have to expand their knowledge through continual learning aligned with work practice. Once professionals have reached a particular level of expertise, they continually need to learn new concepts or develop novel forms of practice. This means that professionals are likely to learn through the activities they carry out as part of their job than through formal training or education (Unwin & Fuller, 2004). The knowledge they need might not be available through a pre-prescribed curriculum with 'known' outcomes and might only be learned on-the-job, through engaging in work activities. This way of learning—learning through working together with others—can be regarded as a form of professionalisation.

Learning through working requires different professions to cross boundaries and work together to develop new forms of practice. For example, police and dentists might work together to formulate new ways of detecting early signs of domestic abuse from dental records. This form of working together delineates who is the 'tutor' from who is the 'learner', emphasising another form of boundary crossing. Tutors' roles shift to guiding learners in the network to collaborating and expanding their practice, while the learners shift back and forth across boundaries, acting in ways that would conventionally be understood as acting as a 'tutor' or as 'learner'.

In professional, networked learning, there are likely to be 'invisible' learners, who may be observing a conversation but not contributing. A key question is, how do tutors know these people are learning? Conventionally tutors are the people who provide guidance and knowledge, but in circumstances where the same individual is alternating between being a 'tutor' and being a 'learner', this relationship is more

complex. Some 'learners' may be acting as a 'tutor' by teaching others and thus may be invisible as learners. Section "Our Starting Point" explores these various issues, presenting illustrative examples.

For example, in *Professional learning in open networks*, Dalsgaard, Chaudhari and Littlejohn trace how midwives self-regulate their learning in Massive Open Online Courses (MOOCs). Within the MOOC, learners share stories about their professional practice, acting as 'tutors' as they teach others. The authors outline how a validated survey instrument was used to measure how each individual self-regulated their learning in the MOOC. The survey was distributed as a post-course online survey to 2039 enrolled participants. Two hundred seventeen participants completed the questionnaire, equivalent to a response rate of 11, higher than the normal response rate in MOOCs. The analysis identified seven specific factors that influence the ways midwives learn in networks. The data provides evidence that midwives' approach to networked learning is aligned to their practice, with findings suggesting that the midwives' learning in the MOOC was characterised through self-reflection and expansive critical thinking. Boundary crossing is illustrated, as participants act as learners while, at the same time, indirectly or directly teaching other MOOC participants.

The theme of learning in MOOCs is expanded by Dalsgaard and Gislev in the chapter on *New educational formats for professional development*. Whereas the previous chapter focused on the proactivity of a large number of learners, this chapter explores the actions and intentions of those who, from a tutor's point of view, appear to be disengaged. Here, the authors highlight that networked professional learning has to accommodate learners who appear 'invisible'. The authors' motivation for writing this chapter originates in an interest in the so-called 'dropouts': non-completing or disengaged participants of Massive Open Online Courses (MOOCs). They term this group 'invisible learners', defined as the non-active and disengaged participants of MOOCs, who do not participate in and complete the course activities and possibly also drop out of the course. The chapter characterises different learner groups in MOOCs and discusses which educational formats can accommodate invisible learners to achieve their professional development needs. The chapter is based on an empirical study of an open online course designed specifically for different types of learner engagement by allowing for different levels of participation. The study draws on 11 interviews and a questionnaire answered by 51 participants. The analysis identifies five different levels of participation, namely, students (enrolled), attendees, members, observers and visitors. The chapter concludes that activities and assignments of students and attendees in a MOOC can provide a key centre for networked learning activities of invisible students that use these activities as part of or as an extension of their own professional practices.

The first two chapters consider professional networked learning as a form of online learning. Yet learning at work often is blended, integrating online activity with face-to-face interaction. In this final chapter in this part of the book, Öberg, Nyström, Littlejohn and Vrieling-Teunter examine professional networked learning as a form of blended learning. Organisations have to prepare their workers to deal

with crisis situations, such as a school shooting, extreme weather flooding, a health pandemic and so on. These circumstances make it difficult to anticipate what needs to be learned and how, because it is impossible to know in advance who will be involved and what they need to be able to do. The chapter examines networked role play exercises where employees learn to deal with crisis situations. The chapter considers these learners in terms of a community of inquiry, since it is assumed that learning communities create awareness and trust and support knowledge sharing, all of which are necessary preconditions for people working together in crisis management situations. The study found that various types of communities may develop within a crisis situation: home communities, cohort communities, specialist communities and local working groups. These expanded views of communities could be used to help plan informal Networked Professional Learning in the future.

Overall, informal learning, where professionals learn through day-to-day interactions, will be important for future forms of networked professional learning. 'Learners' and even those who teach may not be visible or distinguishable, as people move back and forth from the role of the learner, to supporting the learning of others. This interplay of roles, extension of boundaries and invisibility of learners bring consequences for Higher Education, which are explored in the next part of the book.

Part II: The Impact of Networked Professional Learning on the Academy

Networked professional learning has an impact on higher education. This impact includes potential changes in what the university is and should be. Among others, this development implies challenges to higher education practice and changes in the way professionals at the universities teach, research and reach out to the surrounding society. In other words, professional development within higher education needs to adapt to the societal and technological changes and challenges. This process emphasises professional development in terms of being a networked phenomenon where learning is linked to both internal as well as external networks. Such professional development features hybrid educational settings where older boundaries between different educational settings dissolve and possibilities to cross boundaries are important.

Professional development in higher education is a phenomenon that needs to be discussed at different levels. It relates to changes at the individual level and the transformation of practice at the organisational level. Simultaneously, higher education aims at developing professionals. This aim includes students and their teachers as well as supporting professional development within working life. For higher education staff, this implies two different and intersecting tasks. First, 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. In other words, prepare them to perform professional development. Second, higher education staff should be able to perform professional development within their own practices.

The section includes different issues of networked professional development in higher education. These issues emphasise the alignment of formal professional development initiatives with informal networked professional learning that take place in the workplace. Some of these issues address philosophical questions, others relate to the preparation for and performance of professional development. The section examines how networked learning practices influence the design of professional development, through consideration of themes such as learning design, ontological and epistemological assumptions for design, design as an emerging phenomenon and teachers' view of design. The section explores how networked learning shifts the boundary between higher education and society at large, in ways that can help solve global issues. The role of higher education in transforming society is explored, in particular the ways formal, informal and non-formal forms professional development can transform professional practice.

The first chapter, *Networked learning in, for and with the world*, by Toft Nørgård, Mor and Bengtsen considers how networked learning might support integration of the university with society as a hybrid phenomenon. The chapter starts with a conceptual overview of the university from three standpoints: the ivory tower (mode 1), the factory (mode 2) and the network (mode 3). The chapter then traces the development of framework for the networked (mode 3) university, integrating learning principles with organisational guidelines and pedagogical formats. The authors consider two paradigms of education: firstly, learning within the networked university by bringing education to the public and, secondly, learning in and with the world by bringing the public into education. These paradigms are illustrated as educational design patterns that emphasise three dimensions: networked learning as a form of citizenship, networked learning as a form of trust and networked learning as a type of ecology.

The second chapter, *Learning in hybrid protopublic spaces*, by Young Pedersen, Caviglia, Gislev and Hjortskov Larsen, focuses on the notion of a hybrid university which is networked and linked to the adjacent society. While exploring the notion of 'protopublic spaces', the authors propose a framework to analyse learning as a form of collaborative inquiry. The chapter draws on theoretical assumptions and primary sources of inspiration from different lines of research, combining ideas of 'collaborative inquiry', 'connected curriculum' and 'hybrid protopublic spaces' to examine future forms of networked professional learning.

Networked professional learning is critiqued as a design phenomenon in the next chapter, *Designs for learning as springboards for professional development in higher education* by Konnerup, Ryberg and Thyrre Sørensen. The authors examine a number of tensions within the landscape of Learning Design, drawing on the Larnaca Declaration, a theoretical foundation for the field of Learning Design, based on a synthesis of research and practice. The authors outline two distinct ways

of sharing learning designs for networked professional learning: 'plans for action' and 'resources for reflection'. They contrast Learning Design as a way to improve 'effectiveness' versus a way to increase 'reflexiveness' for professional learning. The authors highlight a tension that learning designers have a tendency to assume that tutors are designing for relatively well-known problems and contexts. However, in contemporary workplaces, the desired outcomes of professional learning are seldom known in advance. The authors also position Learning Designs as 'springboards for development', concluding that these should not only be thought of as predefined ideas but should also be viewed as dynamic ways to collectively design new forms of practice.

Hansen and Bonderup Dohn, in their chapter *Design principles for professional networked learning in 'learning through practice' designs*, explore the intersection of design and learning. The authors examine how 'learning through practice' can prepare students for future professional practice and how these practice-based forms of learning can be described as a learning design. Three prototypical learning designs are illustrated: (1) case-based learning, (2) design-based learning and (3) simulation-based learning. Here networked learning is understood as the way in which learners connect the various contexts in which they participate, integrating their knowledge, perspectives and ways of being across these different sites. The authors distinguish sites for learning as both within and outside the formal educational system, emphasising the importance of forming connections between learners' experiences in work practice settings and educational settings. The authors argue that case-based learning establishes a relationship of inquiry between the learner and their work practice and that design-based learning supports learners in expanding their work practice through changing it.

The final chapter in this part of the book is *Teachers' beliefs about professional development* by Jaldemark, Håkansson Lindqvist and Mozelius. This chapter links networked professional to teachers' beliefs, exploring the emerging networked practices of professionals and the organisations they work within. Teachers' beliefs about professional learning are influenced by networked learning. In particular, professional development is fostered and supported through the development of networks which required good networked practices. This chapter is based on a study of beliefs of teachers in three departments at a Swedish university. The findings uncover concerns and beliefs about professional development at both the individual and collective levels.

These changes in Higher Education triggered by Networked Professional Learning have consequences for teachers and the teaching profession, which are explored in the next part of the book.

Part III: Networked Professional Learning in Teacher-Learning Groups

Teachers' work is often structured in a way that allows little room to connect and collaborate and, traditionally, teaching practice is highly solitary. This isolated position can harm teachers' continuous learning and development. In response, educational institutes, such as teaching institutes and schools, increasingly regard learning in real-life social networks as beneficial for facing change and solving problems that are too complex to solve individually. A networked learning perspective may provide insight into the way the networks contribute to teacher professional development. Face-to-face social learning networks with the purpose to stimulate teacher professional development have been elaborated in several studies. These studies use different terms to describe the social learning idea, such as learning networks, communities of practice and learning teams. Although each social learning perspective has its own angle, teacher networks in general can be observed as teachers working and discussing practice issues while sharing a similar focus on learning. To account for the natural dynamics in such groups, Vrieling, van den Beemt, and de Laat (2016) have coined the overarching concept of teacher-learning groups (TLGs). In this part of the book, four examples of networked professional learning in teacher-learning groups are elaborated. The chapters leave from different perspectives representing school management, value creation, knowledge creation and learning experiences.

In the chapter *Learning to teach in a remote school context,* Pettersson and Olofsson take a school management perspective. They investigate an upper secondary remote school in northern Sweden that consists of four schools located in four different municipalities. The school management has the ambition to create conditions for teachers' professional development of digital competence through collaboration between teachers who are geographically separated from each other. The authors use the Cultural-Historical Activity Theory to explore possibilities and challenges in how teacher professional development of digital competence can be organised, facilitated and sustained. The findings show that the development of teachers' digital competence requires a school management that is supportive in creating a culture of change that can be sustained beyond single teacher professional development actions and activities. Moreover, teachers need support to elaborate and negotiate on what type of tools, rules, roles and divisions need to be added to the activity for the networked professional learning to take place and to proceed both in a short-term and long-term perspective. It is also shown how the school management needs to be sensitive to when and how the teacher-learning group is in need of encouragement and external support, that is, the importance of finding a balance between when the learning network can be self-organised and when it is in need of being externally directed with support from the school management.

Van Amersfoort, Korenhof, Nijland, De Laat and Vermeulen inform us about *Value creation in teacher learning networks.* This chapter explores the concept of value creation in two teacher-learning groups that aimed to promote and facili-

tate teachers' networked professional learning. The study investigated how value creation is affected by contextual factors. The findings show little differences in teachers' networked learning activity itself; however, substantial differences in leadership commitment, time and opportunity for networked learning and voluntary network participation were observed. Overall, the findings show that participating in teacher-learning groups may direct teachers to redefine their idea of what learning could be like and reframe the value of consulting their peers for learning. The combination of committed leadership and mandatory involvement in teacher-learning groups appeared to have helped teachers to gain positive networked professional learning experiences.

In *Analysing social learning of teacher-learning groups that aim at knowledge creation*, Vrieling-Teunter, Wopereis, Van den Beemt, De Laat and Brand-Gruwel make use of the 'Dimensions of Social Learning Framework' to study the social configuration of a teacher-learning group of teacher educators that aimed to develop a new curriculum for aspirant primary school teachers. The framework distinguishes four dimensions with 11 indicators corresponding to these dimensions that can bring the social configuration of teacher-learning groups into view. The first dimension, Practice, indicates the necessity for a relationship between the knowledge created and shared in the group and teachers' day-to-day activities. Domain and Value creation, the second dimension, is referred to as the sharing of experience and expertise among group members. When group members work interdependently with a shared purpose and responsibility for collective success, the group can demonstrate a Collective Identity (third dimension). The final dimension, Organization, exhibits how the group is organised. Because the teacher-learning groups in this case study created a sustainable knowledge base necessary to implement a new teacher training curriculum, an extended version of the framework (Dimensions of Social Learning Framework-extended, abbreviated as DSL-E) was needed to reveal indicators for sustainable knowledge creation. Informed by the Social Capital Model and the Value Creation Framework (see the former chapter in this section), the usefulness of the Dimensions of Social Learning Extended Framework for analysing sustainable knowledge creation of teacher-learning groups was explored. Results show that the Dimensions of Social Learning Extended Framework is helpful to identify indicators for sustainable knowledge creation. First, the use of the Dimensions of Social Learning Extended Framework revealed the collective knowledge working identity as indicator. A gradual development of distributed leadership as well as an inquiry-based attitude appeared necessary ingredients in this matter. Second, institutional value creation was found an important indicator for sustainable knowledge creation. This indicator says that teacher-learning groups should involve all stakeholders when starting a joint enterprise and connect actions to institutional goals right from the start.

In *MakerSpaces in schools*, Spante, Johansson and Jaldemark inform us about MakerSpaces settings. This can be defined as places equipped with various materials that can be used to construct things, in order to enhance creativity and cross-disciplinary collaboration. The study searches for learning experiences of teachers in Swedish K-6 schools that participated in a top-down networked professional

development project that focuses on integrating computer programming into the curriculum. The Value Creation Framework (see the former chapter) was used to monitor a teacher-learning group of 15 selected teachers from 16 schools. During 12 meetings in 2 years, the teachers discussed their experiences of integrating programming in their educational settings. Although some teachers were initially sceptical about the project, the results indicate that teachers experienced that participating in the teacher-learning group helped them to develop their professional attitudes, knowledge and practices.

Discussion

The discourse on Networked Professional Learning is situated within the broader economic, societal and education contexts, providing an understanding of whether and how Networked Learning is responsive to the evolving needs of professionals situated within different sectors. Each of the chapters in these parts of the book draws on empirical data, providing critical insight into the possibilities offered by Networked Professional Learning, as well as exploring issues and challenges surrounding the implementation. These ideas are drawn together in a summary chapter by Peter Goodyear in which he argues that Networked Professional Learning operates at two levels: collaboration with others to learn how to tackle a current task and collaboration with others to improve one's capabilities for tackling future tasks, providing it with a design quality which frequently involves inquiry, reframing and action. Design inquiry combines a search for what is true, what is real and what is ideal. Design action involves composing and connecting: bringing people, tasks and things into a unified whole. He positions design as an expert professional activity (offering a professional service) and as a vernacular activity (everyone designs). Combining these perspectives, Goodyear sketches a future for Networked Professional Learning with social innovation at its heart and the co-design of collaborative services as a unifying practice.

These ideas form the beginning of a discourse which we hope you, the readers, will critique, debate and expand. We hope you enjoy the book!

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Part I
Networked Professional Learning Across the Professions

Chapter 2
Professional Learning in Open Networks: How Midwives Self-Regulate their Learning in Massive Open Online Courses

Annette Dalsgaard, Vasudha Chaudhari, and Allison Littlejohn

Abstract This chapter reports on how midwives self-regulate their learning in an open, online network which was constituted as a massive open online course (MOOC). A validated survey instrument measuring self-regulated learning in MOOCs was distributed as a post-course online survey to 2039 enrolled participants. Two hundred seventeen participants completed the questionnaire, equivalent to a response rate of 11%. This rate is higher than the normal response rate to post-course surveys reported in MOOCs. The analysis identified seven specific factors that influence the ways midwives learn in the MOOC. There is strong evidence that midwives' approach to networked learning is aligned to their practice, with findings suggesting that the midwives' learning in the MOOC was characterised through self-reflection and expansive critical thinking. These findings will be of interest to those who plan for and design online, networked learning for health professionals, offering design guidelines; to midwife educators, identifying key learning characteristics of midwives; and to professional bodies, pointing to models for future networked professional learning.

Background: Professional Learning

A midwife is the first and main contact in maternity care. The midwife has responsibility for providing care and support to parents to enable them to make informed choices during pregnancy, throughout labour and during the early postnatal period. Globally, the midwives' responsibility has broadened as maternity care expands. Midwifery practice is changing rapidly, and midwives have to learn continuously throughout their

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career to maintain their knowledge base and their competence to provide contemporary evidence-based care (International Confederation of Midwives, 2011).

Through ongoing and regular continuing professional development (CPD), midwives expand their expertise, professional competence and individual well-being (Collin, Van der Heijden, & Lewis, 2012). Generally, midwives value the opportunity to engage in CPD activities to help them improve the quality of their patient care, to meet professional obligations and to meet personal and professional developmental goals (Casey et al., 2016). Besides giving midwives an opportunity to update their professional knowledge and competences, CPD events and activities act as occasions when midwives can share knowledge and experiences with other, like-minded colleagues (Stirling & Monaghan, 2005).

Midwives often are constrained from engaging in CPD activities because of understaffing, work shifts, family commitments, geographical distance and financial constraints (Katsikitis et al., 2013; Patterson & Davis, 2007). Consequently, there has been a growth in online and networked CPD for midwives to provide opportunities that are flexible, easy accessible and more cost-effective (Carroll, Booth, Papaioannou, Sutton, & Wong, 2009; Gresty, Skirton, & Evenden, 2007; Sidebotham, Dalsgaard, Davis, & Stewart, 2015). It has been argued that there is limited value in online learning for midwives, since online education often is designed for individuals to study alone, with few opportunities to engage within social networks (Gould, Papadopoulos, & Kelly, 2014). However, open, online networked learning environments, such as massive open online courses (MOOCs), offer potential to support midwives in CPD.

Networked learning is defined as:

> learning in which information and communication 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. (Goodyear, Banks, Hodgson, & McConnell, 2004, p. 1).

According to Goodyear et al. (2004), networked learning is characterised from connections with interactions between humans and learning resources; interactions with materials alone are not sufficient for learning. According to Jones and Dirckinck-Holmfield (2009), the nature of the networked learning environment is socially and physically networked and is distributed over time and space. Networked learning is mediated by technologies, and ideally technology tools are utilised to support the creation of connections in the networked learning environment (ibid).

A massive open online course (MOOC) is a course that is openly available to large numbers of people, free of charge and regardless of qualifications or prior experience. Some MOOCs are designed to support interaction and peer-to-peer learning across networks of participants (Margaryan, Bianco, & Littlejohn, 2015). Although MOOCs tend to have low completion rates (some courses have fewer than 10% of participants completing the course [Jordan, 2014]), the so-called "invisible" participants appear to use networked learning activities in a MOOC as an extension of their own professional practices (see Chap. 3 by Dalsgaard & Gislev, this volume). As such, MOOCs provide a mechanism for the transfer and sharing of professional knowledge across a network of distributed professionals (Milligan & Littlejohn, 2016). They can be designed to offer networked professional learning that is aimed towards informal sharing in networks, rather than formal training.

Despite the potential of MOOCs as a form of networked professional learning, many MOOCs are designed to support individuals to learn on their own, rather than offering opportunities to exchange knowledge with others within a network (Margaryan et al., 2015). Another problem with MOOCs is that they tend to be designed around a self-guided format that assumes learners can regulate their own learning (Littlejohn, Hood, Milligan, & Mustain, 2016). MOOCs attract a diverse spectrum of learners, with different backgrounds and ability to manage their own learning. Not all learners are able to self-regulate and to learn independently without the guidance of a teacher (Littlejohn & Hood, 2018).

Through self-regulated learning (SRL), learners attain their learning goals through self-generated thoughts, feelings and actions (Zimmerman, 2001). Self-regulated learners are aware of their strengths and limitations and proactively plan their learning through personal learning goals and task-related strategies. Zimmermann's theory views SRL in three cyclical phases: *Forethought Phase*, *Performance Phase* and *Self-Reflection Phase*. The Forethought Phase involves a number of stages including *Task Analysis*, where the learner carries out goal setting and strategic planning, and *Self-Motivation Beliefs* which impinges on self-efficacy, outcome expectation, intrinsic interest and the perceived value of learning and learning goal orientation. The Performance Phase comprises a number of stages such as *Self-Control* which includes imagery, self-instruction, attention focusing and task strategies and *Self-Observation* which is concerned with self-recording and self-experimentation. The Self-Reflection Phase is focused around stages such as *Self-Judgement* where the learner engages in self-evaluation and causal attribution and *Self-Reaction*, encompassing self-satisfaction and adaptive or defensive reactions (Zimmerman, 2000).

Recent research explored how health professionals self-regulate their learning in MOOCs. Those learners who reported high and low levels of self-regulation may be motivated by the same goal (e.g. gaining the certificate of completion in a MOOC), yet they describe qualitatively different self-regulation strategies around how they plan their learning and follow the course pathway, how they self-evaluate their progress and how they perceive their own development (Milligan, Littlejohn, & Hood, 2016). Health professionals who report low degrees of self-regulation tend to follow the pathway planned by the course designers and may become overwhelmed by the volume of course materials and the time required to complete all the tasks (Littlejohn et al., 2016). This often negatively influences their self-perception and how they feel about their progress and learning. Health professionals who report a high degree of self-regulation are inclined to follow their own learning pathways. Consequently, they self-evaluate their progress against their own goals, rather than the goals set by the course designers, and are more likely to view their progress positively (ibid.).

These findings illustrate the sorts of self-regulated learning strategies professionals apply while learning in a MOOC. However, the findings are based on a detailed study in one MOOC. More insight into how professionals plan and perform their learning in open networks is needed, particularly when employers and professional bodies are looking to MOOCs to scale up modes of continuous professional development (Radford et al., 2014).

This chapter expands on these insights into the ways health professionals self-regulate their learning in open, networked learning environments by reporting how midwife practitioners learned in the Evidence-Based Midwifery Practice MOOC.

The Learning Design: An International MOOC for Midwives

The Evidence-Based Midwifery Practice MOOC (EBMP MOOC) was offered over a 6-week period, during April and May 2015. The MOOC was designed as a form of networked continuing professional development (CPD) to midwives and midwifery educators engaged in clinical practice in countries around the world. The course was open to anyone with an interest in evidence-based practice and midwifery and attracted 2098 participants. The aim was to develop introductory knowledge of evidence-based practice, and the learning outcomes specified that on completion of the course, each participant could:

- Search for evidence-based research articles related to midwifery practice
- Analyse research articles and critique the findings at a basic level
- Interpret evidence-based research results in the global context of midwifery
- Critically appraise research literature and understand the politics that underpin research
- Translate and implement research findings into clinical practice

The EBPM MOOC was developed and implemented by three experienced midwifery academics and educators based in Denmark and Australia. The course was hosted on a platform developed from WordPress blogging technology (www.mooc-formidwives.com). All participants were required to register using an email address, so collective messages could regularly be disseminated to encourage participant engagement and interaction. A simple course design structure was used to guide the learners as they navigated their way through the course. There was evidence that this design could effectively support midwives in open online CPD, even those with limited digital literacy (Dalsgaard, forthcoming; Sidebotham et al., 2015; Stewart, Sidebotham, & Davis, 2012a; Stewart, Sidebotham, & Davis, 2012b).

The course was designed around six modules each requiring 4–6 hours study time. Course materials were provided as open educational resources under a Creative Commons license. These resources included Web-based articles, scientific articles, videos and voice-over PowerPoint videos. In ten synchronous, online lectures, eminent international midwifery professors and researchers presented on subjects related to the themes in the modules, with question and answer sessions that allowed the participants to discuss core concepts with the academics. To facilitate networking and communication, the course design utilised a broad range of educational technology tools and learning resource types that supported networked interaction amongst the participants and between learners and tutors. The participants engaged in sequenced learning activities that encouraged them to create and share knowledge, particularly around forms of midwifery practice. Since the participants were

based in different countries around the world, they had opportunity to compare and discuss issues related to practice. Communication was supported through online discussion fora mediated by the tutors and through asynchronous discussions. The participants also requested that additional discussion fora be set up to support learner-directed discussions; one forum—the "MOOC café"—was used to share knowledge and experiences of midwifery practice, while a second collaboration forum was used to support participants sharing and expanding ideas around development projects for midwifery practice. Social media sites such as Facebook and Twitter were also used to support communication and interactions outside of the course platform.

Most healthcare services around the world require midwives to engage in regular CPD; therefore participants were motivated to gain a certificate of completion to demonstrate to their employers that they had participated in the course. To attain this certificate, course participants were required to complete a multiple-choice assignment.

The remainder of this chapter reports on a study examining how the midwives self-regulated their learning as they engaged within the MOOC. The research reported here focuses on a quantitative analysis of participants' survey responses on self-regulated learning. This work is part of a bigger study exploring the design, implementation and learning in the MOOC (Dalsgaard, forthcoming).

Methodology: Survey of Self-Regulated Learning

Survey Instrument

A self-regulated learning survey questionnaire instrument was circulated in July 2015. The survey was a slightly modified version of a published, validated instrument designed to measure self-regulated learning in adult learners in informal learning contexts. The validated Self-Regulated Learning in the Workplace Questionnaire (SRLWQ) measures self-regulatory learning behaviours in informal learning contexts at work (Fontana, Milligan, Littlejohn, & Margaryan, 2015). The questionnaire was adapted to MOOC context as the SRL MOOC questionnaire (SRLMQ) (Hood, Littlejohn & Milligan, 2015). The SRLMQ questionnaire was slightly modified for this study to fit the learning context for midwives in the EBMP MOOC.

The instrument has three sections reflecting Zimmerman's (2000) three phases of self-regulated learning—Forethought, Performance and Self-reflection. Each section measures a range of SRL subprocesses (see Table 2.1).

These subprocesses were drawn from the work of both Zimmerman (2000) and Pintrich, Smith, Garcia, and McKeachie (1991) and were selected for their relevance to a more informal learning context. The instrument consisted of a total of 38 items: 14 items measuring forethought, 18 items measuring performance and 6 items measuring self-reflection. The questionnaire had a further ten quantitative questions: four socio-demographic questions and six questions related to course engagement.

Table 2.1 Phases and subprocesses included in the SRL instrument for non-formal learning in MOOCs (Hood, Littlejohn, & Milligan, 2015)

Forethought	Performance	Self-reflection
Goal setting	Learning and task strategies	Self-satisfaction
Self-efficacy	Help seeking	Self-evaluation
Task interest/value		

A further four open-ended, qualitative questions asked about participants' learning strategies and behaviours.

The survey was circulated to 2039 of the 2098 participants who had enrolled in the Evidence-Based Practice Midwifery MOOC (EBPM MOOC). These participants were made aware that their participation in the survey was completely voluntary and that the data collected would be treated in accordance with the data protection policy. Fifty-nine participants did not receive an invitation to complete the questionnaire because their email addresses were returned as invalid. A total of 217 learners fully completed the survey. Self-report responses were measured using a Likert scale ranging from 1 = "not at all true for me" and 5 = "very true for me". Quantitative responses were analysed using SPSS software (IBM Corporation, 2015). Of the 2039 participants invited to participate in the survey, 217 responded, yielding a response rate of approximately 11%. This response rate is much higher than the average MOOC post-course survey response rate of 2% (Whitehill, Williams, Lopez, Coleman, & Reich, 2015). Exploratory factor analysis was undertaken to determine the latent structure of the midwifery MOOC dataset, to identify the SRL subprocesses that are significant for midwives.

Participant Demographics

The age range of the respondents was normally distributed with 4% of the participants below 25 years of age, 19% between 26 and 35 years of age, 28% between 36 and 45 years of age, 33% between 46 and 55 years of age, 15% between 56 and 65 years of age and 1% aged 66 years or above. As expected with the midwifery context of the MOOC, 95% of the participants were females, while only 5% were males. Around 42% of the respondents were from clinical midwifery practice, 23% were midwifery educators and 23% were from other midwifery-related roles such as researchers, managers or students, while 12% were from other health-related professions. This shows that the sample is representative of the midwifery and healthcare practice. The respondents resided in 46 different countries from, respectively, Africa, Asia, Australia and Oceania, Europe, North America and South America including under-resourced countries such as Bhutan, Myanmar, Nepal, Papua New Guinea and South Sudan. The international distribution of the respondents suggests that the survey participants are representative of the wider population of MOOC participants. Next, the factorability of the 38 SRL items was examined.

Exploratory Factor Analysis

An exploratory factor analysis was carried out, and all factor correlations were tested. The lowest accepted absolute value for factor loadings is 0.3, and each of the SRL items correlated 0.3 with at least one other item, indicating reasonable factorability. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.93, above the recommended value of 0.6, and Bartlett's test of sphericity was significant (c^2 (703) = 6120.370.26, $p < 0.05$). The diagonals of the anti-image correlation matrix were each over 0.5, supporting the inclusion of each item in the factor analysis. Finally, the communalities were all above 0.3 (see Table 2.2), further confirming that each item shared common variance with other items. Given these overall indicators, exploratory factor analysis was conducted with all 38 items.

Principal components analysis (PCA) was used to identify and compute composite SRL scores for each of the factors within the questionnaire. Initial eigenvalues indicated that the *Self-Reflection* factor explained 42.60% of the variance, the *Expansive Critical Thinking* factor 7.16% of the variance and the *Readiness* factor 4.92% of the variance. The *Goal Setting*, *Help Seeking*, *Task Strategies* and *Strategic Planning* factors had eigenvalues of just over one, each of them explaining 4.00%, 3.68%, 3.07% and 2.77% of the variances, respectively. The seven-factor solution, which explained 68.23% of the variance, was preferred because of its previous theoretical support.

Some of the factor labels proposed by Hood et al. (2015) (Table 2.1) described the extracted, for example, *Goal Setting* and *Help Seeking*, and were retained. However, some of the remaining factors comprised a mixture of items from two or more SRL subprocesses and were, therefore, given a more appropriate name. Renamed factors include *Strategic Planning*, *Readiness* and *Expansive Critical Thinking*. *Self-Reflection* emerged as one factor that brings together two distinct factors from earlier analyses (Hood et al., 2015): self-satisfaction and self-evaluation. Internal consistency for each of the scales was examined using Cronbach's alpha. No substantial increases in alpha for any of the scales could have been achieved by eliminating more items.

Composite scores were created for each of the seven factors, based on the mean of the items which had their primary loadings on each factor. Higher scores indicated greater use of the SRL strategy. *Self-Reflection* was the SRL factor that participants reported most frequently, with a negatively skewed distribution, while *Strategic Planning* was the least reported factor. Descriptive statistics are presented in Table 2.3. The skewness and kurtosis are well within a tolerable range, indicating a normal distribution. Examination of the histograms suggested that the distributions appeared approximately normal (see Figs. 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, and 2.7).

Overall, these analyses indicated seven distinct factors with high internal consistency. An approximately normal distribution was evident for the composite score data in this study; thus these data were well suited for parametric statistical analyses.

Table 2.2 Rotated component matrix: exploratory factor analysis for modified SRLWQ scale

Items	Self-reflection	Expansive critical thinking	Readiness	Goal setting	Help seeking	Task strategies	Strategic planning
I often thought about how my learning fitted into the "bigger picture" of my work/practice	0.774						
I considered how what I have learned related to my colleagues or peer learners	0.739						
I tried to understand how what I have learned might impact my work/practice	0.728						
I thought about what I have learned after I finished	0.720						
I knew how well I have learned once I had finished a task	0.644						
I preferred learning that aroused my interest, even if it was challenging	0.638						
I liked opportunities to engage in tasks that I could learn from	0.581						
I asked myself if there were other ways to do things after I finished learning	0.545						
A satisfying thing for me in this course was trying to understand the things I learned as thoroughly as possible	0.506						

(continued)

Table 2.2 (continued)

Items	Self-reflection	Expansive critical thinking	Readiness	Goal setting	Help seeking	Task strategies	Strategic planning
During learning, I treated the resources I found as a starting point and tried to develop my own ideas from them		0.688					
I tried to play around with ideas of my own related to what I was learning in this course		0.688					
Whenever I read or heard a statement in this course, I thought about possible alternatives		0.653					
When I was learning, I combined different sources of information (e.g. people, web sites, printed material)		0.638					
When I was learning, I tried to relate new information I found to what I already knew		0.603					
I tried to apply my previous experience when learning		0.599					
I read beyond the core course materials to improve my understanding		0.589					
When I studied for this course, I made notes to help me organise my thoughts		0.480					

(continued)

Table 2.2 (continued)

Items	Self-reflection	Expansive critical thinking	Readiness	Goal setting	Help seeking	Task strategies	Strategic planning
I felt that whatever I was asked to learn, I could handle it			0.763				
I have felt prepared for the demands of this course			0.678				
My past experiences have prepared me well for new learning			0.671				
I think I will be able to use what I have learned from this course in the future			0.510				
I am interested in the topics that were offered in the course			0.506				
The learning that I have undertaken is very important to me			0.461				
When confronted with a challenge, I could think of different ways to overcome it			0.421				
I have set goals to help me manage studying for my learning				0.758			
I have set short-term (daily or weekly) goals as well as long-term goals (for the whole course)				0.748			
I have set realistic deadlines for my learning				0.699			
I have met the goals I set for myself in this course				0.545			

(continued)

Table 2.2 (continued)

Items	Self-reflection	Expansive critical thinking	Readiness	Goal setting	Help seeking	Task strategies	Strategic planning
I tried to identify others whom I could ask for help if necessary					0.881		
I asked others for more information when I needed it					0.879		
When I did not understand something, I asked others for help					0.868		
I have asked myself questions about what I was going to study before I begin to learn					0.449		
I tried to translate new information into my own words						0.627	
I asked myself how what I was learning was related to what I already know						0.626	
I changed strategies if I did not make progress while learning						0.520	
Even if I was having trouble learning, I preferred to do the work on my own							0.644
When planning my learning, I have used and adapted strategies that have worked in the past							0.419
I thought of alternative ways to solve a problem and chose the best one							0.419

Note: Extraction method: principal component analysis for SRLWQ scale.
Rotation method: varimax with Kaiser normalisation (rotation converged in 14 iterations)
Total explained variance: 68.23%

Table 2.3 Descriptive statistics for the seven SRL factors ($N = 217$)

	No. of items	Mean (SD)	Skewness	Kurtosis	Cronbach's α
Self-reflection	9	3.61 (0.91)	−0.647	−0.166	0.929
Expansive critical thinking	8	3.27 (0.94)	−0.310	−0.472	0.904
Readiness	7	3.77 (0.84)	−0.858	0.566	0.878
Goal setting	4	2.90 (1.02)	−0.033	−0.814	0.842
Help seeking	4	2.57 (1.10)	0.432	−0.702	0.870
Task strategies	3	3.30 (0.93)	−0.216	−0.532	0.758
Strategic planning	3	3.09 (0.90)	−0.164	−0.447	0.583

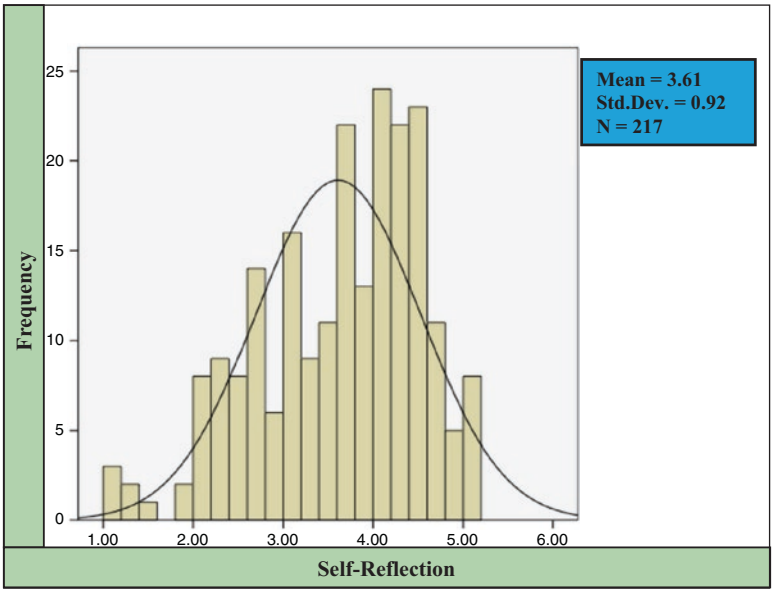

Fig. 2.1 Frequency distribution for self-reflection

Key Components of Midwives' Self-Regulated Learning

Seven factors characterise midwives' self-regulated learning in the MOOC:

- F1: Self-Reflection ($\alpha = 0.929$ for nine items; total variance explained, 42.60%)
- F2: Expansive Critical Thinking ($\alpha = 0.904$ for eight items; total variance explained, 7.16%)
- F3: Readiness ($\alpha = 0.878$ for seven items; total variance explained, 4.92%)
- F4: Goal Setting ($\alpha = 0.842$ for four items; total variance explained, 4.00%)
- F5: Help Seeking ($\alpha = 0.870$ for four items; total variance explained, 3.68%)
- F6: Task Strategies ($\alpha = 0.758$ for three items; total variance explained, 3.07%)
- F7: Strategic Planning ($\alpha = 0.583$ for three items; total variance explained, 2.77%)

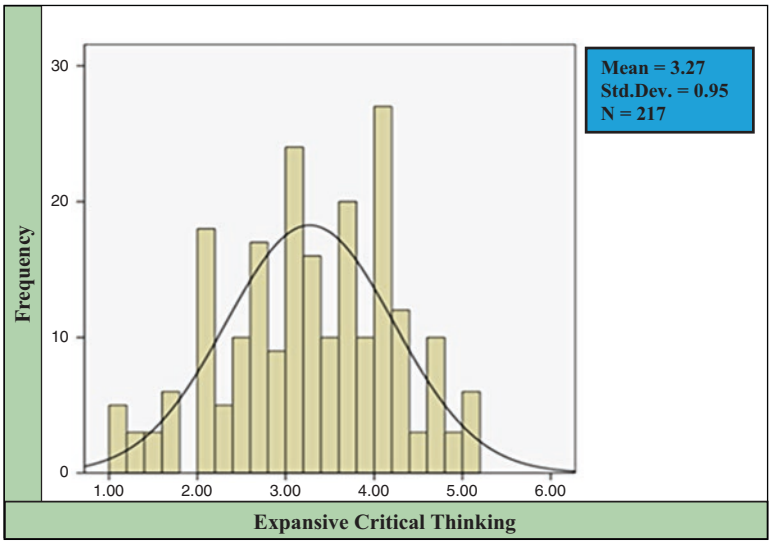

Fig. 2.2 Frequency distribution for expansive critical thinking

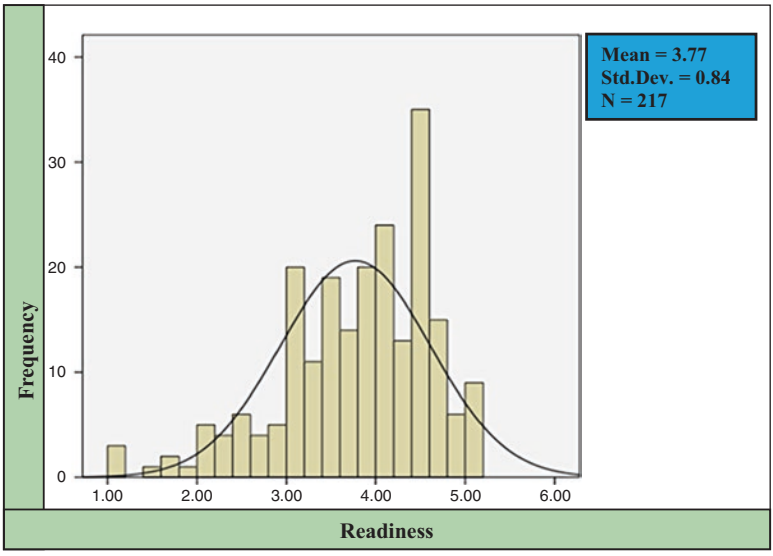

Fig. 2.3 Frequency distribution for Readiness

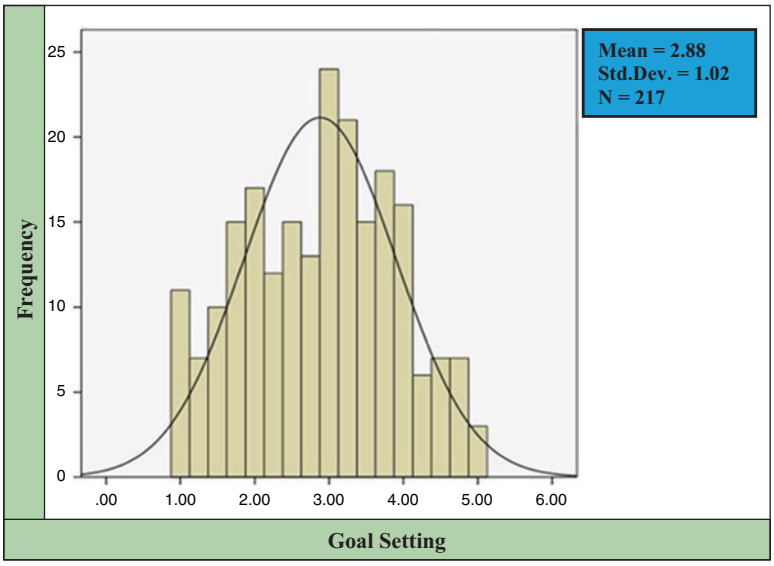

Fig. 2.4 Frequency distribution for goal setting

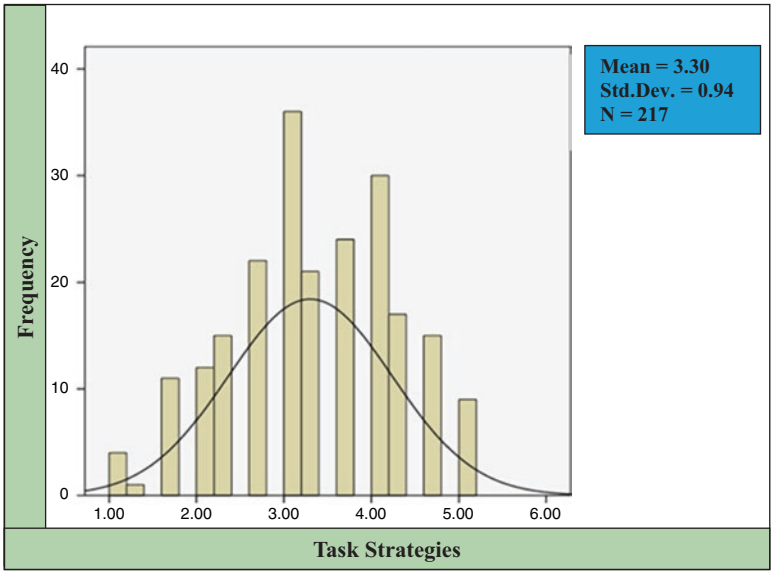

Fig. 2.5 Frequency distribution for task strategies

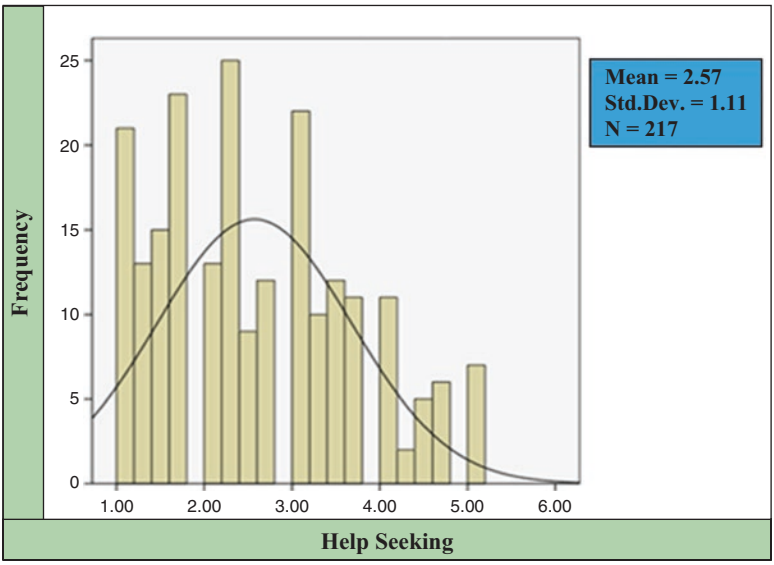

Fig. 2.6 Frequency distribution for Help Seeking

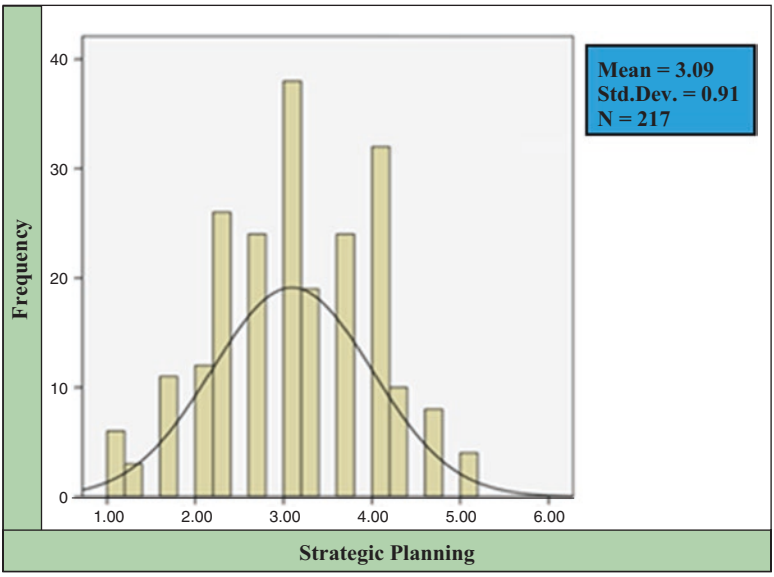

Fig. 2.7 Frequency distribution for strategic planning

Table 2.4 The subprocesses for midwives' self-regulated learning in a MOOC

Forethought	Performance	Self-reflection
Goal setting	Task strategies	Self-reflection
Readiness	Help seeking	
Strategic planning	Expansive critical thinking	

The seven factors have been identified as representing the following subprocesses in the three phases of self-regulated learning described by Zimmerman (2000). The Forethought Phase is represented by the subprocesses F4, *Goal Setting*; F3, *Readiness*; and F7, *Strategic Planning*. The Performance Phase is signified by F6: *Task Strategies*, F5: *Help Seeking* and F2: *Expansive Critical Thinking*. The Self-Reflection Phase comprises one subprocess F1: *Self-Reflection* (see Table 2.4). However, previous studies suggest that Zimmerman's (2000) three phases occur iteratively rather than sequentially (Fontana et al., 2015; Hood et al., 2015), so these three phases may not be distinct.

Self-Reflection refers to the ways learners reflect on and self-evaluate their learning and their satisfaction with their progress. It signifies how learners reflect on their learning in relation to their work. It reflects the learners' understanding of how their learning impacts on their work and practice. It also represents the ways learners evaluate their learning. This factor includes how each learner prefers to learn, for example, do they respond positively to being challenged, engaging in multiple tasks and understanding concepts as thoroughly as possible.

Expansive Critical Thinking relates to the learners' ability to play around with their own ideas as they learn and to think about alternatives to increase their learning. It also indicates the learners' capability to elaborate on their learning through combining different sources of information and relate this to what they already know. Furthermore, this factor reflects that there is an association between critical thinking and elaboration and the strategies the learners have in order to organise and improve their learning.

Readiness describes being feeling prepared for learning. The influence of self-efficacy is apparent, and the relationship between self-efficacy/confidence and interest and value in learning seems important. It also highlights the importance of drawing on past experiences when preparing for new learning. The preparedness seems to be connected to the learners' interests in what they are learning, and it also entails the value and importance of the learning.

Goal Setting is the ability to manage learning time and deadlines, setting both short-term and long-term goals. It reflects the need to be realistic about planning adequate time for learning. Central to goal setting is the idea of meeting goals and adapting ways of learning that have previously been successful. It is about the learners' investment in their own learning.

Help Seeking illustrates the different ways people seek help, including identifying other people who could help them learn, actively asking for information when needed and proactively asking for help when he or she does not understand something. An element of strategic planning, through reflecting upon what is going to be learned, is also important.

Task Strategies is about relating current learning to prior knowledge. It is also about asking oneself what is about to be learned and changing strategies if progress is not made. This factor has the strongest loading of the items.

Strategic Planning refers to the way the learner wishes to address learning challenges. When problems in learning are encountered, people prefer to work alone to select from a range of previously successful strategies for learning and adapt these. This factor has the lowest loading of items.

These processes of self-regulated learning and their implications for professional, networked learning are discussed in the next section.

Discussion: Implications for Networked Professional Learning

This analysis has identified how midwives engage in networked professional learning, specifically focusing on how they self-regulate their learning. A striking feature of the data is the importance of *Self-Reflection*. The mean score for self-reflection reported by the learners was 3.61, with a standard deviation of 0.92 (see Fig. 2.1). It could be argued that this finding signals that learning practice mirrors work practice, since a key feature of working as a midwife is using reflection as a form of critical thinking that enables integration of theory and practice. Midwifery is characterised as an autonomous profession, where midwives continuously have to make critical decisions that have life-and-death implications for birthing women and unborn babies. Therefore, self-reflection is an important and integral way of ensuring that each midwife makes the right decisions based on the best available evidence and clinical experiences (Wain, 2017).

Self-Reflection is about the ways learners reflect on and self-evaluate their learning and their satisfaction with learning. Self-Reflection is a critical form of practice for many health professionals, including midwives, so it may not be surprising that midwives reflect upon how they will learn in the MOOC network. One respondent described how she "spent time when walking thinking about it [learning in the MOOC]" (Respondent 214). To aid self-reflection of their learning, some respondents "took notes during sessions and while reading resources reviewed at the end and wrote a reflection on my own learning and thoughts" (Respondent 32) and "I took the info given in each module, read it, listened to the lectures, then wrote a synopsis of the info" (Respondent 189). Several respondents reported that they took notes to help them reflect on what they were studying in the course.

Another important factor is *Expansive Critical Thinking* which has a mean perceived score of 3.27 and a standard deviation of 0.95 (see Fig. 2.2) This factor is related to critical self-reflection: as learners self-reflect, they gain an understanding of the ways the concepts they learn could be applied to other areas of their practice. The approach of midwives to learning through expansive critical thinking reinforces the idea that they integrate learning with practice. Their responses indicated that midwives want to pinpoint where and how specific concepts they are learning might help them in the future, hence "expansive" critical thinking. This combination of

reflective and *expansive learning* characterises how midwives learn within the network. This finding reflects the approach to practice of midwives and other health professionals who tend to learn through thinking about alternative forms of practice that could be used to achieve specific outcomes. In maternity care and healthcare, professionals need to be able to offer the best available treatment for patients. Sometimes the best treatment might not be the most obvious solution, so midwives need to be able to think critically to find solutions.

Expansive Critical Thinking is about being able to elaborate on one's own learning and extend it across different contexts. Some of the respondents reported that they expanded their learning by looking for extra information. Typical responses included "each module took a lot longer […] as I looked for more information, or clicked on all the links" (Respondent 22) and "I do my own independent study and added the course into my routine. It mainly involved me reading before starting a module then reading about specific things I had learned in the module afterwards" (Respondent 5).

Another important factor is *Readiness* to learn, which has a mean perceived score of 3.77 and standard deviation of 0.84 (see Fig. 2.3). *Readiness* to learn is important for professionals learning in a MOOC, because they need to have the confidence and ability to be proactive in scaffolding their own learning. This factor connects the learners' interests in what they are learning with the value they place in what they are learning.

Readiness is about feeling prepared to learn. It relates to learners' self-efficacy, confidence, interests and values. Respondents reported that they felt prepared to be able to learn from the course: "I studied basically from the availed materials, articles and videos, which seemed very interesting and actually simple in terms of language and precision" (Respondent 169), and "I really wanted to do the assessment at the end so worked quite hard for the last weeks to finish of[f]" (Respondent 212). Some of the respondents did not feel prepared to complete all the course learning activities due to time constraints, professional workload or technological issues.

Readiness for learning and *Goal Setting* is part of planning, which has a lower mean score of 2.88 and a standard deviation of 1.02 (see Fig. 2.4). Goal setting involves setting short-term and long-term goals and managing time. Goal setting is particularly important when learning in a MOOC, since the participants have to allow time to interact with others, connecting and responding to feedback. The combination of setting goals to optimise readiness for learning is particularly important when learning in open networks. For some midwives, goal setting means defining personal goals. For example, Respondent 75 said "I had weekly goals". For many of the midwives, *Goal Setting* focused on managing how they spent time engaging in the course. Working in shifts and family demands (e.g. caring for young children) constrained the time many of the midwives had available for learning. Some organised themselves by allocating a specific amount of time as regular times slots for the course on a weekly basis: "I put a note in my calendar and found a quiet hour or two each week to look a[t] the material" (Respondent 165), and "I tried to give 2–4 hours daily" (Respondent 107). Others found time to engage at work during lunch breaks, or late evenings, weekends or off-duty time at home: "I would try and do the readings

et cetera during the week and then listen to presentation when I was sure I would have time undisturbed" (Respondent 209). Some midwives found it difficult to plan time for studying, and they had to find the time when it was possible: "Spasmodically as had to fit it in with a lot of other commitments" (Respondent 41).

Help Seeking and *Task Strategies* are two other important factors. *Task Strategies* has a mean score of 3.30 and standard deviation of 0.94 (see Fig. 2.5). This factor represents all the different strategies learners use while learning in a MOOC. It is important that if a specific way of learning does not support the learner, then he or she has to be able to find other ways to learn in the MOOC.

Task Strategies is about the ways learners personalise their learning through translating the information into their own words and relate to prior knowledge. The respondents reported that they engaged in the learning resources and activities by reading articles, watching videos and participating in the synchronous online presentations such as: "I did look at the relevant documents of the modules, listen to sermons downloaded and tried to understand the information given" (Respondent 137), and "I would try to review things weekly, but missed some weeks and caught up at other times" (Respondent 196). Many of the respondents stated that they went back to learning resources and downloaded the learning resources and activities to be able to revisit the resources for a deeper engagement on a later occasion: "I took time to download materials that I read afterwards" (Respondent 63) and "downloaded and read later" (Respondent 69).

Help Seeking is a specific type of learning task strategy. This factor had a slightly lower mean score of 2.57 and standard deviation of 1.11 (see Fig. 2.6) and is an important strategy for learning in a MOOC. It involves identifying and connecting with others who can offer relevant information and help learning. Help seeking is about to seek help when learners do not understand something.

Some respondents reported that they participated in the discussions in the synchronous online sessions and the forum discussions and "asked questions online when confronted with doubts" (Respondent 111). Some of the respondents were also seeking for help from and discussed their learning with others such as "discussing some of the research and citrate information with another midwife" (Respondent 11) or "discussions with colleagues and the forums" (Respondent 140). Not all learners did seek for help through interactions with other learners, but they got the information they were looking for by watching the dialogue between other learners in the discussions fora or chat rooms without interacting: "Read what others had written in the chat rooms" (Respondent 89).

Strategic Planning has a mean score of 3.09 and standard deviation of 0.91 (see Fig. 2.7). This factor refers to the way learners plan to use the various task strategies and forms of help seeking as they perform their learning. Strategic Planning is about the ways learners would like to address the learning tasks in the course and to be able to change these strategies if needed.

Many of the respondents emphasised the importance of how they planned their engagement in the course as "being systematic, read the intro, listen to recordings, watch video clips, download recommended resources, make notes, review feedback from others" (Respondent 4), and "while I try to modify my daily activities to fit in

with the time for the live presentations. Sometimes I had to wake up at midnight to participate in the live presentations" (Respondent 186). When the strategies are not possible to maintain, then learners are able to select from other successful strategies for learning they may have used previously. Respondents said, "I intended to go through the entire course (watch all videos and read all readings), but … I found myself not having enough time in my schedule. So I eventually ended up seeing the videos not in their entirety" (Respondent 115) and "[I] tried to complete each week within each week. This didn't always go to plan. Would settle down for several h[ou]r blocks at a time" (Respondent 167).

One of the most interesting findings is that Task Strategies, Help Seeking and Strategic Planning all represent the ways that midwives plan and perform different ways of learning within the MOOC.

It is important to consider some limitations of the study. The survey instrument used was a slightly modified version of a validated survey instrument (Fontana et al., 2015; Hood et al., 2015) to measure the subprocesses of SRL. A total of 217 respondents completing the survey with 38 items meant the sample size was sufficient for conducting an exploratory factor analysis (Henson & Roberts, 2006). The free text from the survey has added to the understanding of the seven subprocesses for midwives' self-regulated learning in a MOOC that emerged in the exploratory factor analysis in this study. However, more research is needed focusing on the learners' experiences of professional networked learning in online learning contexts such as MOOCs to expand the understanding of how professionals self-regulate their learning in open networks.

Conclusion

This study gives insight into the ways professionals engage in networked learning, as they draw on the available resources, experts and peers within the network. Midwives use a number of approaches to networked professional learning, through a combination of learning task strategies—of which help seeking is a specific case—and strategic planning. Planning largely is through goal setting and is aligned with an appreciation of each individual's readiness to learn. What is clear is that there is not a discreet delineation across the phases of planning, performing learning and reflecting on learning. These phases appear to be fluid and dynamic, rather sequenced than ordered in time.

This study provides clear evidence that professionals' tactics for networked learning are aligned to their approach to practice. We have strong evidence that the way midwives self-regulate their learning in a MOOC largely is characterised through self-reflection, as they reflect on what they have learned and what they need to learn next, and expansive critical thinking, as they learn and plan how they will apply this learning across different areas of practice. The intertwining of work and learning is a known phenomenon in professional learning (see, e.g. Billett, 2001; Fuller & Unwin, 2011). However, this study offers substantial empirical evidence

that professional networked learning is characterised and shaped by the approach to professional practice. This finding is important for HR professionals and those who design professional development, since it gives confirmatory evidence that professional development activity should be designed in ways that align with professional practice in different disciplines. The finding also highlights the complexity of designing professional learning where people from diverse professions are expected to learn together.

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Chapter 3
New Educational Formats for Professional Development: Accommodating the Invisible Learners

Christian Dalsgaard and Tom Gislev

Abstract The motivation of this chapter originates in an interest in the so-called dropouts, non-completing or disengaged participants of Massive Open Online Courses (MOOCs). In this chapter they are called invisible learners. Invisible learners are defined as the non-active and disengaged participants of MOOCs, who do not participate in and complete the course activities and possibly also drop out of the course. The objective of the chapter is to study how to characterise different learner groups in MOOCs and to discuss which educational formats can accommodate invisible learners in professional development. The chapter is based on an empirical study of an open online course designed specifically for different types of learner engagement by allowing different levels of participation. The study is primarily based on 11 interviews and a questionnaire answered by 51 participants. The analysis identifies five different levels of participation, namely, students (enrolled), attendees, members, observers and visitors. The chapter concludes that activities and assignments of students and attendees in a MOOC can provide a key centre for networked learning activities of invisible students that use these activities as part of or as an extension of their own professional practices.

Introduction

The motivation of this chapter originates in an interest in the so-called dropouts, non-completing or disengaged participants of Massive Open Online Courses (MOOCs). In this chapter they are called *invisible learners*. Invisible learners are defined as the non-active and disengaged participants of MOOCs, who do not participate in and complete the course activities and possibly also drop out of the course. They leave no or few traces of activity for the course providers to register. They are often termed inactive or disengaged, and they do not do the assignments, quizzes and tests in the MOOC that they have registered for.

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The massive part of most MOOCs are actually the participants that do not complete the MOOC (Daniel, 2012). Only a small minority (of about 10%) complete the course as intended by the MOOC providers (Jordan, 2014). Thus, one could argue that if the aim of MOOCs is the M, then focus should be turned towards the non-completing group. Whereas low completion rate can be viewed as a major shortcoming of MOOCs, this paper wishes to focus on the non-completing, not with the intention of necessarily aiming for increasing the completion rate but rather to study the motives and needs from the non-completing participants and to explore educational formats that accommodate this group.

This chapter is based on an empirical study of an open online course designed specifically for different types of learner engagement by allowing for different levels of participation. The study is primarily based on 11 interviews and a questionnaire answered by 51 participants. Based on the findings of the study, the paper will discuss and question the MOOC format as a relevant educational format for the 'massive' group of non-completing participants. The main critique of the MOOC format in relation to this target group is the C, the course format. The findings from the current empirical study show that some of the participants were from the outset not interested in completing a course or doing assignments.

As Littlejohn and Hood (2018) argue, there is often a conception that completing is the best and most valuable way of participating in a course. However, MOOCs 'have the potential to legitimise learning behaviour that in traditional contexts would be characterised as deviant, nonlearning, associated with failure' (Littlejohn & Hood, 2018, p. 50). A number of previous studies have examined how learners participate in different ways in MOOCs (Littlejohn & Hood, 2018; Littlejohn et al., 2016; Milligan and Littlejohn, 2017). Milligan, Littlejohn, and Margaryan (2013) distinguish between three types of learner engagement: active participation, passive participation and lurking. Further, their study identified that different factors such as confidence, prior experience and motivation influenced participants' engagement. Clow (2013) introduced the metaphor of 'funnel of participation' to describe his findings of a steep decline in student participation during the run of a course. He concludes that unequal participation is characteristic of MOOC learners. Finally, a widely used typology has been developed by Kizilcec, Piech, and Schneider (2013) in a study of subpopulations of MOOC participants. Along with the other study, this study shows that completing a course is not the only way of learning from a MOOC. The study identifies four prototypical types of learner engagement in MOOCs: learners completing, auditing, disengaging and sampling. A key finding in Kizilcec et al. (2013) study is that within all types of learner engagement, there were satisfied participants. For example, the auditing participants generally expressed a high degree of satisfaction, although none of them completed the course.

Invisible Learners in Professional Development

A hypothesis behind the current study is that the ways in which invisible learners utilise MOOCs are of particular relevance to professional development. A target group aiming at professional development has different motives and objectives than

students enrolled at a university. Thus, it is relevant to study activities and forms of participation in MOOCs for such a group. As Ho et al. (2015) also argue, it might be fruitful for 'disengaged' users to participate in MOOCs without completing:

> If we wished only to increase overall certification rates, one solution is simple: restrict access. Online browsers, online explorers, and teachers-as learners would not benefit from such a policy. And MOOCs would lose their first two letters and much of their claim to innovation, instead becoming familiar, smaller, online courses. (Ho et al., 2015, p. 33)

The point made by Ho et al. (2015) is that a strict focus on participants who complete a course might overlook a group of participants that utilise the course content and activities in different ways and possibly in ways not intended by the course providers. Ho et al. (2015) indicate that the non-completing will also benefit from MOOCs. This is supported by the study of MOOC participants in the studies of Kizilcec et al. (2013) and Littlejohn and Hood (2018). These results suggest that there are educative potentials within other levels of participation than completing MOOCs. In the study presented in this chapter, the focus is on potentials of invisible learners related specifically to professional development.

Research Questions

Based on the discussion above, the chapter explores the following research questions:

1. How can different learner groups in MOOCs be characterised?
2. What are the activities, needs and learning outcomes of invisible learners?
3. Which educational formats can accommodate invisible learners in professional development?

Based on an empirical study of user activities in MOOCs, the chapter will investigate activities of different learner groups. Further, the study will more specifically examine activities, needs and learning outcomes of invisible learners. This finally leads to a discussion of how new kinds of educational formats might support professional development.

The (M)OOC Design of the Study

The MOOC in the study was designed specifically to be able to study the research questions. This also means that the findings of the study cannot be generalised to other MOOCs. The objective of the study is to identify emerging patterns of participation.

In order to study the research questions, a MOOC was designed to accommodate different levels of participation, inspired by Kizilcec et al. (2013), and also to invite participants seeking professional development. This meant that the different

participants could choose to participate in a number of activities: write blog posts, comment on blog, read literature, watch teacher videos, work on assignments and read blog posts. None of the activities were prerequisites for participating in the other activities. The MOOC was designed as part of a course in a master's programme in ICT-based Educational Design at Aarhus University. The course, called 'Digital Learning Contexts', was organised so that the first 6 weeks of the course was run as a MOOC, open for anybody who was interested in the subject matter. It was mandatory for the students enrolled in the master's programme to participate in all activities and to hand in all the assignments because it was part of an for-credit course with (ECTS) points. Besides being part of the course, the MOOC was offered as further education targeted at educational professionals in Denmark, thus aiming at professional development. There were 25 enrolled students in the master's programme, and there were 165 registered external participants. Due to the small number of external participants, the designed course was in practice not a MOOC but rather an OOC. However, the massiveness of participants is not key to the objectives of the current study. Rather, the most important thing for the designed course is the openness and opportunities to participate on different levels.

The (M)OOC was designed as an aggregation of different digital tools: all activities were handed in as blog posts in a WordPress environment, Google Docs was used for group collaboration, there was a Facebook group for discussions, YouTube live was used to stream supervision sessions and record them for later viewing and Twitter was used for communication with outside interest groups.

Methodology

The research design for the study is a mixed methods approach combining qualitative and quantitative methods (Tashakkori & Teddlie, 2010). The study is first and foremost a qualitative study aiming at in-depth analysis of different levels of participation. The studies of this paper consist of a survey answered by 51 MOOC participants and 11 interviews with selected participants.

A survey to all the participants of the open online course was performed after completion of the course. The objective of the survey was to gather quantitative data related to the first research question: how do learners participate in different ways in open online courses? The survey was intended to provide a broad overview of which activities the learners had participated in, how much they had participated and what they had achieved from the different activities. This study is inspired by Kizilcec et al. (2013), but to supplement their study, the current study was not based on identifying student completion, dropout or disengagement, but rather on mapping what activities the students participated in.

As mentioned above, the MOOC was designed to allow for a number of activities: write blog posts, comment on blog, read literature, watch teacher videos, work on assignments and read blog posts. These activities formed the basis of the survey, that examined the students' participation in each activity and the learning outcome

of each activity. For the study in this paper, the key question in the survey is shown in Table 3.1. The participants were asked about their level of participation in the activities of (1) online tutoring, (2) reading literature, (3) watching teacher videos, (4) working on assignments, (5) writing blog posts, (6) reading blog posts and (7) commenting on blog.

The questionnaire also contained background questions on age, gender, educational background, residence and job status.

Table 3.1 Questions in the survey

1. How will you describe your overall working effort in the course? Options: I have followed the entire course I have followed parts of the course I stopped completely before the course ended I did not start the course and I have not followed it
2. How will you describe your overall participation in the course? Options: I have done all the assignments, read and commented on the blog I have done some of the assignments, read and commented on the blog I have read and commented on the blog I have read the blog None of the above Other: _____
3. How much have you participated in the following activities in the course? Scale: To a very large extent (4 points) To a considerable extent (3 points) To some extent (2 points) To a lesser extent (1 point) Not at all (0 points) Written blog posts Commenting on blog Read the literature Watched the teacher videos Worked on assignments Read blog posts
4. To what extent have you learned from participation in the following activities in the course? Scale: To a very large extent (4 points) To a considerable extent (3 points) To some extent (2 points) To a lesser extent (1 point) Not at all (0 points) Written blog posts Commenting on blog Read the literature Watched the teacher videos Worked on assignments Read blog posts

To establish a terminology to discuss the participants' level of engagement in the different activities, the study reflects on the visibility of the activities. As mentioned above, the study includes the following activities of the course:

- Write blog posts (visible)
- Comment on blog (visible)
- Read literature (invisible)
- Watch teacher videos (invisible)
- Work on assignments (invisible)
- Read blog posts (invisible)

Even though the focus was on experiments and discourse, reading was still a central part of the course design. There was a basic course syllabus containing academic literature that the participants were encouraged to read. Furthermore, the participants were also encouraged to read each other's blog posts and the comment threads that branched out from these blog posts. In this study, reading was regarded as an invisible activity, because there was no reliable way to detect whether the participants had read the abovementioned texts. Albeit indications on the participants' reading activities can be obtained by looking at their blog posts and comments, they are only circumstantial evidence at best and do not give a clear picture of the participants' level of engagement in terms of reading; hence reading is regarded as an invisible activity. Also, work on assignments is invisible, because it involves making analyses, observations and experiments in practice. Blog posts are the final outcomes of the assignments, but not all participants wrote these when working on assignments.

The objective of the qualitative study was to go further into depth with the first research question 'How can different learner groups in MOOCs be characterised?', and more specifically to study in detail the second research question: 'What are the activities, needs and learning outcomes of invisible learners?' The qualitative study consisted of interviews with MOOC participants. For the interviews, the interview guide in Table 3.2 was developed and used.

Eleven interviews were completed with participants of the course. The 11 interviewees were chosen in order to represent a variation in course participants. Thus, the aim was to pick interviewees from the different categories of participation identified from the survey. Based on activities on the blog (both posts and comments), the Facebook group and in Google Drive, students with different levels of participation were chosen and contacted by email.

Participants

Fifty-one of the 165 registered participants filled in the questionnaire. Their average age is 46 years. A total of 66.7% are female (n = 34) and 33.3% are male (n = 17). The majority of the participants have a former degree; 33.3% have a professional or

Table 3.2 Interview guide

Theme	Interview questions
Forms of participation	Why did you want to participate in the MOOC? How have you been working in the MOOC? Can you describe how you have participated in the MOOC? What kind of 'environment' have you participated in?
Use forms and learning outcome	What have you achieved from participating in the course? What elements of the course have you found useful?
Communication between learners	What is your experience of the academic communication and interaction between participants (on the blog)? How will you describe your communication with the enrolled students? What are your experiences with group work in the course? How have you collaborated in your group?
Enhancement of qualifications	What was your purpose or motive for participating in the course? How do you keep up to date within your professional area? How do you enhance your qualifications?

university bachelor's degree (n = 17), 37.3% (n = 19) have a master's degree and 25.5% (n = 13) have a different higher education degree. The majority of 82.4% (n = 42) have a full-time job. To a large extent, the majority of the participants would be the typical target group for continuing education.

Different Levels of Participation

Fifty-one participants answered the questionnaire. Of the 51, 39 had started the course, whereas the remaining 12 did not do any course activities. Thus, the latter 12 did not answer the questions in Table 3.1 concerning course activities, and they are not included in the results presented below. The results from the 39 responses are shown in Table 3.3 below. The table shows the levels of participation within each of the seven activities and a total level of participation from each of the participants.

The table shows which activities each participant has engaged in and also the level of engagement within each activity (points from 0 to 4). The participants are sorted by the total level of engagement, which is calculated by adding up the points for participation in each activity. The table shows a large variation in student activities and engagement and no obvious patterns of participation.

Seventeen participants were engaged in visible activities, whereas 22 participants were only engaged in activities invisible to the teacher and the other participants. To sort the participants by degree of visibility, each participant's percentage

Table 3.3 Participation sorted by total level of participation

No	Tutoring	Literature	Videos	Assignments	Blog posts	Read blog	Commenting	Level of participation
33	4	4	4	4	4	4	4	32
34	4	3	4	4	4	3	4	30
1	2	4	4	3	3	4	3	24
35	2	3	3	4	3	2	3	24
37	1	2	3	3	3	3	3	22
38	0	2	3	3	3	4	4	20
8	2	3	3	1	0	3	3	17
12	3	2	4	1	1	4	1	17
36	2	2	2	2	2	2	2	16
9	2	3	3	1	0	3	1	14
10	2	2	2	1	1	3	2	13
13	1	3	2	1	1	2	1	12
28	2	1	3	1	0	3	0	11
21	2	1	2	1	0	3	0	11
15	0	4	3	0	0	3	0	10
18	0	2	2	2	0	2	0	9
27	2	1	1	1	1	1	1	8
32	1	2	2	0	0	2	0	8
17	2	2	2	0	0	1	0	7
19	0	2	2	1	0	2	0	7
20	1	2	2	0	0	2	0	7
26	0	2	2	0	0	2	0	7
11	1	1	1	0	1	1	1	6
30	1	0	1	1	1	1	0	6
24	0	1	2	0	0	2	0	6
5	1	1	1	0	0	1	1	5
2	0	1	2	0	0	2	0	5
7	0	4	0	0	0	1	0	5
23	0	2	1	0	0	2	0	5
25	0	1	1	1	0	1	0	5
14	0	1	1	0	0	2	0	4
16	1	1	1	0	0	1	0	4
29	0	1	2	0	0	1	0	4
31	2	1	0	0	0	1	0	4
39	0	0	0	2	0	0	0	2
6	0	0	0	0	0	1	1	2
22	0	1	0	0	0	1	0	2
3	0	1	0	0	0	0	0	1
40	0	1	0	0	0	0	0	1

of 'visible' and 'invisible' activities was calculated. Looking only at the 22 invisible participants, Table 3.4 shows that they have primarily watched videos, read the course literature and read the blog posts written by the visible participants. They have generally been less active than the visible participants.

What is relevant, however, is also to look into the experienced learning outcome of the participants. A weighted average level of learning outcome was calculated for each participant based on the answers to the question 'To what extent have you learned from participation in the following activities in the course?' The weighted average level of learning outcome only includes the activities that the participants were active in. In Table 3.5, the participants are sorted by their weighted average learning outcome. Although in general, the visible participants have experienced the highest learning outcome, several of the invisible participants have experienced a relatively high learning outcome, in spite of their limited participation.

The conclusion of the survey is that the participants have participated in the course in many different ways. They have participated in different activities, and their level of participation within the activities also varies. Within the studied sample, there is a tendency that the participants that have engaged in many of the course activities are also the ones that are most active within each of the activities. However, it should be noted that there are also examples of participants who have a relatively high level of activity within a few of the activities. For example, student number 15, 21 and 28 are relatively active within watching videos, reading blog posts and also reading course literature (student number 7 and 15). Based on the survey data, it is difficult to divide the participants into specific groups.

However, it is possible to identify some overall patterns of participation, also with inspiration from Kizilcec et al. (2013). As an answer to the first research question, participants can be identified as:

- Students (enrolled)
- Attendees
- Members
- Observers
- Visitors

Students are the enrolled students (in the ECTS course) that participate in all course activities. Attendees are external (M)OOC participants who act very similar to the enrolled students; they do all or most of the course activities and complete the course. Members are participants who may do a few of the assignments and also comment on some blog posts, but they do not complete all course activities. Observers are participants who do not leave any visible signs of activity but only browse course literature, blog posts and videos. Finally, visitors are external viewers who have not registered for the course and only browse selected course materials.

This categorisation of participants has been used as a basis for selecting people for interviews. The aim of the participant interviews has been to further understand how they have participated in different ways and to understand their learning outcomes and needs for learning. Of the 14 interviews, 3 were enrolled (ECTS) students and 11 were external (M)OOC participants. Below follows a

Table 3.4 Participation sorted by visible (white) and invisible (blue) participants

No	Blog posts	Commenting	Videos	Assignments	Literature	Read blog	Tutoring	Level of participation	% visible activities	% invisible activities
33	X	X	X	X	X	X	X	32	100	100
34	X	X	X	X	X	X	X	30	100	90
38	X	X	X	X	X	X		20	87,5	60
1	X	X	X	X	X	X	X	24	75	85
35	X	X	X	X	X	X	X	24	75	70
37	X	X	X	X	X	X	X	22	75	60
36	X	X	X	X	X	X	X	16	50	50
8		X	X	X	X	X	X	17	37,5	60
10	X	X	X	X	X	X	X	13	37,5	50
12	X	X	X	X	X	X	X	17	25	70
13	X	X	X	X	X	X	X	12	25	45
27	X	X	X	X	X	X	X	8	25	30
11	X	X	X		X	X	X	6	25	20
9		X	X	X	X	X	X	14	12,5	60
30	X		X	X		X	X	6	12,5	20
5		X	X		X	X	X	5	12,5	20
6		X				X		2	12,5	5
28			X	X	X	X	X	11	0	50
15			X		X	X		10	0	50
21			X	X	X	X	X	11	0	45
18			X	X	X	X		9	0	40
32			X		X	X	X	8	0	35
20			X		X	X	X	7	0	35
19			X	X	X	X		7	0	35
17			X		X	X	X	7	0	35
26			X		X	X		7	0	30
24			X		X	X		6	0	25
7					X	X		5	0	25
23			X		X	X		5	0	25
2			X		X	X		5	0	25
25			X	X	X	X		5	0	20
16			X		X	X	X	4	0	20
14			X		X	X		4	0	20
29			X		X	X		4	0	20
31					X	X	X	4	0	20
39				X				4	0	10
22					X	X		2	0	10
40					X			1	0	5
3					X			1	0	5

Table 3.5 Participation sorted by level of learning outcome for visible (white) and invisible (blue) participants

No	Tutoring	Literature	Videos	Assignments	Blog posts	Read blog	Commenting	Level of participation	Level of learning outcome	% visible activities	% invisible activities
1	X	X	X	X	X	X	X	24	4,00	75	85
33	X	X	X	X	X	X	X	32	3,92	100	100
9	X	X	X	X		X	X	14	3,71	12,5	60
35	X	X	X	X	X	X	X	24	3,42	75	70
12	X	X	X	X	X	X	X	17	3,10	25	70
15		X	X			X		10	2,60	0	50
34	X	X	X	X	X	X	X	30	2,55	100	90
26		X	X			X		7	2,50	0	30
20	X	X	X			X		7	2,50	0	35
10	X	X	X	X	X	X	X	13	2,43	37,5	50
39				X				4	2,33	0	10
19		X	X	X		X		7	2,33	0	35
8	X	X	X	X		X	X	17	2,22	37,5	60
36	X	X	X	X	X	X	X	16	2,00	50	50
27	X	X	X	X	X	X	X	8	2,00	25	30
32	X	X	X			X		8	2,00	0	35
28	X	X	X	X		X		11	2,00	0	50
37	X	X	X	X	X	X	X	22	1,75	75	60
38		X	X	X	X	X	X	20	1,71	87,5	60
17	X	X	X			X		7	1,71	0	35
7		X				X		5	1,67	0	25
21	X	X	X	X		X		11	1,67	0	45
30	X		X	X	X	X		6	1,60	12,5	20
23		X	X			X		5	1,60	0	25
13	X	X	X	X	X	X	X	12	1,50	25	45
40		X						1	1,50	0	5
24		X	X			X		6	1,50	0	25
25		X	X	X		X		5	1,43	0	20
16	X	X	X			X		4	1,40	0	20
18		X	X	X		X		9	1,40	0	40
2		X	X			X		5	1,38	0	25
11	X	X	X		X	X	X	6	1,33	25	20
14		X	X			X		4	1,29	0	20
5	X	X	X			X	X	5	1,00	12,5	20
22		X				X		2	1,00	0	10
6						X	X	2	0,00	12,5	5
3		X						1	0,00	0	5
29		X	X			X		4	0,00	0	20
31	X	X				X		4	0,00	0	20

presentation of the analysis of the interviews within each of the five levels of participation—primarily members, observers and visitors, because they represent the group of participants who do not complete the course. The analysis provides the answer to the second research question concerning activities, needs and learning outcomes of the invisible learners.

Students (Enrolled)

The students wrote most of the blog posts and also most of the comments on the blog. In other words, the enrolled students were accountable for most of the production and discussion in the course. The students took part in all course activities: reading course literature, producing, collaborating, writing blog posts, participating in online feedback sessions and commenting on blog posts.

Attendees

Some of the participants in this group would be the so-called completing in the sense that they did all course activities and completed the course. However, some attendees did only attend part of the course. Thus, their participation is much similar to that of the enrolled students. From the interviews, it is learned that they see their role as 'attending a course'. The point of attending is that these participants more or less perceive themselves as students in a course. Thus, it is not surprising that they all—like most of the other participants—entered the course with the ambition of completing it.

Some of the interviewed participants argued that they felt that they had to try out the ideas in their own practice to achieve any profound learning. Others argued that with all the time invested in the course, they felt compelled to keep up the engagement to qualify for the final certificate. This group of participants is very similar to the 'completing' group of Kizilcec et al. (2013), but they slightly differ, as the participants cannot be categorised as attendees throughout the whole course. At times, participants will, for instance, go from attendee to member, and thus the same participant can belong to more than one category.

Members

Participants in this group can be said to be part of the course—but without attending it or aiming at completing it. These participants have not participated in all course activities; that is, they have typically not done the assignments, not participated in group work and not written blog posts. They may occasionally participate in discussions.

In the interviews, the participants express a certain sense of belonging to the course activities. They are members in the sense that they can follow the activities, and it is legitimate to stay on the sideline and only take part in some of the activities. It is obvious that these students participated in other ways than the attendees and they had other approaches and objectives of participating. For example, several members had a strong focus on interacting and connecting with other people who share their interest in the field.

> To connect with people whom I share an interest with.
>
> That thing about engaging in and developing your network and connecting with other people.
>
> There is an opportunity to get in contact with many, many people in the whole country and learn about how they do things.
>
> I thought that I could be together with someone who speaks within the same discipline as me and who shares my interests.
>
> To be able to find like-minded.

This approach to the course meant that these students participated differently compared to the attendees. For example, the student below participated in discussions and also engaged in discussions with one of the student groups.

> I participated on the blog, where I commented on everything that I possible could.
>
> Someone wanted to write about [a learning management system], and then I volunteered to comment on their work. … So they used me by sending me some of their assignments, before they handed them in. … They had some thoughts, and then I asked them questions in return, which they could reflect on.

Observers

Participants within this group have not contributed to group work, they have not worked on the assignments and they have not written blog posts or commented on them. Within this group, some of the participants have to a large extent read the course literature, watched teacher videos and read the blog posts. Further, their evaluation of their own learning outcomes of reading course literature, watching teacher videos, reading blog posts and reading blog discussions is high. Whereas the attendees have been somewhat stable and consistent in their participation in most course activities, the observers are very selective. Some have primarily read the course literature, whereas others have primarily spent time on reading the blogs and blog discussions. Thus, these participants express a wish to be part of the course on the sideline and choose what is relevant for them, as the following quotes show:

> I have used it for inspiration and new knowledge, and I think that it is nice to be able just to be present without having to be actively engaged. … I have learned valuable things on the sideline.

> You knew that you could always go in and take a look at things and read, and new things would appear.
>
> It has been an educational course where it was OK to be a wallflower, because that is what I have been. And I have received valuable learning from the sideline.
>
> I would like to participate again another time, but I think that my starting point would be to participate on the sideline, only viewing. Next time that I will participate … I will just do it in my spare time, and then just watch what you are doing.

The aim of these participants was to view and observe. As the quote below indicates, they were not interested in doing assignments or tasks, and they did not wish to collaborate or even discuss with other participants. But their 'passive' observations were meaningful to them.

> I did it [took the course] to connect with the activities and see what happened and acquire knowledge about these things. Maybe to get updated, when I knew that I would not do the assignments.

Visitors

A final group is very similar to the observers. From data from Google Analytics, we could see that the course was used by non-registered participants. These are the ones that are termed visitors. In the study, it was not doable to study these participants in detail because it was only possible to see traces of them in Google Analytics. These data indicate that the visitors are even more selective than the observers and that they only visit few elements in the course.

New Educational Formats for Professional Development?

Taken together, the members, observers and visitors are only rarely visibly active in the course. It was only possible to identify traces of their activities. However, they are active in the sense that they read literature, view videos and reflect on the course content in relation to their own practices. Therefore, it is not possible to say that they are attending a course, because they do not perform the course activities, that is, handing assignments and discussing with peers. Rather, they are using course activities as input to their current practices. From the outside or from the perspective of the teacher, they can be considered as consumers of course content. The members, observers and visitors will often be considered as dropouts or non-completing, and they would not count as successful participants. Further, MOOCs are primarily designed for active participation and with the aim of student completion. Such courses are designed in ways that imply student participation, doing assignments and participating in discussions. In other words, they are designed for students and attendees, not for members, observers and visitors. If it is educationally

valuable—as the interviews indicate—to participate in MOOCs in different ways, the question is, how can educational formats for members, observers and visitors be designed. In this final section follows a discussion of the third research question by presenting three ideas for educational formats that aim at accommodating invisible learners in professional development.

Dron and Anderson (2007, 2014) have proposed a model for social forms for learning in online contexts. The model contains three different social formations, called *group*, *net* and *set*, that 'all are bound by common attributes of sharing and communication that can contribute to the learning of others' (Dron & Anderson, 2014, p. 72). The group is the most commonly used social form of our traditional formal educational activities. Also known as the class, a group is a unit of individuals gathered around a common (educational) purpose. The net is an aggregation of nodes, that being individuals or groups of individuals, or even things, that connect through interaction, one node at a time. Finally, there is the set which is the social form of an aggregation of people and things with common attributes. The model's usefulness lies in its ability to make sense of different social online educational settings both in formal and informal contexts. Below, the discussion of educational formats connects to these social formations.

Open Online Course

To accommodate the attendees of the MOOC, a traditional course format is suitable. An open online course is a formal educational procedure. The term 'course' implies an educational context and involves a lot of different qualities or concepts that distinguish it from other ways in which people might organise themselves. These characteristics align with the social form 'group' (Dron & Anderson, 2014). This is of course not surprising, being that the 'core' of the course was designed for enrolled university students. What *is* interesting is that only a few of the participants from the outside engaged in the MOOC in this social form, in spite of invitations to do so. What we saw from the interviews is that the members and observers did not have a need for specific learning objectives and a specific course content. Rather, they were looking for inspiration and input. This suggests that the course might not have been the right format for them and their specific needs for professional development.

Open Online Community

The term 'open online community' is applied to describe an informal formation, being a network or a group of people organised around a certain context. A community might contain some of the characteristics that can accommodate the members, observers and visitors. A community might revolve around a certain practice,

a certain activity, a certain content, a certain shared space or identity. The term ‘community’ signifies something else than the term ‘course’. A community might be regarded as an aggregation of nodes in a network, and a network is not organised around a hierarchic structure (Dron & Anderson, 2014). There are no authorities in a network, just the ability to connect or to disconnect. A community is dynamic and constantly changing, nodes might connect, disconnect and even reconnect as they see fit. As opposed to a course, the existence of a community organised as a network is largely dependent of its members. Basically, the community is its members and it would cease to exist if all the members disconnected from each other for one reason or another. This description of the community aligns very well with the social form net. Some of the participants did connect due to their mutual engagement in the MOOC, and thus potential network-related connections between the enrolled students and the participants from outside of the university were registered.

Networked Learning Around a Common Centre

As stated earlier, only few outside participants did actually engage in the group or the network settings in the MOOC, albeit a bit more were part of the net than part of the group. The majority of the outside participants were not part of either social form. Sometimes the online learning activities end up in emerging social structures that can be described neither as groups nor as network connections.

On one hand, they do not belong to any group, they are on their own schedule and the purposes of the activities are set by themselves. On the other hand, they do not know anybody close enough to describe their engagement as a network. This is the social form of the set. The set consists of people and things with similar attributes and in the same categories (Dron & Anderson, 2014). The important part here is that the set emerges as the MOOC progresses, it is not there from the start. The set takes shape from the participants and their blog posts, teacher videos and other content that is produced by the enrolled students in the group. It is the content generated primarily by the participants in the group, but also to some extent by the participants in the net, that makes it meaningful for the observers and to some extent the visitors to follow or return to the MOOC for inspiration and input that they use in their own practices with colleagues and other peers. Basically, the evidence points towards the notion that the set was the reason that the invisible learners actually participated.

Conclusion

The presented study provides insights into how invisible learners engage in and make use of MOOCs. The analysis of the empirical data identified groups of *members*, *observers* and *visitors* as examples of invisible learners that engage in MOOCs in very different ways than enrolled students. The study shows that invisible

learners looking for professional development are not necessarily interested in a traditional course structure with assignments, curriculum and learning objectives. In that sense, invisible learners are not necessarily interested in completing or even participating in (part of) a course. The results of the presented study point towards that networked learning should not dismiss other social forms that might support networked activities. Especially within professional development, it can make sense to connect more traditional course or community activities to other learners by opening up these activities and allowing for both members, observers and visitors to connect and bring it out and into their own professional practices.

The findings from the study put forward questions concerning educational formats for invisible learners looking for professional development: learners for whom a course might not be the right format. The results of the presented study do not provide answers to these questions. However, the results do show that the learning activities of groups or communities—and products of these activities—can be considered focal points around which online, 'invisible' learners converge and engage in networked professional learning. In the study, the observers and visitors used activities in the MOOC as part of or as an extension of their own networks. There are similarities with the studied MOOC and the original cMOOC 'Connectivism and Connective Knowledge' developed by Siemens and Downes in 2008 (Downes, 2013; Siemens, 2005). However, the current study points towards the distinction between different target groups and different roles that participants can and wish to play in an open online course. The study calls for more attention towards these different forms of learner engagement in design of future educational formats for professional development.

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Chapter 4
Communities of Inquiry in Crisis Management Exercises

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Abstract Employees working in diverse settings such as schools, shops and government organisations have to be prepared for crisis situations, for example, a school shooting, extreme weather flooding, a health pandemic and so on. In these situations, they have to deal with the unexpected which makes it difficult to anticipate what they need to learn and how. This chapter examines how employees learn to deal with crisis situations, specifically focusing on whether a crisis management exercise could contribute to the development of a community of inquiry (CoI). The CoI model is chosen as the underpinning theory because it is assumed that learning communities create awareness, trust and support knowledge sharing, which are necessary pre-conditions for collaboration in crisis management situations. The study uses a combination of quantitative and qualitative data to analyse a simulated crisis exercise. The first round of analysis evidences that the exercise does not contribute to the development of a learning community. Digging deeper into the data in a second round, the results show that the CoI model does not reflect the various types of learning communities that develop within a crisis management exercise, such as home communities, cohort communities, specialist communities and local working groups. A key recommendation is that the CoI model should be expanded to include these four community types. Four additional key concepts appear important for community development in crisis management exercises: adoption of the various group, considering important partnerships, value creation and visibility. The extended CoI model could help to plan, monitor and evaluate professional learning of learning communities in future crisis management exercises.

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Introduction

Contingency planning for 'worst case scenarios', such as pandemics or terrorist attacks has become a feature of modernity (Aradau & van Munster, 2012). People expect that countries and organisations have crisis management plans in place to help them deal with unexpected and disruptive events that harm nations, organisations or people. Policymakers in Sweden have developed a national crisis management system that supports people working in different organisations, such as private industry or public offices, in managing and containing a crisis within single organisations or across different sites. This system is based on the principle that employees working in diverse work settings such as schools, shops and government organisations must be prepared for the unexpected and the 'unthinkable', such as a school shooting, extreme weather flooding, a health pandemic and so on. Dealing with a crisis may require employees in diverse roles spread across different organisations to work together to mitigate the crisis. Employees with different levels of education, work experience, communication approaches, tools, values, cultures and routines must be able to work together to find ways to share information and reach decisions. They are expected not only to communicate with others in their own workplace but, potentially, with people in other organisations as well. To achieve these goals, employees in a range of different disciplines and workplaces need to develop competencies in crisis management. Under these circumstances, it is difficult to appreciate what must be learned and how, because it is impossible to know beforehand which groups of employees might get involved in specific situations. This makes the conditions for learning how to handle an unexpected situation more complex than conventional workplace learning situations.

The conventional way to prepare employees for crisis management is to enable them to engage in various types of learning exercises. There are many different types of exercises, varying from discussions of what to do if a crisis situation occurs (often termed 'tabletop' exercises), to a range of practice and operative exercises (often called field exercises) and various types of simulations (Aradau & van Munster, 2012; Boin, Kofman-Bos, & Overdijk, 2004). However, few of these learning exercises are designed and evaluated using pedagogical theories and models (Magnusson & Öberg, 2015). This means that organisations are planning, performing and evaluating learning exercises without knowing whether these activities are supporting professionals in developing the wide range of competencies needed to resolve a crisis situation (Andersson, Carlström, Ahgren, & Berlin, 2014; Berlin & Carlström, 2015; Borell & Eriksson, 2013; Perry, 2004).

In the second and third chapters of this book, professional networked learning is considered as a form of online learning. However, learning at work often is blended, integrating online activity with face-to-face interaction. In this chapter, professional networked learning is examined both within organisations (at an intra-organisational level) and across organisations (at an inter-organisational level). One key issue is to identify what kind of models or theories of learning could be applicable and useful in designing learning exercises that support professional networked learning, specifically aimed at building capacity in crisis management competencies.

This chapter outlines an evaluation of a crisis management learning exercise. This exercise aimed to enable employees to work together during a flood crisis. To respond to a flooding incident, employees learned how to collaborate with other people in their own organisation as well as groups in other organisations. The Community of Inquiry (CoI) model (Garrison, Anderson, & Archer, 2000) was selected as an underpinning theory because it is assumed that learning communities create awareness, trust, and support knowledge sharing, and these are necessary pre-conditions for collaboration in crisis management situations. These assumptions align with the presuppositions of networked learning. Therefore, the use of the CoI model can align with and add value to the networked learning area.

The aim of the research project as presented in this chapter was to ascertain whether specific forms of learning exercises contribute to the development of a CoI. The learning exercise evaluated in this study was designed as a set of 'tabletop' activities – meetings, discussions, and shared experiences – based on cases found in local crisis management plans. The research aimed to understand whether engaging in these kinds of activities would support the participants in building a learning community. Because the groups of employees were not co-located, the project also paid attention to the group's use of various types of information technology, questioning whether those tools would support community shaping. In the following section, the CoI model and its theoretical background are explained in more detail.

The 'Community of Inquiry' Model

The roots of Vygotsky's (1978) sociocultural theories are based on the idea that learning and development are interactive processes. Wenger (1998, p. 4) presents a related social theory based on the idea of 'learning as social participation' in which he describes 'informal learning, mediated through communities of practitioners' as an effective form of learning. Both theories are relevant to learning situations that emphasise collaboration, which is important in crisis management situations. Therefore, communities are a theoretical concept that could be used to understand and describe learning among people in groups (see also, Chap. 12, Vrieling-Teunter, Wopereis, Van den Beemt, De Laat, & Brand-Gruwel, this volume; De Laat, 2005). According to Shea (2006), there is consensus that online learning communities can be established to support the creation and sharing of knowledge within groups. Shea (2006) argues for the examination of the foundation and assumptions behind this community concept from theoretical, philosophical and pedagogical perspectives. From a theoretical perspective, there has been a shift from behaviourism towards adoption of socioculture theories. In parallel, there has been a philosophical shift from objectivism towards constructivism (ibid., 2006). These transformations have also been observed in changes in pedagogical approaches that have transformed from a perspective of teaching as instruction towards the idea of facilitating learning. To analyse these various transformations, a CoI model was developed to analyse constructivist interaction in online blended and face-to-face courses (Garrison et al., 2000).

The concept of the CoI model is grounded in John Dewey's progressive understanding of education (Garrison, 2016; Garrison et al., 2000). Dewey was an American philosopher and reformer whose ideas influenced education and society in general. His model was further developed and applied to online education by Garrison et al. (2000). The CoI model is based around 'three elements essential to an educational transaction: cognitive presence, social presence, and teaching presence' (Garrison et al., 2000, p. 87). To elicit an effective educational experience, all three elements must exist and balance each other. Garrison et al. (2000) posited that the cognitive element is fundamental for student success in higher education. Cognitive presence is 'the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication' (ibid., p. 89). Furthermore, cognitive presence is essential for critical thinking. Social presence is defined as 'the ability of participants in the community of inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as "real people"' (ibid., p. 89). Teaching presence consists of two general functions, which are the teacher's primary responsibilities: (1) design of educational experience (e.g. choice of learning materials, organisation and presentation of course material and activities) and (2) facilitation (such as ways to provide (peer) feedback to students). The latter function might be shared by educators. The teaching presence supports and underpins social and cognitive presence to scaffold students in realizing their educational outcomes. Garrison (2016, p. 62) describes that the 'focus on the presences as a whole will shift as the learning experience evolves'. One example is the need for attention to social presence in the beginning of a learning activity to be able to gain trust among the participants of the community. The following sections describe the testing of the CoI framework in a multi-institutional crisis management sample called Hubbe1, followed by a description of the data collection and analysis. Finally, the results are elaborated and discussed.

The Study Object: Hubbe1

This study is based on an analysis of one case example of a crisis management exercise: Hubbe1 (Hubbe is a male Swedish name and was selected to give the project a name). This exercise aimed to support employees located across a number of Swedish regional organisations to develop critical crisis management skills. These skills include communication, sharing information and collaboration across groups of professionals located in different sites. The crisis exercise was designed to support participants in identifying weaknesses and areas for improvement around four themes: crisis plans, situational awareness and technology, management and coordination, and evacuation and receiving people who have been evacuated (see Table 4.1). A Swedish 'county administration board' oversaw the planning and performance of the exercise. This agency is responsible for civil protection, public safety, emergency management and civil defence and is obligated to run these types

Table 4.1 Weekly themes and indicative questions

Week	Theme and aim	Example of triggering tasks/questions
1	Crisis plans (Implementation of local crisis plans and identification of weaknesses in plans)	How does your organisation act according to the situation? Are your plans complete, or are they in need of revision? Which resources are available?
2	Situational awareness and technology (Creation and development of routines to facilitate information sharing between the participants)	How do you create a common operational picture? What information do you need from other participants to create this common operational picture?
3	Management and coordination (Identification of the participants' ability concerning management and collaboration in the actual events and daily concerns)	What legal decisions do you face? How do you ensure sustainability if the process extends over a long period of time?
4	Evacuation and receiving vacated people (Investigation of and plan for evacuation possibilities for people and animals)	How is your business affected by a decision on evacuation? What ability do you have to carry out an evacuation of people and pets?

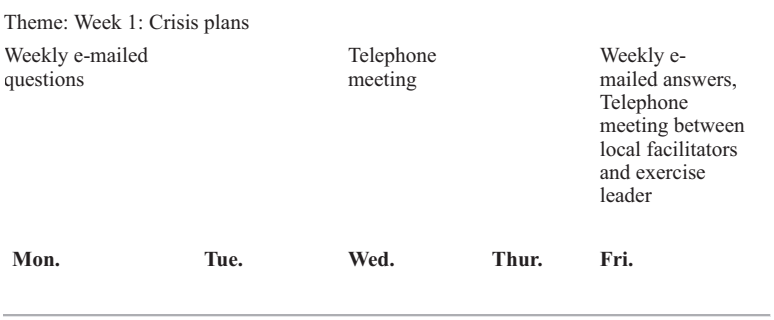

Fig. 4.1 Example of a typical week during the exercise

of exercises, based on a plan set up by the national agency in Sweden. The administration board appointed an exercise leader because the national agency guidelines require that all exercises should be managed by a lead.

The Hubbe1 learning exercise was based on a flood scenario that was based around the effects of high levels of rainfall on hydroelectric dams. The exercise took place over 4 weeks in the early part of 2016. Hubbe1 was designed as a table-top exercise: based around a number of seminars during which participants discussed a series of questions. During these seminars, participants agreed with decisions and actions based on local crisis plans, taking into consideration how the flood scenario changed over time. This work during the seminar was guided by the exercise leader. Each workplace also had one local facilitator who normally worked in that workplace, so all the workplace employees knew this person. A typical week is visualised in Fig. 4.1.

Over a time span of 4 weeks, 185 participants were guided by 23 local facilitators across 26 organisations. These organisations were municipalities from two Swedish counties, energy companies, non-governmental organisations, county administration boards, national agencies, the Swedish church, an association responsible for cooperation and maintenance of water economy, the alliance of fire brigades in two counties, the Federation of Swedish farmers, an SOS alarm centre, regional level healthcare and the Swedish armed forces. Each week the exercise focused on a distinct theme (see Table 4.1, column 2). Weekly questions (see Table 4.1, column 3) were triggered each Monday. This was achieved by the exercise leader disseminating information by email to the local facilitators who in their turn discussed it with the employees of each organisation. Once each week, on Wednesday, a pre-scheduled telephone conference meeting took place between the exercise leader and a representative delegation from each organisation including the local facilitator, during which they could raise questions and discuss emerging issues. Besides this pre-scheduled conference meeting, participants could also contact participants from other organisations by e-mail or by phone to discuss exercise-related issues. Every Friday, each organisation could, via the local facilitator, email answers to the exercise leader. Also on Fridays, the local facilitators and the exercise leader met in a telephone meeting to decide whether the original exercise plan had to be adjusted.

Data Collection

The aim of this chapter is to ascertain whether specific forms of learning exercises contribute to the development of a CoI within the crisis management context. A mixed methods approach was used to collect both quantitative and qualitative data. The rationale behind collecting quantitative data was based on earlier studies using the CoI model (for example Arbaugh et al., 2008). These quantitative data were complemented with qualitative data to achieve in-depth explanations of the quantitative findings.

In this study, we used a survey to support quantitative measurement of mean values for social, cognitive and teaching presence. The survey was translated from the original 34-item CoI instrument developed by Arbaugh et al. (2008). Because the instrument originally was developed in a teaching context from a student-teacher perspective, we altered it into a participant-facilitator perspective to suit the crisis management exercise context. Consequently, the adaptation process included validation with experts within the crisis management as well as the crisis exercises context and an expert on the CoI model (see Öberg & Nyström, 2016, for a detailed description). Three examples of the final survey are focused on: ‘the telephone meetings that were used during the exercise were a good channel for social interaction’ (social presence), ‘problems posed during the exercise triggered my knowledge about crisis management’ (cognitive presence), and ‘the local facilitator clearly communicated the aim of the exercise’ (teaching presence). The survey was emailed to all 165 participants and 23 local facilitators within Hubbe1 after completion of

the exercise. A reminder was sent out 1 week later to those who had not submitted a response to the survey. The response rate for the survey was 89% for the participants and 100% for the facilitators.

Qualitative data was gathered in the form of the answers to the open questions in the survey, the weekly emailed questions and answers, the weekly reports and the notes of the weekly meetings.

Data Analysis

The quantitative data have been analysed using descriptive statistics and mean values as suggested in the CoI model (Garrison et al., 2000). The concepts that were used in the analysis concerned social, cognitive and teaching presence. During the analysis, it was identified that the Hubbe1 project did not resemble the development of one community as reflected in the CoI model. From a CoI perspective it was, therefore, problematic to reach a high level of social presence in the learning community, which, in turn, influenced the analysis of cognitive and teaching presence. This resulted in a second round of analysis of the qualitative data that was grounded on additional theories concerning multiple and shifting communities. In this second round, we used the work of Ramondt, Chapman, and Powell (2002) to analyse the data. These analyses from both perspectives (three forms of presence as well as multiple and shifting communities) are discussed in detail in the following sections.

Community Building: Cognitive, Social and Teaching Presence

Cognitive presence, social presence and teaching presence were all found within the groups who participated in the Hubbe1 crisis management exercise. Participants and facilitators gave consistent responses, as illustrated in Table 4.2.

Looking at the results presented in the table, it is remarkable that participants have a lower mean value for *social presence* than the facilitators. This higher perception of social presence as observed by the facilitators might be explained by the fact that each facilitator met with facilitators from other organisations during the

Table 4.2 Mean values for the different presences measured in the survey

	Participants $N = 165$ (response rate 89%)	Facilitators $N = 23$ (response rate 100%)
Cognitive presence	2.76	2.76
Social presence	3.00	3.17
Teaching presence	3.06	3.07

1 = do not agree, 4 = strongly agree

planning and performing phases, whereas the participants had fewer opportunities to meet people from outside their organisation. Despite the lower value, the mean value indicates that the participants did experience social presence during the exercise.

Further interrogation of the data shows that this sense of social presence and the feeling of belonging to a community is complex. For example, the weekly meetings were designed as opportunities to raise questions about specific issues. However, when asked to reflect upon the weekly telephone meetings, almost half of the respondents said that the statement 'the meetings were valuable for the understanding of different perspectives' was 'not relevant'. Just over 40% of the remaining respondents answered 'no' or 'insufficient evidence'. A related question asked if telephone contact during the weekly meetings provided an effective channel for social interaction. Two-thirds of the respondents considered the channel sufficient, and one-third said it was irrelevant. Apparently, the learning environment did not support discussion around specific issues, so, in reality, the weekly meetings included an attendance roll-call and discussion about formal processes. The use of an ordinary telephone and the high number of participants (26) in the meetings may have made it difficult to hold in-depth discussions. Therefore, the design of the exercise and the environment did not enable participants to gain a sense of social presence. Participants were not aware of the ongoing issues and the sorts of problems other organisations might be experiencing. Thus, even though there had been a social sense of community building during the exercise, the data demonstrates that this community did not support the development of key crisis management skills.

Rather than a single CoI, multiple smaller communities were formed within organisations. Many participants were co-located in the same room with others from the same organisation, resulting in *intra-organisational social presence*. Two questions asked whether people had formed impressions of participants inside and outside their own organisations. Two-thirds of the respondents indicated this as insufficient, yet the same respondents said that the sense of presence of participants within their own organisation was 'sufficient' or developed to a 'large extent'. Thus, the data revealed that everyone involved in an exercise needs to be aware of 'other' participants and this can only be achieved by bringing people together. The exercise supported people from the same organisation, who might not be familiar with each other, to a sense of social presence leading to the high mean values. As for the use of technology tools, the participants indicated they wanted to learn about ways of facilitating intra-organisational communication to share information with others in their own organisation.

However, the exercise was less effective in creating a sense of social presence of people across organisations. Only participants who had opportunities to talk with people in other organisations were aware of *inter-organisational social presence*. Only 9% of the respondents had been in contact with a colleague in another organisation and this communication had to be facilitated through the use of technology tools, since the organisations were not co-located. Participants were uncertain about which channels of communication they should use in a crisis situation. This uncertainty could prove fatal in a crisis. It also negatively impacted the sense

of inter-organisational presence and decreased the potential for community building. Participants identified a need to design exercises that demonstrate how to use a range of digital communication tools, such as video conference systems, safe radio communication and so on, for inter-organisational communication.

Overall, when it comes to social presence, the participants had no problem making themselves heard and seen in their own organisations, but they were not visible to participants in other organisations. This supports the interpretation that Hubbe1 has contributed when it comes to co-located communities but not in the wider community that includes all participants.

Garrison et al. (2000) argue that the primary importance of social presence is a support for *cognitive presence* which means that if the mean value for social presence is low, cognitive presence will be harder to reach. Furthermore, cognitive presence is found to be the most important form of presence for learning (Garrison et al., 2000). In our study, communications were limited to face-to-face communication within co-located communities and weekly telephone meetings once a week. In this way, the communication between the participants was limited and restricted to the exercise design. This means that all the meetings where pre-scheduled and only some of the participants were invited. This way of work restricted participants' social presence, in its turn restricting their cognitive presence.

Finally, *teaching presence* consists of the functions, design of educational experience and facilitation. Questions we asked around participants' perceptions of the local facilitators' role show that instructions and support had been sufficient. In this case, the facilitator's role was more often that of a tutor than a teacher, so it was not possible to measure the teaching presence.

According to Garrison et al. (2000), the CoI model assumes that learning occurs in the community through the interaction of three core elements: social presence, cognitive presence and teaching presence. In our study, we found that all three types of presence were evident in the participant groups. On the other hand, the participants clearly stated they had a clearer impression of the participants in their own group than of 'the others'. So, a key question is, which community, if any, is developed? The data show that several smaller inter-organisational and intra-organisational communities co-existed. This finding made us question whether the three CoI elements could, in fact, be used to describe the communities in Hubbe1, since they appeared too unstable. Therefore, another theory was adopted that may explain what was observed. In the next section, the results of the second round of analysis are described, outlining multiple and shifting communities based on ideas presented by Ramondt et al. (2002).

Community Building: Multiple and Shifting Communities

De Laat (2005) identifies three types of collective learning, i.e. learning in networks, learning in teams and learning in communities (see also, Chap. 12, Vrieling-Teunter, Wopereis, Van den Beemt, De Laat, & Brand-Gruwel, this volume). In line

with this work, Ozturk and Ozcinar (2013) observed that communities and sub-communities exist in a networked structure. They wrote, 'Learning in multiple communities requires a fuller understanding of the complexity of learning from diverse multiple communities which are connected in a social structure' (Ozturk & Ozcinar, 2013, p. 1). Hodgson and Reynolds (2005) also view networked learning as a more promising way than the CoI model to conceptualise the cross-site learning as observed in our study, because community-based discourse can thwart acknowledgement of differences across sites. Instead, networked learning facilitates 'participative and democratic values' because it allows for emergence of subgroups.

Ramondt et al. (2002) outline various types of communities that may improve 'presence' within a learning environment: home communities, cohort communities, specialist communities and local working groups. The first type, 'home community', allows members (around 25 in total) to become familiar with the online environment and with each other. The second type of community, the 'cohort community', is designed to provide a central space for teachers to send out questions and receive answers from learners. The third type is based on 'specialist communities', where learners can collaborate and discuss issues but have to ask for permission to enter the community. Finally, 'local working groups', comprising people located in the same region, make it possible for participants to meet face-to-face. According to Hodgson and Reynolds (2005), these communities constitute a learning environment that can be varied and dynamic and they allow for the fluidity needed to support shifting communities. In the following is elaborated how these ideas might relate to the CoI framework in crisis management exercises.

The outcome of any crisis management situation is highly dependent upon all the participating organisations. The Swedish crisis management system is a structured hierarchy at national, regional and local levels. Based on the idea of a *home community*, all organisations at the local level can be considered as one single community. However, some situations, such as the flood crisis enacted in Hubbe1, require cross-organisational cooperation. This means that the home community might consist of local, regional and national organisations.

A key characteristic of communication and cooperation in the crisis management context is that the relationships between employees or groups of employees changes, depend on the type of crisis, the resources available, the geographical location and so on. By analysing the descriptive data, we found that the most visible community in Hubbe1 was the exercise planning group that spanned across the 26 organisations participating in the exercise. The planning group had similarities to *cohort communities,* since the participants were responsible for the design and planning of the exercise. They engaged in a number of meetings before, during and after the exercise and communicated regularly through e-mail, face-to-face and through telephone conferences. Their responses indicated a strong sense of social presence.

In terms of decisions about the exercise, the process was characterised by consensus thinking. The exercise planning group chose the dates when the exercise should be carried out. Some of the members of this cohort community were also part of a more stable community connecting security managers located across all

municipalities in the Jämtland region of Sweden. This type of community could be considered a *specialist community* and this may have been a critical element in terms of enabling learning (i.e. cognitive presence). Another example of a specialist community was a group of staff members that worked with crisis information. These individuals also organised meetings to discuss how they worked with crisis information and issues they faced.

A number of communities were identified that shared similarities with *local working groups*. Here, the greatest variety was observed in the number of participants (varying between participants working alone to groups consisting of 10 participants) and the stability and strength of the group connections. These local working groups, in fact, represented the different organisations participating in the exercise. Some organisations consisted of a number of co-located people who seldom worked together in their daily work task, but did communicate and cooperate on a daily basis in the Hubbe1 project. One example was a municipality that formed one local community of participants who worked in various departments (security, central management, water-related jobs and so on) and had no previous experience of working together. The qualitative data provided evidence that this type of community (in the project described as 'local management teams') was viewed as central for the project. This type of community was cited as critical for inter-organisational and intra-organisational cooperation. It appeared that some of the local working groups worked together well during the exercise with strong connections between the participants. In this matter, it was also observed that participants who were co-located within a single organisation generally shared a sense of both social and teaching presence. It is also striking that some organisations stated that, if they end up in a scenario like Hubbe1, they would prefer to work together by sending one person from their own organisation to the organisation that is considered as central.

Another key concept for community building appeared the *adoption* of the various groups into the community. Overall, the development of Hubbe1 was based on the concept that all participants and facilitators should be considered as one community. It is notable that most organisations indicated that in the future they would prefer to work with the same bodies they worked within the past, indicating that being adopted into a community takes time and effort. Hubbe1 included a number of organisations that were not part of the traditional crisis management system, for example, the Swedish church. No other organisation mentioned the church as a likely future partner.

The concept of *partnership* needs close consideration while building a community. Hubbe1 showed that the types of organisations that people were likely to work with depended on the nature of the crisis. The project focused on a flood crisis that involved many organisations working with electricity and water companies. Nevertheless, some organisations that were not invited to partner within Hubbe1 – groups of private entrepreneurs and volunteers – were considered important partners in a crisis. Although the participation of volunteers was considered important, their involvement was not clear. One Hubbe1 participant (municipality) explained this issue as follows:

> We cooperate well with the home guards. There are organizations for volunteers but there is no model for how to cooperate with them. (Participant (municipality) in exercise Hubbe1)

Value creation (see also Chap. 11, Van Amersfoort, Korenhof, Nijland, De Laat, & Vermeulen, this volume) is another important concept for community building. The data indicated that the exercise meetings contributed to the participants' awareness of social presence. The need for attending meetings seemed important particularly for participants that were not part of the traditional crisis management groups, such as electricity suppliers. The perceived value of the weekly meetings is illustrated in the following quote:

> We will not participate in the exercises the coming weeks. But our experience is that the [weekly] meetings on Wednesdays have been really important, so we will try to participate in those meetings. (Participant (electric supplier) in exercise Hubbe1)

A final key characteristic for community building in Hubbe1 concerned the *visibility* of the participants. Participants did not consider it important for the management to be visible. However, it was critical for them to know which organisations were involved in the crisis exercise. This is very challenging from a community perspective, since there are a wide variety in organisations that should be included within the community, and this mix depends on the nature of the crisis and the context (geography) where it takes place. An important step is to make sure the home community is visible, perhaps by using information technology (IT) to visualise the various organisations and participants involved.

Discussion

The aim of this chapter was to ascertain whether specific forms of learning activity contribute to the development of a learning community in a crisis management exercise. From a CoI perspective, it was concluded that the exercise did not contribute to the development of a learning community to any extent. It was also concluded that the CoI model had to be complemented with other theories because it did not reflect multiple and shifting types of communities. It was, therefore, unclear in which community the participants felt which sense of presence, if at all. Since each crisis management situation is characterised by cooperation amongst multiple and shifting communities, learning activities must be developed in ways that engender presence. In this chapter, as postulated by Ramondt et al. (2002), different types of community were analysed within a crisis management exercise. This analysis has helped to identify a range of technology tools that can be used to support communication and information sharing within specific types of communities. IT communications are ideally based on agile, online systems, such as online forums or video conferencing systems, instead of (static) telephone conference systems. A range of systems developed for information sharing should be available for use during crisis exercises. In Hubbe1, the organisations used e-mail; however, a more extensive range of systems might have generated a greater sense of presence.

Finally, we recommended the CoI model is expanded to include four community types: home communities, cohort communities, specialist communities and local working groups. Besides these form of communities, four additional concepts appeared important for community development: adoption of the various group, considering important partnerships, value creation and visibility. This extended model could be used to help to plan, monitor and evaluate professional learning of communities in future crisis management exercises.

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Part II
The Impact of Networked Professional Learning on the Academy

Chapter 5
Networked Learning in, for, and with the World

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Abstract This chapter proposes a framework for networked learning in, for, and with the world at mode 3 universities. First, a theoretical overview of the configuration and development of the mode 1 university (the ivory tower), mode 2 university (the factory), and the mode 3 university (the network) is provided. Second, the framework for the networking mode 3 university is developed through presenting and integrating organisational guidelines, pedagogical formats, and learning principles. Then, two categories of educational patterns for learning in and with the world at the networking university are introduced and described: (1) bringing education into the public (learning *in* the world) and (2) bringing the public into education (learning *with* the world). Examples of concrete educational design patterns are also given. Finally, three dimensions for students' learning *for* the world through hybrid networks at the mode 3 university are developed: networked learning for the world as citizenship, networked learning for the world as trust, and networked learning for the world as ecology. The main contribution of the chapter is to develop the notion of the networking university along with its implicated teaching and learning practices.

Institutions in, with, and for the World: The Changing Mandate of the University

With the concept of 'mode 3 university' as overarching framework (Barnett, 2004; Barnett & Bengtsen, 2017; Nørgård & Bengtsen, 2016, 2018), this chapter considers how traditional forms of and formats for teaching and learning within higher

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education can be rethought, reconfigured, and redesigned in order to facilitate hybrid networked learning in, for, and with the world.

What it means to 'be' a university is changing (Barnett, 2011), something offering challenges, opportunities, and potentials to the teaching and learning that takes place there. Through history, and across national contexts and cultures, the 'being' of the university and its livelihood and mandate has altered (Barnett, 2018; Wright, 2016). Through these transformations where the university, either voluntarily or by force, has sloughed its skin, the roles, relations, and meaning of teaching and learning had to change with it. This chapter describes some of these transformations and considers the implications, challenges, opportunities, and potentials of teaching and learning in and through hybrid networks at the mode 3 university.

The Ivory Tower

The mode 1 university is related to an understanding of universities as juridical and political autonomous. In this mode, the university has a more primordial and privileged understanding of knowledge creation than other societal actors and institutions, and the university as an institution is defined with greater distance to its societal and political surroundings and environments. Sometimes, and a bit onesidedly, this mode is referred to as the *ivory tower*, typically in a not too positive sense and alluding to a secluded university, distant from the world and with its gates closed. It is what the higher education philosopher Ronald Barnett has more favourably called 'the metaphysical university' (Barnett, 2011). Here, knowledge is universal and kept within the university walls in a self-sustaining ecosystem. The inhabitants of the ivory tower are the keepers of knowledge, and their task is to transfer knowledge from one generation to the next and from university to society. In this mode, teaching and learning exist within a closed geography and a closed ontology (Barnett, 2011; Barnett & Bengtsen, 2017). It is a university that controls knowledge, what it takes to be educated, and what counts as needed knowledge and competencies. The university is a tower, transmitting knowledge to the students until the students themselves become towers of knowledge and, thus, may enter into society to transmit that knowledge to it (Barnett, 2011). Today, the configuration of the mode 1 university is powerful in the core disciplinary work that is part of educational programmes. It is the epistemological configuration activated in pure research, and it is still embodied in existing universities.

Even though the rationale of the mode 1 university is perhaps, today, limited mostly to core disciplinary activities and epistemologies, we see that some of the structures of this rationale have been taken up in much of the educational technology and systems today. Learning Management Systems such as Blackboard or Moodle are to a large degree systems with a closed geography and ontology and in control of communication and knowledge as systems for transmission of information or knowledge, or at least for keeping the majority of the control and power on the

side of the university and in the hands of academics. The same could be said of teacher videos or screencasts that leave no room for dialogue or interaction. Here, students sit back and receive the transmitted knowledge without being able to interrupt or raise question. Interestingly, this also goes for many Open Educational Resources (OER) and Massive Open Online Courses (MOOC), especially the so-called xMOOCs that often resemble digital correspondence courses where the participants are only able to interact with the information in the system, not each other or the teacher that is often totally absent, and as such they are cut off within their own tower of knowledge where a network transmits knowledge into the tower.

So, it is not that the mode 1 university is backward-looking or archaic but rather that the university's overall mandate has changed and its way of being has to be moderated and renegotiated in relation to external stakeholders and demands from the wider socio-political and economic contexts (Wright, 2016). The mode 1 university, in the sense that we know it from earlier historical periods, has been forced to transform central parts of itself into the mode 2 university. In the mode 2 university-configuration, the tables have turned and there has been a change in the balance of power between society and university.

The Factory

The mode 2 university has many forms of being. Barnett (2011) mentions, amongst others, 'the entrepreneurial university' focused on employability, societal use-value, and economic growth and 'the corporate university' concerned with management, employers, funding, and competitive position. Across these different forms of being, there are some common traits. Taken together, these traits can be said to constitute the mode 2 university. Here, the ivory tower as a dominant trope has been replaced by *the factory*. Following from this, the university is now positioned as the producer of the future workforce through transferrable skills and professional competences. In the factory, it is no longer the university that defines, owns, and transmits knowledge to society. Performance, output, benchmarking, and societal use-value is core to the university's mandate, and it is up to the university to substantiate that it is delivering what society demands as well as upholding a strong position in the global competition between universities.

In the mode 2 university, researchers and teachers find themselves in a situation where they have lost much of the ownership and the power of definition, which characterises the mode 1 university. The factory is not in control of its own fate, it is rather a question of market forces and demand, and here relevance and value are measured in the ability to efficiently produce a future workforce with competencies enabling employability as well as the production of socio-economic growth. This is in line with what Shumar (1997) calls the neo-liberal university growing out of 'new capitalism' and 'the knowledge economy' (Shumar, 1997; Wright, 2016). In the factory, knowledge and students are commodities to be sold to society for profit or

survival. The commodities will be brought to the extent it is deemed useful. So, it is the university's responsibility to produce the right students with the right competencies and skills that enable them to occupy the right jobs that will ensure the right socio-economic growth. Teachers are held accountable for the production proceeding according to plan in such a way that not too much value is lost in the system. As such there are production schemes and measurement tools in place to ensure that the student produces at the right speed and with desirable employability. The mode 2 university should be equipped and ready to help society with whatever challenges and problems it faces just now and is therefore occupied with educating for the present or immediate future. It is a professional factory, complete with branding strategies, corporate culture, accelerators, incubators, strategic communication, and so on (Barnett, 2011).

The mode 2 university has an open geography susceptible to the world and its present condition and power structures. However, its ontology is still closed as it is society that is in control of what it constitutes, which is not something open to interpretation, dialogue, or experimentation. The transformation from ivory tower to factory is also visible in the intrusion of private companies into the heart of the university. Both in relation to taking up actual space on the campus itself and being in charge of developing and managing the educational technology and systems used to do education. Also, private companies influence the qualification of knowledge and competencies as well as the relevance of courses or study programmes.

The mode 2 university's integration of higher education, professional contexts, and different cultural practices in the wider societal environment, which was a refreshing 'opening of the windows in the ivory tower', seems to have become just as dominant as the original mode. Where the mode 1 university operates through a one-way transmission of knowledge from ivory tower to society, the mode 2 university is controlled through a one-way transmission of knowledge demands from society to university. However, we now see contours of a more dialogic relation between university and society; what has elsewhere been called the emergence of 'academic citizenship' (Nørgård & Bengtsen, 2016), the 'ecological university' (Barnett, 2018), and 'the co-operative university' (Nørgård & Mathiesen, 2018).

The Network

At the 'mode 3' university, the institution, society, teachers, researchers, students, employees, workers, and societal citizens enter into closer dialogues and partnerships. The aim is to co-create future knowledge and societal value that go beyond immediate use-value, present demand, or measurable output – thus substituting the economic and instrumental university-figuration of the mode 2 university with a configuration of the mode 3 university focusing more on human societal value and citizenship.

Unlike in the mode 1 and mode 2 university-configurations, neither university nor society holds the power of definition in relation to what constitutes valuable knowledge, education, and academic development. Rather, both society and the individual institution need to treat the university as being ontologically and geographically open. Implying that they need to enter into conversation and collaboration and be committed to each other to create knowledge for an unknown and open future. To do this, university and society need to be networking and networked. That is, integrated and embedded into each other to such an extent that they acknowledge each other as part of the same ecological system or world. In the circumstances, society and university can exist by serving each other and the people living within their entangled networks. This has caused Barnett (2018) to call the mode 3 university an ecological university. One particular configuration of the ecological university is *the networking university* that is described in the next section of this chapter.

In the *network,* the campus, classrooms, and offices are open to society, but not as kicked-in gates or broken bulwark where society and corporations have flooded or taken over the university. Rather, the mode 3 university configures itself as an open network entangled in and connecting with other networks, enabling citizens, professionals, workers, researchers, teachers, students, and whoever is interested and engaged in the networks to think, talk, and tinker together. This reconfiguration of the university from competence factory to ecological network highlights (a) societal value as more and other than immediate and instrumental use-value, (b) human worth as more than future workforce, and (c) higher education as more than holding the right degree and competencies or skills. To achieve this, it requires mutual commitment, care, respect, and integration of networks between university and society in an effort to co-create a shared world (Barnett, 2011; Nørgård & Bengtsen, 2016). This entails that both society and university are able and willing to network and be networked and to 'participate in the idea of the university' (Ossa-Richardson, 2014, p. 154).

The networked and networking entanglement needs to be formed and upheld through a bond of mutual commitment. The university should not try to be of value to society through meeting its demands as it does in the mode 2-configuration. Rather, it is an insistence on the inherent worth and value of the university in itself; of *academic* professional development, and of *academic* citizenship. But that does not entail a university that can take the power back and retreat to the ivory tower as a backlash against the factory. To become a networking university, it must be open and networking, and at the same time, it must be open for being networked in return – to keep ontology and geography open. Consequently, the networking university opposes to socio-economic structures, supplies and demands, or use-value of academics.

In the next section, the underlying value framework for the networking mode 3 university and the pedagogical principles integrating and expressing this value framework are explicated.

University Teaching and Learning in and Through Networks

The term 'hybridity' seems particularly apt when trying to grasp how the changing mandate of the university and the emergence of the mode 3 university impacts the future of teaching and learning. Hybridity refers in general terms to a mixture of parts or emergence of new breeds through the cross of animals (e.g. mules or tigons), plants (e.g. grapefruit or rabbage), or cultures (e.g. Bollywood or glocal education). Cultural hybridity can, according to Mikhail Bakhtin, be viewed as 'intentional hybridity', while organic hybridity, in the form of animals or plants, is a form of 'unintentional and unconscious hybridization'. Intentional cultural hybridity, such as hybrid networks or education, consists of mixing different discourses, perspectives, and forms (Bakhtin, 1935/1981). Accordingly, hybridity in education implies a system for bringing different discourses and formats in contact with one another that aims to invigorate one format by mixing it with another. Rorabough and Stommel (2012) specifically address the concept of hybridity within education, and view it as a way to keep education open to the world and itself. As such, hybridity strives to cut across, fuse, entangle, or circumvent traditional dichotomies within higher education such as online-onsite, digital-physical, formal-unformal, university-society, learning-teaching, study-work, individual-collective, and so forth. To do so, there is a push against the closed ontology and geography framing teaching and learning at the mode 1 and mode 2 university, as processes of indeterminacy, open-endedness, exploration, experimentation, dialogue, and co-creativity are highlighted.

This also entails the opening up of teaching and learning as university and society meet to talk and work together. Looking at teaching and learning in higher education through the lens of hybridity, accentuates how education at the mode 3 university invokes entanglements and nested ecologies rather than fixed knowledge or socio-economic measurability. At the mode 3 university, teaching and learning shift from transmission of knowledge (mode 1) or knowledge production (mode 2) towards teaching and learning in hybrid network collectives. Here, more traditional research-informed teaching (teacher transmitting knowledge about other people's research) and research-based teaching (teacher transmitting knowledge about own research), is fused with research-producing students (students producing own research, based on knowledge). This puts research-producing students on equal footing with research-based teachers, as they both become researchers and partners at the university – what elsewhere has been termed *Participatory Academic Communities* (Aaen & Nørgård, 2015), *Academic Citizenship* (Nørgård & Bengtsen, 2016), or *Teaching-based Research Collectives* (Nørgård & Mathiesen, 2018).

Overall, teaching and learning in and through hybrid networks carry the potential to resist and push against the managerialism and standardisation of the commodified competence factory. Through hybrid teaching and learning, people inside and outside the classroom and campus get entangled in joint dialogues, collaborations, and communities. As the mode 3 university enters into dialogue with society, its teachers enter into collaboration with students, and the onsite classroom enters

into dialogue with online research communities. In this way, the possibility for other forms of professional academic development and networked learning comes to the fore.

One way to grasp this emerging possibility and create a pedagogical framework for teaching and learning in and through networks at the mode 3 university is to connect the following:

(a) Guidelines for co-operatives (the pinnacle of mode 3 *organisations*)
(b) Emerging formats for innovating pedagogy (embedding mode 3 *teaching* elements)
(c) Principles for connected curricula (pointing towards *learning* dimensions in mode 3 institutions)

When connected, organisational guidelines, pedagogical formats, and learning principles constitute a three-dimensional framework for teaching and learning in hybrid networks.

Organisational Guidelines for Members at the Networking Mode 3 University

The framework for co-operatives (Co-operative identity, values and principles, n.d.) shares strong similarities with the conceptualisation of the mode 3 university. A co-operative is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled enterprise. The Rochdale principles (The Rochdale Principles, n.d.) are a set of ideals for the operation of co-operatives. Co-operatives are based on the values of self-help, self-responsibility, democracy, equality, equity, and solidarity. In the tradition of their founders, co-operative members believe in the ethical values of honesty, openness, social responsibility, and caring for others (Zeuli & Cropp, 2004).

The co-operative guidelines, or Rochdale principles, are a set of guidelines by which mode 3 institutions – such as the networking university – can be organised. These guidelines work bottom up, and thus, must be visible in mode 3 teaching and learning in order to become manifest as organisational structures. The reworking of the Rochdale principles into the below seven points for co-operative universities offers a lens to think about how to transform universities into more ecological organisations in ways that invite for professional academic development and citizenship:

1. The university is open to all through voluntary and democratic membership.
2. Higher education takes place through democratic organisations controlled by their members, who actively influence and decide their policies and practice.
3. Members contribute to, and democratically control, the mandate of their university.

4. Higher education takes place in autonomous networks controlled by their members.
5. University teaching provides education and professional development for their members so they can contribute efficiently to the development of their university and society.
6. Universities serve their members most efficiently and strengthen the Networking University by working together in hybrid networks through local, regional, national, and international structures.
7. Higher education aims for sustainable development of its member communities through policies approved by their members.

Organisational guidelines for the mode 3 university, such as the networking university, need to be connected with pedagogical formats as described hereafter. Together, this will enable the formation of macro-structures for teaching and learning in and through hybrid networks that scaffold and promote professional academic development within mode 3 universities.

Pedagogical Formats for Higher Education at the Networking Mode 3 University

One set of potential formats to draw inspiration and develop pedagogy from when considering the future mode 3 university, can be found in the yearly *Open University Innovation Report*. Every year the Open University in collaboration with different partners publishes its annual *Open University Innovation Report* presenting emerging pedagogical directions for future education, to inform and guide teachers and policy makers in productive innovation (Sharples et al., 2016, p. 3). Reading through Innovating Pedagogy 2016 and 2017, 20 pedagogical formats are identified, thoroughly described and grounded in research in the reports. The formats carry particular potential and pertinence in regards to future academic development and professional learning in hybrid networks. Although all 20 directions can fit within the mode 3 university, 7 of them can be said to have a tight fit with the networking university (see Ferguson et al., 2017, p. 3–4; Sharples et al., 2016, p. 4–5):

1. *Learning through social media*: Social media can offer a range of learning opportunities such as accessing expert advice, encountering challenges, defending opinions, and amending ideas in the face of criticism, inaccurate information, biased comments, and hostile responses.
2. *Teachback*: One person (who may be the teacher, an expert, or another student) explains their knowledge of a topic to a learner. Then that learner attempts to explain, or teach back to others, what they have come to understand.
3. *Learning from the crowd*: Amateurs and experts exchange ideas, generate and discuss content, solve problems, vote for the best solutions, and raise funds. Another example is crowdsourcing, that is, research initiated by the general public, rather than by scientists.

4. *Learning for the future*: Future-ready learners have agency and autonomy in planning what and how to learn. They have the skills to be responsible citizens, contributors, and innovators in an uncertain future.
5. *Learners making science*: Enabling learners to experience how Science is made can enhance their content knowledge. It can also develop scientific skills, contribute to their personal growth, and result in identity change and increased understanding of what it means to be a scientist.
6. *Open textbooks*: Open textbooks can be seen as part of a broader move towards 'open pedagogy', which emphasises open content and open practices. They have an open licence that enables everyone to reuse, remix, revise, redistribute, and retain them.
7. *Intergroup empathy*: People from different backgrounds interact with each other, even if they come from countries or cultures that are engaged in conflict. This means that skills such as communication, teamwork, and empathy are important.

Reading across the pedagogical formats from Ferguson et al. (2017) and Sharples et al. (2016) common approach to teaching and learning through hybrid networks for professional academic development reveals. Networked learning in, for, and with the world on the grounds of the co-operative guidelines and innovating pedagogy formats is characterised by developing future academic citizens that enter into dialogue and participate in society as responsible professionals and citizens, contributors, and innovators. It is a move towards education in and through entangled networks where learning, courses, curricula, and even institutions can be constructed in collaboration with other professional communities and community members. To make this approach operational as concrete learning practices, it needs to be embedded in curricular learning principles as described in the next section.

Learning Principles for Students' Academic Citizenship at the Networking Mode 3 University

One curricular framework that seems to align particularly well with the networking university is the *Connected Curriculum* framework which is the educational strategy 2016–2021 for University College London (Fung, 2017). In the foreword to *A connected curriculum for higher education,* Barnett highlights 12 dimensions of connectedness (or hybridity) that can be practised as learning principles. These dimensions are hybrid connections between disciplines, campus and wider world, research and teaching, theory and practice, student and teacher, student inner being and student being in the world, student and students, students and disciplines, curriculum elements, student perspectives, member and university, learning at university, and learning in society (Fung, 2017).

Taken together, these connections create professional development and learning through what Barnett calls *institutional vibrancy* that:

> bring the university into a new configuration with the wider world in all its manifestations. There is surely a sense here of the university coming out of itself to attend to all the many ecosystems in which it is implicated – the economy certainly, but the ecosystems too of knowledge, social institutions, persons, learning, the natural environment and even culture. The Connected Curriculum opens, in short, to a new idea of the university, a university that is fully ecological, attending carefully to the many ecosystems in its midst. (Barnett, 2017, p. vii)

The concrete implications for learning in such hybrid networks is explicated through six identified learning principles (Fung, 2017). These can also serve as learning principles to design for and consider learning at the mode 3 networking university when they are integrated with the pedagogical formats and organisational guidelines. The principles are:

1. *Students connect with researchers and with higher education research*: Students may, for example, become part of research groups, or collaborate with researchers in depth.
2. *A through-line of research activity is built into each programme*: Each programme of study should be designed in such a way that students experience a connected sequence of learning activities that empower them, step by step, to apply skills and dispositions needed to undertake actual research of their own.
3. *Students make connections across subjects and out to the world*: Though connecting across disciplines and out to the world, students can be empowered to articulate their own academic values and consider their current and future academic contributions to society.
4. *Students connect academic learning with workplace learning*: Students need to be able to connect academic learning with professional work and for lifelong learning.
5. *Students learn to produce outputs – assessments directed at an audience*: Through some of the work they produce for the purpose of being assessed by faculty members, students can engage in partnership with local or wider communities.
6. *Students connect with each other, across phases, and with alumni*: The focus for this final dimension is on ensuring that students feel a sense of belonging as they study and being part of an inspirational learning and research community.

Overall, these six learning principles highlight a shift in the structure of higher education as well as in professional academic development towards hybrid connections and networks and towards students as research partners and equal members of the university through engaging in collaborative research production, collective research networks, and co-operative professional learning partnerships with society (Aaen & Nørgård, 2015; Fung, 2017; Nørgård & Bengtsen, 2016; Nørgård & Mathiesen, 2018).

In the next section of the paper, the organisational guidelines, pedagogical formats, and learning principles will be illustrated and concretised through presenting some potential educational design patterns for students networked and networking professional learning at the mode 3 university.

Hybrid Education: Educational DESIGN Patterns for Learning in and with the World

Educational design patterns have been proposed as a way to articulate the challenges of educational practice alongside developing viable methods for addressing those challenges (Goodyear, 2005; Mor & Warburton, 2014; Mor & Winters, 2007). Originating from the work of Alexander et al. (1977), the pattern approach has been widely adopted in software design and engineering, and later in the domain of learning design and education. Educational design patterns are particularly good at capturing pedagogical and institutional practice in ways that sustain educational and organisational change – such as a shift from the mode 2 to the mode 3 university.

At the core of an educational design pattern is a triplet: (a) an educational problem (or challenge), (b) the educational context in which this problem occurs, and (c) a possible method or educational design for solving this particular problem. Once a particular pattern has been adequately described and validated, the pattern authors augment it with theoretical justification, links to additional patterns, and notes on the barriers and limitations of the pattern (Mor, 2013). While individual patterns have their merits, the real power of design patterns (in contrast with other representations) is in the links between them, forming networks of design knowledge within a certain domain called a pattern language. The work of Köppe, Nørgård, and Pedersen (2017) identified 85 pattern candidates. The level of descriptions varies from just a title and a rough idea to a fully developed description of an educational design pattern. The seven pattern candidates provided below, have been selected from the 85 to best exemplify how the networking university and the pedagogy of teaching and learning through hybrid networks can be put into practice as networked learning in, for, and with the world. As such, the seven pattern candidates included below are meant to convey a basic understanding of how networked learning in and with the world could exist.

Pattern Candidates for Bringing Education into the Public: Learning in the World

- *Street tasks*: Bring the students out to the streets to have real-world experience. Assign activities that bring individuals or groups to engage in out-of-classroom experiences. Students should learn experimenting with/in the world. This can help them develop as a professional academic citizen through interaction with people. This pattern is somewhat related to the 'runaway classroom' (see below), but the students are often dispersed at different locations and carry out task in small groups or individually.
- *Education flashmob*: Students (with or without teacher) self-organise to meet at a specific location to engage the public in the form of a shared learning activity that has the transformatory potential either for the flashmob or the audience.

For example, students of architecture could meet at a building and engage and transform it together. The flashmob takes place in the public often carrying with it an element of spectacle or expressive quality, so that outsiders are drawn in or invited to join. Or students meet at 'tweet-bars' to express, experiment, or explore a concept together in public.

- *Nomadic student*: Students taking part in classes and lectures wherever they are in the world. Whether they find themselves at home, on a bus, in another country, a coffee shop, supermarket, or in the forest. In this way, students are connecting with each other through the onsite/online classroom as a hub. This allows students to be nomadic but located in distributed localities rather than becoming displaced virtual students. While riding the bus, you can be participating in a lecture or group discussion. In a coffee shop, you can be doing assignments together with other students scattered across localities but together in the same online document or conversation. The teacher functions as a hub connecting, drawing in and reaching out to the students as they dispersed in the world but connected through the teacher hub.
- *Runaway classroom*: Many societal issues, complex topics, or collective partnerships can only be engaged in a classroom to a certain extent. As teachers, we run the risk that the boundaries of classroom and campus set the boundaries of our teaching. Through teaching, students should also learn to engage with experts in society or experience teaching and learning at authentic sites. This is why field trips are organised. However, such trips are the exception rather than the norm. Yet, through digital technologies, a classroom can pop up anywhere, and through these technologies students can form a multi-sited classroom outside campus. Runaway classrooms can be supported or organised by a teacher that takes the entire classroom 'in the backpack' and moves it into the world. In this way, the runaway classroom has left the campus with the teacher in order to go somewhere else. In this way, teaching hits the streets, making education something that takes place in the public domain.

Pattern Candidates for Bringing the Public into Education: Learning with the World

- *Collaborative open online projects*: Create online projects in which students work together in groups or collectives with people outside the course. Connect people across contexts to engage them in shared projects, societal issues, or community interventions. Work together in a large community across groups and collectives to create large-scale projects and big impact. Large scale projects connect professionals, students, teachers, researchers, and citizens and could be organised as Massive Open Online Projects (MOOPS) to generate lasting change in multiple contexts or create projects with spin-off products and shared content. But this pattern also works on a smaller scale. For example,

small projects creating group web sites with local community services or companies. It can also be in the form of students as a group contributing to and taking part in a large-scale external project such as open educational resources, book projects, online curated content, onsite festivals, or conference.

- *Integrating practitioners*: Connecting a course to society by bringing into the classroom people, activities, problems, and tools. The integration or collaboration with practitioners or professionals can take on the form of cases. It can be in the form of private companies, public institutions, and cultural organisations or in the form of more informal communities, networks, or groups of people. Integrating practitioners has the potential of transforming student assignments from artificial or simulated tasks to authentic or actual contributions to society. To promote academic connections and collaborations with society, teachers can bring practitioners in to demonstrate application of knowledge and competencies in practice early on in the process. Make space for dialogues to develop throughout the process between integrated practitioners and students. One possibility is to set up a shared project space for practitioners, students, and teachers to collaborate around shared research agendas. But practitioners can also be brought in to evaluate and discuss student end products and course deliverables. Integrating practitioners aims at creating connections between theory and practice, students and practitioners, and university and society. Working with practitioners may take more time and requires more careful and reflective planning. The schedule of practitioners varies often and sometimes they might not be able to provide input or feedback on time.
- *Global online interuniversity teaching*: In interuniversity teaching and learning academics, researchers and teachers teach on each other's courses across different universities and/or courses by giving lectures and participating in each other classrooms or courses through video conferencing or shared writing spaces. One benefit is that teachers' get the opportunity to take advantage of their professional networks to invite research colleagues across the globe into their classroom and think and talk together without having to pay the cost of bringing them there physically. Students get the benefit of experiencing multiple perspectives and voices in their course, making it more connected, polyphonic, and hybrid. It's not just expertise that is added, but a complexity of perspectives and voices. Furthermore, colleagues in the teacher's network are much more obliged to contribute to a course for an hour or two, if it does not mean that they have to fly to another country in order to be there. Other benefits could be that students feel part of and connected to a global research community. It is however important that the teacher is the hub in interuniversity teaching as the course otherwise runs the risk of becoming fragmented where 'teacher of the week' just keep dipping in and out without any coherence. The teacher can't just turn the whole class over to guest speakers and call it a day. Rather, the teacher needs to be the spider in the web, sensing and pulling the strings. Integrating interuniversity teaching in the course with all its accompanying benefits therefore also means taking on the ethical responsibility for the collective co-located experience and the coherence of the course spinning webs between sessions and across the curriculum.

Taken together, the above seven patterns point towards concrete networked and networking teaching and learning formats that promote learning in and with the world. Considering organisational guidelines, pedagogical formats, learning principles, and educational patterns, a certain university is formed; it is not just any mode 3 university but a particular mode 3 university – *the networking university*.

From Patterns to Network: Learning for the World

Synthesising the above into the networking university, three dimensions for learning in, with, and for the world through hybrid networks at the mode 3 university can be developed; networked learning for the world as citizenship, networked learning for the world as trust, and networked learning for the world as ecology.

Networked Learning for the World as Citizenship

Through patterns for integration and collaboration, different public arenas and actors are inter-weaved into the academic enterprise, and vice-versa. The learning activity itself becomes a form of societal co-operation and co-commitment. Learning at the networking university becomes something that takes place within society and creates new societally infused knowledge *from and for* society. Accordingly, the networking university becomes a 'societal driver' (Shumar & Robinson, 2018) for a better future by generating societal value through academic practice. Hereby, academic practice becomes a form of citizenship, and students and teachers are seen, explicitly, as citizens – members of the society through their academic practices. Similar to the term 'academic citizenship' (Macfarlane, 2007; Nørgård & Bengtsen, 2016), Arvanitakis and Hornsby (2016) suggest the term the 'Citizen Scholar' where the university (and its students) may not speak for itself, but *for* others and in the place of others. When becoming inter-weaved with other societal domains, the academic voice becomes merged with other voices from professional domains, political domains, cultural domains, and private domains. At the networking university, the academic voice and practice of its inhabitants become *inter-patterned* into networked learning for the world as citizenship as is visible in the design patterns of 'Street task' and 'Educational flashmob'.

Networked Learning for the World as Trust

Through integrated citizenship, mutual trust between university and society is built into the network. Through allowing itself to be networking and networked, the mode 3 university regains the trust of society that it may have lost in the mode 1

configuration, and society regains the trust of the university that it may have lost in the mode 2 configuration. The networking university is held together by a mutual trust, which can be argued to be central to its academic practice and critical thinking (Gibbs, 2004). Here, trust should not be understood as a functional and formal sort of mutual agreement, but one of also mutual recognition and respect. In line with Gibbs (2017), we would even argue that the patterns outlined above let us define trust also as compassion and a deep mutual care emerging as a bond between university and society (Dall'Alba, 2012). Collaboration around academic teaching and learning activities demands a strong sense of trust between universities and wider societal domains. The difference in knowledge forms, methods, and criteria for validity are highly different and require that academics and professionals care for and trust each other. At the networking university, the collaborative and collective practice between its inhabitants and the wider society become *inter-patterned* as is found in the design patterns of 'Integrating practitioners' and 'Collaborative open projects'.

Networked Learning for the World as Ecology

When mutual trust is beginning to consolidate between different academic, professional, institutional, and private domains, the network starts to form an ecology. In an ecology the many individual and different domains cannot be immediately translated or transferred towards each other, but slowly they become *hybrid* joined together through a common interest and bond. As Barnett (2018) points out, an ecological university is defined *through* its interconnectedness and embeddedness with a wide range of societal domains. The network as hybrid ecology goes beyond sustaining the present. Knowledge creation, teaching and learning, takes place as a particular form of societal fecundity (Feyerabend, 1999), where knowledge and higher education may contribute to societal needs to become closer connected with the whole world, including but going far beyond the human domain. The patterns that show that the mode 3 university as networking university is life-infused, even saturated by life, manifesting itself as networked learning for the world as ecology, are visible in 'Nomadic student', 'Runaway classroom', and 'Global online inter-university teaching'.

Conclusion: Professional Networked Learning in, for, and with the World

When learning in and learning with the world is integrated in the mode 3 university while critically reflecting the different frameworks and how they connect in meaningful academic ways, higher education has the potential of supporting and

promoting professional networked learning in, for and with the world. To make this happen, it is necessary that universities and teachers undertake the ethical responsibilities that come with these new modes of being and learning at the networking university.

When work is undertaken to transform universities, teaching and learning, it is imperative that the darker sides of such change is embraced and given words to, what we have elsewhere named the 'shadowy siblings' of bright and promising educational transformations (Aaen & Nørgård, 2015). Seemingly, promising and enriching practice, patterns, and principles for professional networked learning for the world also contain side effects, unintended consequences, and negative outcomes and experiences for some students and teachers. To mitigate such risks, the teacher needs to take on more extensive ethical, relational, and social obligations as campus, courses, learning, and students are opened up to the world. Often, students and teachers will find themselves on shaky grounds, as will professionals and practitioners, and thus, presence, commitment, care, authenticity, dialogue, and community spirit become more important in education – what Nixon (2008) calls *the virtuous university* or *the moral bases of academic practice*.

Teachers and university are obligated to not leave the student hanging like a fly in the web, but scaffold and sustain ethical partnership relations between teachers and students, university and person, university and society, academic, professional, and personal spheres. Learning in, with, and for the world at the networking university requires equal partnerships, mutual respect, and communal dialogue: 'academic citizenship occurs when university becomes a place where the "they" is being dissolved, when university, society, and people are nested within each other' (Nørgård & Bengtsen, 2016, p. 12).

Here, the university as network could be seen as a potent metaphor for transforming the way the objectives of higher education and the purpose of teaching and learning are currently articulated. It is a call for a university where its members participate in, for and with society. This article's contribution to professional networked learning calls for further research and thinking into the ways university and society can work together, students and teachers can participate and learn in cooperatives in and with the world, as well as how future professional and academic citizens can participate in society through entangled learning networks and professional-academic networked and networking practice.

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Chapter 6
Learning in Hybrid Protopublic Spaces: Framework and Exemplars

Alex Young Pedersen, Francesco Caviglia, Tom Gislev, and Anders Hjortskov Larsen

Abstract This chapter proposes a framework for the analysis of collaborative inquiry in hybrid protopublic spaces that broadens the perspective on networked professional learning. The theoretical assumptions and the primary sources of inspiration from different lines of research for the framework are presented. By focusing on the theoretical grounding, we identify three interconnected assumptions that function as building blocks for these practices. The notion of 'collaborative inquiry' and its expansion into 'connected curriculum' are combined with the idea of 'hybrid protopublic spaces' as potential sites of learning at the boundaries of higher education and beyond. The main finding of this explorative study is the identification of various categories and parameters that constitute the framework. These include multiple connections, modes of knowledge, role models and spaces of application. Three exemplars of hybrid learning spaces are provided and analysed within the proposed framework: an open online course, an open journal and a civic data hackathon. Opportunities and challenges about creating new and supporting existing spaces for collaborative inquiry that connect higher education with society in different ways are discussed. The chapter concludes with directions for future work for incorporating these spaces into existing practices and possibly using the framework for the design of new practices.

Introduction

A focus on networked professional learning calls for understanding a broader constellation of learning experiences and connections than traditional single-course formats. In understanding these different formats, this chapter presents a framework for analysis and explores exemplars that are excellent examples of collaborative

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inquiry in hybrid protopublic spaces, which are spaces for collaboration and dialogue that connect learners with the public sphere (Eberly, 1999, 2000). In doing so, the chapter will focus on different spaces for networked professional learning that takes place outside or at the boundaries of traditional institutional settings.

The guiding research question is how collaborative inquiry can be integrated into learning spaces at the boundaries between educational institutions and the world outside. This links to the current debate in education on the design of networked learning on the connections between (in)formal learning and professional development settings in schools and universities and in the workplace (Cremers, Wals, Wesselink, & Mulder, 2016, 2017; Herrington & Oliver, 2000; Mazereeuw, Wopereis, & McKenney, 2016). These learning spaces are defined as 'hybrid' since they identify social practices aimed at addressing ill-defined, authentic problems which span and transcend disciplines (Wals, Lans, & Kupper, 2012).

The focus on collaboration reflects a sociocultural view of learning as participation, with emphasis on authentic practices and communication (Lave & Wenger, 1991). Another source of inspiration includes instructional design, as in educational design research (McKenney & Reeves, 2012) and learning design theories (Van Merriënboer & Kirschner, 2018).

The chapter aims at defining a framework for identifying and analysing hybrid spaces with the overarching goal of understanding how these spaces and their design properties can be integrated into higher education (HE). The framework is the basis for analysing three concrete 'exemplars' – that are paradigmatic examples – of hybrid spaces for collaborative inquiry. The chapter is thus both theory-driven and practice-inspired.

Firstly, the criteria to explain the choice of exemplars are presented. Secondly, theoretical assumptions leading to a framework for the analysis of hybrid spaces for collaborative inquiry are proposed. After that, the three exemplars of professional development are presented. The discussion connects the findings from the analysis with open questions about pedagogy and institutional setups that ought to be addressed by those who wish to connect HE with the public sphere. Finally, directions for future work in designing new spaces are proposed as a provisional conclusion.

Method: Criteria and Selection of Exemplars

The three exemplars selected for this chapter represent spaces that build on collaborative enterprises and are fuelled by the technological affordances of the Internet in which users are involved in generating, curating and sharing content:

- An open online course
- An open journal – *Hybrid Pedagogy*
- A civic data hackathon

The authors have personal experience of these exemplars as designers and teachers (open online course), contributors (open journal) or learners (civic data hackathon), which affords proximity to the practice-based aspects of knowledge. Moreover, the three exemplars cover a variety of contexts which highlights the broad scope of application. All exemplars originate from the efforts of people engaged in HE and unfold in spaces that are neither closed to the external world as traditional university courses nor entirely part of the public sphere. Finally, the exemplars are connected to the public sphere in what rhetoric scholar Rose Eberly defined as 'protopublic spaces' (Eberly, 1999, 2000). The idea that this protopublic dimension is relevant for collaborative inquiry has been the ultimate criterion for choosing the exemplars used in this chapter.

Towards a Framework for Analysis

The proposed framework that finalises this section derives support from different lines of research with different units of analysis, and jointly they contribute to understanding how people learn in hybrid environments. First, the theoretical underpinnings of the approach include the notion of Community of Inquiry (Dron & Anderson, 2014, henceforth, CoI) as a general model for designing spaces for collaborative learning. Second, a section on the connected curriculum (Carnell & Fung, 2017; Fung, 2017a; UCL, 2018) expands the scope for educational intervention to whole curricula and focuses on opportunities for tighter integration of HE with real-life problems. Third, a section concerning interdisciplinarity, modes of knowledge and role models connects different conceptions of knowledge to the challenges and opportunities of learning in interdisciplinary spaces. The notion of 'hybrid, protopublic spaces' is finally proposed as a concept that captures important properties of networked learning settings that connect formal education with the public sphere.

Collaborative Inquiry

Learning as collaborative inquiry has been suggested by both Garrison (2016) and Dron and Anderson (2014) as a further development of Dewey's concept of inquiry (Dewey, 1933). Communities of inquiry are 'critically important to learning to adapt and succeed in a connected, knowledge-driven society' (Garrison, 2016, p. 54). The connectivity of the digital world has created conditions for community building where collaborative inquiry is possible.

Dron and Anderson (2014) view collaborative learning as a process where individuals work together for mutually beneficial interests. Collaboration is understood

as the 'core dynamic' of the community. The main idea of collaborative inquiry is to facilitate social spaces where transactional thinking and learning experiences can occur with open communication (Garrison, 2016). A certain duration of time is needed in order to develop the necessary trust for collaboration and a certain (informal/formal) leadership to collaborate towards the same goals.

Confirmation bias is essential to understanding the importance of collaborative inquiry (Garrison, 2016). Individuals tend to avoid or ignore information that challenges their beliefs and worldview. Only in the encounter with the views and perspectives of other individuals can our perspectives be objectified. Collaborative inquiry within a community of learners thus represents a way of challenging individual beliefs and opening up to new perspectives.

The CoI framework provides a model for describing online experiences in HE and has been one of the main sources of inspiration in designing the open online course presented below as a first exemplar (see Chap. 2, Dalsgaard & Gislev, this volume). The framework places a strong emphasis on inquiry and dialogue as open-ended, goal-directed processes and identifies three key dimensions of the educational experience: social presence, cognitive presence and teaching presence (Fig. 6.1).

The three dimensions are defined as follows; *social presence* represents the degree to which participants feel connected to each other; *cognitive presence* the extent to which participants can enter into sustained dialogue in order to construct and reaffirm meaning; and *teaching presence* the design and process that facilitates learning (Garrison et al., 2010).

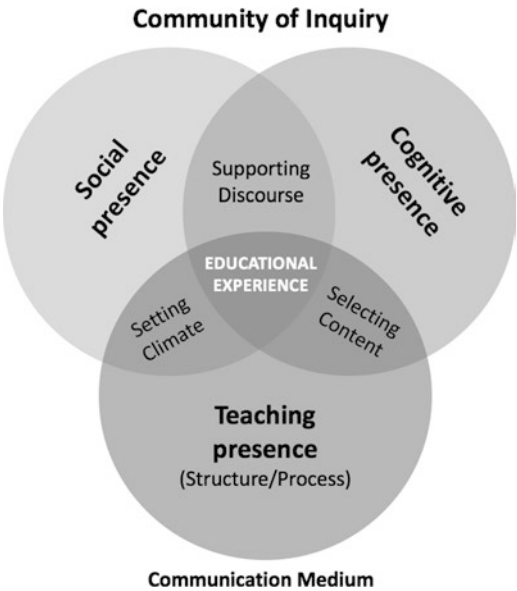

Fig. 6.1 Elements of educational experience. (Adapted from Garrison, Anderson, and Archer, 2010)

The Connected Curriculum

The CoI framework has been developed with formal education in mind and a course as the typical unit of design and analysis. The connected curriculum framework (henceforth, CC; Fung, 2017a) focuses instead on the design of whole curricula – and identifies paths for connecting students with other people (researchers, students, stakeholders), with research, with other disciplines, with real-life problems and with the workplace (Fig. 6.2).

The CC as a framework for best practices is currently implemented at University College London (henceforth, UCL; UCL, 2016). It is first of all committed to 'research-based' education, in the sense that students learn through active participation *in* research rather than simply being taught *about* research (Fung, 2017a). Inquiry-based activities are made possible by creating a collaborative environment among students and making connections (Fig. 6.2).

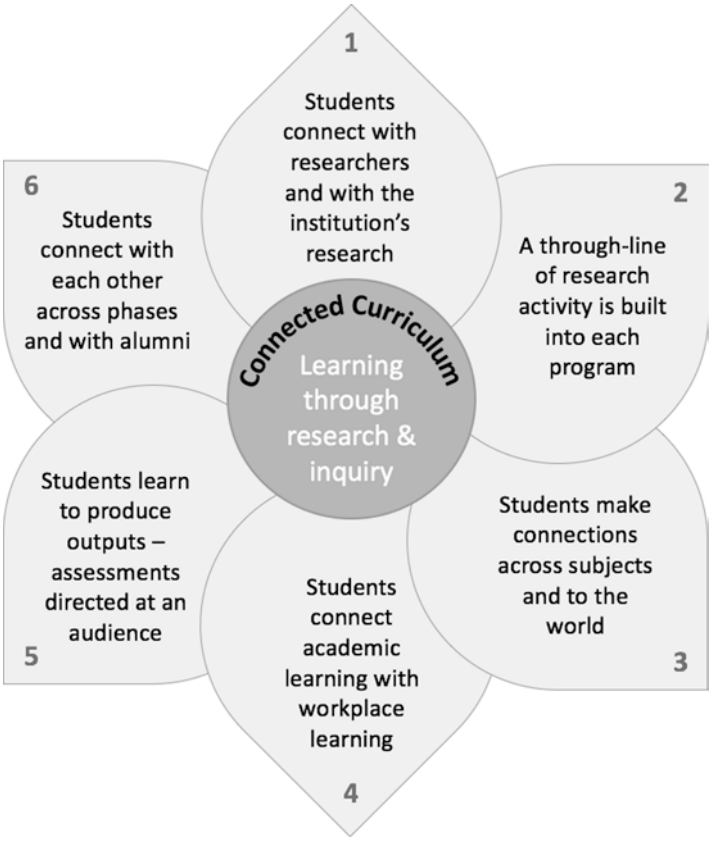

Fig. 6.2 Model of the connected curriculum. (Adapted from Fung, 2017a)

Connecting research and teaching has almost become a mantra within HE, while the need for improving connectivity between learning and the workplace has been the focus of research and intervention (e.g.Cremers et al., 2016; Tynjälä, 2008). CC has the merit of integrating all these dimensions in a coherent unit. Thus CC contributes to the proposed framework by providing the categories mentioned above for connectivity, as well as categories for defining the audience and authorship of student artefacts.

These artefacts are – at least in principle – meant for an external audience in the genre of, for example, business reports, digital curation of artefacts and Wikipedia entries, thereby inviting outward facing student assessment (Fung, 2017a).

Interdisciplinarity, Modes of Knowledge and Role Models

Interdisciplinarity is a key value in CC, and it is an increasingly recognised requirement for approaches meant to address real-life problems through research (e.g. 'Mind meld', 2015; 'Why interdisciplinary research matters', 2015). The dialogue between disciplines has become easier due to technology-enhanced access to research (Fung, 2017a) and new opportunities for data-intensive scientific discovery through interdisciplinary analysis (Hey, Tansley, & Tolle, 2009). Fung's principle of connecting education across subjects and out to the world brings interdisciplinarity into the core of research-based curricula in HE that break with traditional disciplinary boundaries, such as the combined Bachelor of Arts and Sciences at UCL (UCL, 2016).

Markauskaite and Goodyear (2017) have identified 'epistemic fluency' as the overarching competence that prepares students for professional work and defined it as the capacity 'to understand, switch between and coordinate different kinds of knowledge and different ways of knowing with awareness, sensitivity to the situation and skill' (pp. 64–65). Central to 'epistemic fluency' is the notion of 'actionable knowledge', that is knowledge that combines explanatory coherence with practical guidance. Markauskaite and Goodyear adopted from Gibbons et al. (1994) the distinction between knowledge production in 'Mode 1', that is, academic discipline-based knowledge, and knowledge production in 'Mode 2', characterised by being interdisciplinary, problem-focused and context-driven (Markauskaite & Goodyear, 2017) and aligned with the type of knowledge produced in professional work. A focus on 'epistemic fluency' highlights the importance of bridging divides between HE and society in ways that create spaces for students to engage actively with societal issues since this is the only arena in which the students can learn 'actionable knowledge' through experience and inquiry. These different modes of knowledge are defining parameters applicable to the framework for collaborative inquiry.

Different modes of knowing imply a plurality of role models for learners. Scardamalia and Bereiter (2014) have proposed an influential model for bringing to education 'both the goals and the processes of knowledge-creating organizations – as represented, for instance, in scientific research groups and industrial design teams'. The members of a community or team of researchers constitute the central role model which also serves as a guiding principle in designing classroom settings. Other role models for scholars and students, more focused on the social sciences and humanities, propose the 'citizen scholar' (Arvanitakis & Hornsby, 2016), the 'fellow citizen' (Pedersen & Caviglia, 2018) and in a broader context the 'reflective practitioner' (Schön, 1987). These role models represent instances of legitimate diversity of scholarly practices building on different values, strengths and goals (Fung, 2017b).

Hybrid Protopublic Spaces

Eberly (2000) introduced the notion of 'protopublic spaces' to describe how she turned her classrooms into spaces where students engage with the public sphere as a 'discursive space in which individuals and groups associate to discuss matters of mutual interest and, where possible, to reach a common judgment about them' (Hauser, 1999, p. 61).

Eberly's teaching is anchored to artefacts (e.g. contested literary works, TV shows, podcasts and the students' productions) that facilitate discussion in 'common places' of public interest (Eberly, 1999, 2000). The students in Eberly's classrooms eventually enter the public sphere, for example by calling during a local radio talk show to make or support an argument (Eberly, 2002) or creating an open website of collected memories (Eberly, 2004). Worth noting, however, is that the part that becomes visible to the public sphere is the tip of the iceberg in a larger body of 'protopublic' classroom activities.

The notion of 'protopublic' alone does not fully capture the inherent hybridity of such a classroom. Classrooms can never truly be secluded from the public because the institutions, the teachers and the students are part of the public and this flows into the practice of education. However, within those semi-secluded institutional structures, students 'can engage in the praxis of rhetoric, an art whose telos is [...] judgment', and possibly choose to send out their contributions into public debate (Eberly, 2000, p. 169). The classroom offers space for practising judgement, but to fully realise the capacity for judgement, one needs to go beyond. The ability to pass judgement is a mental capacity that cannot be taught and but must be learned through practice (Arendt, 1989, p. 37). Therefore, it is important to acknowledge that passing of judgement and the arena for practice never happen in a vacuum. The situation of the 'protopublic' is and always was hybrid.

Students increasingly build on an intercultural and hybrid base of experience that shapes their expectations and identity. Hybridity emerges as a reality of the classrooms of the world and as Bhabha emphasises this '[…] provides the terrain for elaborating strategies of selfhood – singular or communal – that initiate new signs of identity, and innovative sites of collaboration, and contestation, in the act of defining the idea of society itself' (Bhabha, 1994, p. 2). So, hybridity in education is the acknowledgement of the initial condition of otherness and difference as something productive and conducive to in-between spaces.

The ubiquitous combination of the digital and the physical in an increasingly interconnected world have become the norm in most societies. Hybrid spaces denominate these situations where participants are connected to public networks and where the distinction between the public and the private tends to blur. Therefore, the degree of exposure to the public in protopublic spaces cannot be entirely controlled. The hybrid is always beyond the control of anyone and radically opens towards something and someone entirely unforeseen. The hybrid is bound to the being and becoming of what Hannah Arendt (1958) called 'newcomers' (see also Pedersen, Nørgaard, & Köppe, 2018). The fact that human beings are literally 'newcomers'; unique by birth and capable of action is exactly why we can expect the unexpected. But Arendt makes it clear that action can only be conducted in a space where freedom is a worldly reality (Arendt, 1954). Therefore, the concept needs to consider this hybridity whereby the concept itself is extended. Hybrid protopublic spaces are spaces at the boundaries of:

> Physical Learning Space/Virtual Learning Space, Academic Space/Extra-academic Space, On-ground Classrooms/Online Classrooms, Institutional Education/Informal Education, Garden-walled Academia/Open Education, Scholars/Teachers, Academic Product/Learning Process, Disciplinarity/Interdisciplinarity, Learning in Schools/Learning in the World, Analog Pedagogy/Digital Pedagogy, Use of Tools/Critical Engagement with Tools, Passive Learning/Experiential Learning. (Stommel, 2012)

A Framework for the Analysis of Collaborative Inquiry

In summarising the presentation of the theoretical underpinnings of different research threads informing and compromising collaborative inquiry, an initial framework for analysis is presented. Table 6.1 summarises the different categories and parameters that will be used for analysing and discussing the contexts and exemplars proposed in this chapter. The table may serve both as a framework and a point of reference for analysis and design of existing and new practices of collaborative inquiry.

First Exemplar: An Open Online Course

This section presents a specific online educational format called Open Online Course (OOC). It is proposed as an exemplar of a hybrid protopublic space, where any participant can discuss and inquire into a common subject matter.

Table 6.1 A framework for analysing dimensions of collaborative inquiry

Categories	Parameters	Main conceptual grounding
Dimensions of educational experience	Teacher/social/cognitive presence	Garrison, Anderson, and Archer (1999)
Connection with research and with researchers	Using vs. doing research researchers as facilitators/coworkers/reviewers	Fung (2017a)
Connection across subjects	One discipline vs. across disciplines	Fung (2017a), Markauskaite and Goodyear (2017)
Connection to real-life problems	No/implicit/explicit	Fung (2017a)
Connection to the workplace	No/yes (with various modalities)	Cremers et al. (2016); Fung (2017a)
Students produce for the world outside	No/yes/yes (with external assessment)	Cremers et al. (2016)
Authorship	Individual/collective (with individual credits)	Fung (2017a), Dron and Anderson (2014)
Modes of knowledge	'Mode 1' (investigator-initiated and discipline-based knowledge) vs. 'Mode 2' (interdisciplinary, problem-focused and context-driven), 'actionable knowledge'	Gibbons et al. (1994), Markauskaite and Goodyear (2017)
Role model(s)	Team of researchers/team of designers/ reflective practitioner/individual researcher/professional/citizen scholar/ fellow citizen	Scardamalia and Bereiter (2014), Arvanitakis and Hornsby (2016), Schön (1987), Pedersen and Caviglia (2018)
Domains (for processes and outcomes)	Private/protopublic/public/hybrid (process and outcome can have different spaces)	Eberly (1999, 2000)

The OOC format is related to the Massive Open Online Course (MOOC), but there are significant differences. The success of MOOCs tends to be measured by the number of participants and by completion rates (Jordan, 2015). However, instead of focusing on the level of completion, the focus of attention might be shifted to the level of engagement of the participants in the MOOC. Thus, the emphasis of the design was on supporting different ways of participation, rather than solely focusing on completion. This shift in focus also leads to omitting the 'M' standing for massive, leaving the abbreviation OOC (see also Chap. 3 by Dalsgaard & Gislev in this volume).

The OOC was designed for the course 'Digital Learning Contexts' that is part of an interdisciplinary master programme called 'ICT-based Educational Design' developed at Aarhus University. The programme integrates design, digital tools and media with learning theory and teaching practices (Bang, Dalsgaard, Kjaer, & O'Donovan, 2016). The majority of courses are designed with the Open Educational Resources as a model (Downes, 2007). The student-produced content is embedded on blogs and is open to anyone.

Design of the OOC was informed by the notion of the CoI framework (Garrison, 2016; Garrison et al., 2010) combined with the learning goal of understanding information technology as a social and collaborative enterprise. The design had an explicit focus on opening up the course and making the information technologies involved more susceptible to collaboration with outside participants.

In alignment with the theoretical underpinnings concerning collaborative inquiry, the OOC was designed for group work, organised in six modules and planned to run for 6 weeks. The content was put on open static blog pages, including instructions, assignments, video lectures and course materials. Each module consisted of some assignments, e.g. reading of texts, observations in the field, publishing of blog posts and commenting on blog posts, which involved a certain level of teacher presence (Garrison, 2016) in the actual instructions of the assignments.

A typical module consisted of specific tasks engaging the participants in field studies of a particular educational context where they would record their observations, analyse and discuss them and reflect upon them in video or text that was later published on their blog and finally commented and discussed.

The choice of blog posts as the primary media for assignments had several reasons. Firstly, the participants should be offered the possibility of communicating with people other than their fellow course-mates and the educators, which correspond with Garrison's (2016) ideas of social presence. Secondly, the blog should support commenting which would provide a space for posing and answering questions. A feature that is related to the dimension of educational experience called cognitive presence (Garrison, 2016). Thirdly, the blog afforded multiple modalities, and fourthly, it supported a text format that was suitable for short and 'draft-like' texts, rather than more traditional assignments.

Assignments were designed in such a way, that the participants were not credited for the module before commenting on at least two of their fellow participants' blog posts and responding to the comments on their own blog posts. By this requirement, the comment section of the blog was supported in keeping the dialogue vibrant and focused on the participant's observations, reflections and the overall subject matter.

The blog was shared via different social media channels by course participants, instructors and people connected to the instructors, many of whom were scholars, designers and teachers. They also engaged in the discourse and to some extent acted as peers and even in few instances as informal teachers for both the enrolled students and the outside participants, qualifying the reflections and discussions and even adding content.

For the duration of the OOC, the blog became a super-node (Dron & Anderson, 2014) in a network that accommodates the Danish discussion of the use of educational technology, which happened due to a relatively high amount of content, which in turn produced further comments leading to a vibrant discussion forum.

Second Exemplar: An Open Journal

The primary mode of knowledge production in academic research is the publication of articles in peer-reviewed journals. Access to essential journals is often restricted via paid subscriptions, which are often exclusive to academic faculty and more seldom open to students. For the scientific community, the most obvious downside of this exclusive model of information distribution is the restriction of the communication of research, which again poses a problem for the essential quality control aspect in science. As a result, open-access has proliferated as one way to open up scientific communication. In both the natural sciences and the social sciences an open-access model of fast distribution has become a supplement to traditional scientific journals, with online archives for articles and pre-prints – arXiv.org and Social Science Research Network (SSRN) being the most prominent examples (Bryant, Srnicek, & Harman, 2011). Many of these open-access journals are still too specialised to be relevant for the broad public, and the communication is for all practical purposes still restricted to academics. In trying to strike a balance between relevance *for* and participation *of* the public, a growing number of different scholarly, peer-reviewed, open-access, online journals have begun to address more broadly conceived topics.

Hybrid Pedagogy – launched in 2010 – is a prominent example of such a journal which offers an alternative publishing model inspired by digital culture. *Hybrid Pedagogy* is a scholarly journal, but it is also open to other professions than academic researchers. According to the collective of editors, the journal is 'a community, a conversation, a collaboration, a school, and a journal. It is a place to discuss Critical Digital Pedagogy by advocating for students and fostering awareness of academic hierarchies' (Hybrid Pedagogy, n.d.). There is a great emphasis on collaboration and co-creation which is also reflected in the review process which they describe as 'collaborative peer review' where the editors engage directly with authors in the process of revision and development. The standard blinded review has been replaced by a transparent review process with the intent of fostering an ongoing dialogue. The reviewers are not anonymous but are explicitly mentioned in most articles following the name of the authors, whereby authorship is increasingly becoming shared. The focus is on supporting the continual development of knowledge and understanding through dialogue and community building or as one of the authors in the journal states:

> To foster such a teeming community of teachers requires a pedagogy that stretches beyond the bounds of academic culture, one that is hybrid—both germanely academic, and incessantly human—that encourages vociferous engagement and dialogue, and that offers genuine, productive hospitality. (Morris, 2013)

The essential component in this form of networked professional learning is a specific pedagogy because learning has to be supported by dialogue that functions to strengthen the relations of the community. In this sense, there is a strong emphasis on the civic ideal of participation in the public sphere lending credence to role models such as the 'citizen scholar' and 'fellow citizen' that are motivated by their adherence to community building and real-world problem-solving.

In the fall of 2016 during a writing course for undergraduates at Queens College, New York, teacher Danica Savonick engaged her students in a process of collaborative writing with the goal of publication in either the online journals *Hybrid Pedagogy* or *HASTAC* (Humanities, Arts, Science, and Technology Alliance and Collaboratory; HASTAC, n.d.). Preparing for publishing in these journals became a pedagogy in itself whereby her students learned to actively engage in the ongoing conversation in society as Savonick reports:

> They learned what a scholarly, peer-reviewed, open access journal is: a conversation among people researching a specific topic, sharing and debating the conclusions of their research in public, with the intent of engaging a larger audience in this conversation. (Savonick, 2017)

The ongoing and procedural character of this knowledge is further underscored by the fact that the review process continues post-publication in the blog-like comments embedded in the online articles themselves. This further enables possible connections with the public and with other peers and researchers in the field.

It is important to stress the public dimension of these journals because it changes the motivational characteristic. For the undergraduates in Savonick's course, the attention shifted away from 'just another' assignment to something that mattered outside the context of the college and that engaged with issues in society. The Stanford Study of Writing (n.d.) emphasises that students do not perform particularly well when writing papers for the sake of writing papers; in summarising the study, Davidson writes, 'Rather, students value writing that "makes something happen in the world"' (Davidson, 2017, p. 93). For Savonick's students, publishing was motivational because of the public dimension and the possibility of learning through the dialogue initiated with the publication. Going public in this manner had another positive effect due to a very egalitarian approach that served to demystify the scientific process for the students.

Networked learning perspective journals such as *Hybrid Pedagogy* share the pedagogical dimensions of openness, self-determination, real purpose, supportive environment, collaborative assessment and the idea that this is an ongoing process (McConnell, Hodgson, & Dirckinck-Holmfeld, 2012).

Third Exemplar: A Civic Data Hackathon

'Data science' is an interdisciplinary field whose specialists engage in identifying patterns in data with the goal of diagnosing problems or making predictions (Provost & Fawcett, 2013). The compound and interdisciplinary nature of data science is illustrated in Fig. 6.3, in which the competencies required in the field are defined by overlapping of deep domain-specific knowledge, knowledge of statistics and, not least, IT operational skills in finding, organising and clarifying data for analysis. The figure also shows the need to incorporate all competencies simultaneously: domain-specific expertise and access to technology cannot stand alone because,

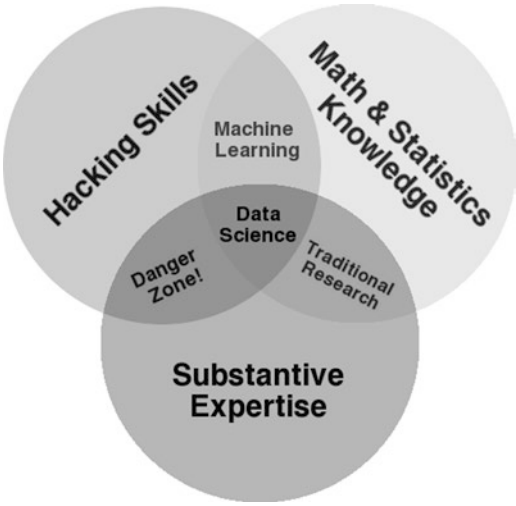

Fig. 6.3 Competencies for data science. (Conway, 2013)

in the absence of knowledge of research methods and statistics, it constitutes a 'danger zone' (Conway, 2013).

It has been argued that data science represents a new paradigm for scientific discovery across disciplines (Hey et al., 2009), a resource for sustainable social development (Sharif & Van Schalkwyk, 2016) and economic development (Stott, 2014). As a consequence, HE and corporate research units are investing heavily in developing study degrees and online resources for educating data scientists. The rising need for specialists in data science is thus being addressed. Concurrently, the expanding role of data in society also highlights a need for educating citizens who are *not* meant to become data scientists but professionals in other fields who can connect to the methods, tools and results of data science, for example, journalists, business people or members of organisations who need to understand and interpret data or teachers who wish to integrate data-based reasoning into their teaching. These people are the target group for educational intervention on 'data literacy' – the focus of this section – that has been succinctly defined as 'the ability of non-specialists to make use of data' (Frank, Walker, Attard, & Tygel, 2016). The practices and tools of data literacy are fast-changing, thereby turning data literacy into one of the 'literacies of the digital' that require lifelong learning (Littlejohn, Beetham, & McGill, 2012).

Data literacy relates to professional networked learning in HE for two reasons. Firstly, data literacy is necessary for employability and active citizenship (Wolff, Gooch, Cavero Montaner, Rashid, & Kortuem, 2016) and is therefore emphasised in new interdisciplinary curricula (e.g. UCL, 2016, 2018). In other words, HE has a pivotal role in bringing data literacy to the broadly educated population across disciplines. Secondly, integrating the competencies of people with different expertise lies at the core of data literacy. A civic data hackathon is presented with the goal of highlighting the connection between the cognitive and social dimensions in fostering data literacy.

'Hackathons' (n.d.) are events in which a group of computer programmers engage in a coordinated effort to produce code for a project, related to technology or a cause. 'Civic data hackathons', e.g. DataDives (DataKind, 2015) and Open Data Day (2018), are hackathon-type events that bring together non-profit organisations (NPOs) and 'data volunteers' with the goal of performing collaborative data analysis that support data-driven decisions or improve understanding of civic issues). NPO personnel typically have a deep understanding of their domain-specific contents but may lack expertise in data analysis and resources for hiring data experts. Civic data hackathons are promising spaces for integrating the expertise of NPOs personnel and data experts, but collaborative data analysis may not proceed beyond an initial, exploratory stage if the experts in the domain cannot sufficiently grasp the method of data experts (Choi & Tausczik, 2017; Chou et al., 2014).

Hou and Wang (2017) have reported on two civic data hackathons organised by graduate students at Michigan University involving 9 NPOs and 40 data volunteers. The problem of connecting different communities of practice was addressed by organising groups of 'knowledge brokers' (Wenger, 1999) with the task of bridging the divide between NPOs and data expert by facilitating translation, coordination and alignment between perspectives of the two groups and matching the various competencies of data volunteers with the need of the NPOs. Knowledge brokers strived to keep the focus on the collaborative analysis but had to mediate between the dual goals of civic data hackathons, that is, to develop actionable knowledge for the NPOs and to improve the overall data literacy of the community (Hou & Wang, 2017). Hou and Wang's civic data hackathons thus describe a practice in which a heterogeneous group of people with specific domain competencies and needs are matched with students and teachers with some core competencies in data science to address complex real-life issues through collaborative inquiry.

In the exemplar, data literacy emerges as a property of the community seen as a whole, as opposed to an individual, with members of the community making different contributions (Wolff et al., 2016), combined with the idea of engaged citizens as common role model among participants.

Discussion: Requirements and Challenges for Designing Hybrid Protopublic Spaces

The three exemplars presented above constitute practices of collaborative inquiry in hybrid protopublic spaces chosen from a wider variety of examples that may serve to show the broad scope of application. The presented exemplars are summarised in Table 6.2 through the lenses of the proposed framework for the analysis of collaborative inquiry. This section discusses the requirements and challenges of integrating these elements in the design of new spaces for networked learning.

Table 6.2 Elements of collaborative inquiry in the exemplars presented in this chapter

	Open online course	Open journal *Hybrid Pedagogy*	Civic data hackathon
Teacher presence	Instructional designer and facilitator	Editor or peer reviewer	Organisers as designers Researchers and students as 'knowledge brokers'
Social presence	Discussion in blog	Collaborative writing	Collaborative problem-solving
Cognitive presence	Asking/answering research questions	Contributing to disciplinary discourse	Developing new solutions Improving individual and collective data literacy
Connection with research and researchers	As sources or teachers	As peer reviewers	Students, researchers and practitioners as partners
Connection across subjects	The subject is intrinsically interdisciplinary	Explicit	Explicit
Connection to real-life problems	Through assignments	The goal of the journal	Direct, explicit
Connection to the workplace	In part (when practitioners are students)	Explicit (for professional educators)	Explicit
Students produce for the world outside	Output is shared within the course	Students can in principle contribute	Participants, also students, produce for the world outside
Authorship	Individual	Individual, but reviewers are explicitly named	Collective
Knowledge	Mode 1	Mode 1 and 2	Mode 2
Role model	Student/scholar/ professional	Scholar/professional/ citizen scholar	Fellow citizen
Protopublic spaces (for processes and output)	Work is done in protopublic classroom – no public output	Protopublic, collaborative peer-review – public output	Protopublic spaces designed for outside impact

The framework has emerged in the combination of different theoretical positions in order to identify the most critical parameters in analysing hybrid protopublic spaces for collaborative inquiry that by definition transcends the traditional boundaries of HE.

The exemplars secure a balance of teacher presence, cognitive presence and social presence, but the roles of the participants and the forms of recognition for intellectual work go beyond the traditional roles and practices of HE, while at the same time only being made possible by a connection with institutions of HE. Establishing hybrid learning spaces requires a mixture of individual and institutional commitment to create and sustain the necessary momentum. It is time-consuming to design and maintain such spaces, and a certain level of flexibility of

the institution is needed to allocate resources and ensure recognition for the work done by the participants. Institutional flexibility seems, therefore, the most challenging requirement for establishing new learning spaces. Individuals can promote pilot initiatives, but establishing whole study programmes is a major enterprise that requires a process of participatory design involving both researchers, administrators and some stakeholders (Fung, 2017a).

Hybrid protopublic spaces connect learners with authentic, real-life contexts as well as experts and practitioners. Such authenticity may be ideal for intermediate experts or even 'expert like novices' (Bereiter & Scardamalia, 1993), but for learners at lower levels of competence, this may constitute an insurmountable barrier for participation. Novices may feel overwhelmed by the authenticity and hybridity and choose to stay away or do as little as possible. For those who design or monitor these spaces, it is important to stress the 'protopublic' dimension that makes it possible to provide support to all participants regardless of the level of competence. Being hybrid and protopublic does not ensure that such spaces help individuals become effective and efficient learners. Therefore, the community-building dimension is crucial in sustaining and developing the hybrid protopublic spaces. The spaces should strengthen inclusion instead of reproducing spaces of exclusion. The real challenge for the spaces for collaborative inquiry is to stay heterogeneous while at the same time creating community.

About connectedness, the exemplars proposed in this chapter involve networks of researchers, learners and stakeholders that connect by shared interests and values about the relevance of their field of study. Connectedness under these conditions is almost bound to succeed, but can connectedness ever become mainstream – something that both learners and teachers come to expect from HE?

In the long run, connectedness to real-life problems may be a requirement for the very survival of a discipline, but disciplines often compete for resources and recognition rather than collaborate, and Fung's advocacy for different ways of being a scholar (Fung, 2017b) may clash with a lack of recognition for work done in non-standard formats. For example, the open journal *Hybrid Pedagogy* presented in this chapter has recently been refused inclusion in the list of journals recognised by the Danish Ministry of Higher Education and Science because it does not fulfil the criteria of a blinded peer review (BFI, 2018). The journal is indeed different from other academic publications, although it does, in the authors' view, provide a valuable contribution to educational theory and practice.

Teachers, researchers and students are subjected to a strong societal influence towards focusing on individual (academic) achievements rather than contributions to collaborative outcomes. Connection to real-world issues can provide feedback and recognition, sometimes at the cost of relinquishing power and opening up to different forms of knowing, which may provide a further challenge. In designing for hybrid protopublic spaces, it may, therefore, be necessary to negotiate and make explicit the type of knowledge used and developed. For example, in the case of the *Hybrid Pedagogy* journal, it is explicit that the knowledge they aim for is inherently co-created in close collaboration and that the knowledge production takes place in

a hybrid situation at the boundaries of disciplines and between academic space and extra-academic space (Stommel, 2012).

Dependent on topic, working in hybrid protopublic spaces also affords and imply that knowledge is interdisciplinary. The hybrid protopublic space nearly by default presupposes interdisciplinarity due to the social basis of knowledge production relying on heterogeneous groups. The creation and coming together of highly diversified groups are the benchmark for the quality of knowledge and the feasibility of solutions. This is obvious in the data hackathons, where a community of people with different competencies is the necessary condition sine qua non.

In all exemplars, 'epistemic fluency' emerges as a key requirement for participating in connected spaces. However, additional work is required for understanding and learning from challenges, conflicts and failures that may be experienced in the process of establishing and maintaining these spaces.

The risk that the outcome would not live up to the expectation is intrinsic to educational intervention (Biesta, 2013), and establishing collaboration among participants from different contexts can indeed be very challenging. Of course, risk-taking needs to be balanced with institutional responsibility for achieving learning goals. The notion of 'hybrid protopublic space' does leave some room for working within a 'traditional' classroom but with an acute awareness and acknowledgement that this already means acting in hybrid spaces.

In traversing the hybrid protopublic spaces we insert and assert ourselves in the human world which Arendt (1958, p. 176) calls a second birth into the public sphere via free speech and action. Arendt was well aware of the dangers of totalitarianism and the encroaching control over both the public and private spaces it relied upon. These spaces need to be guarded and politically guaranteed against such encroachment (Arendt, 1951). Arendt envisioned and understood the Greek *polis* as a modern ideal where decisions are the product of deliberation in the absence of coercion and violence. We need to be aware of the inherent political quality of the hybrid protopublic spaces but at the same time cherish that what we do and say matters:

> If we understand the political in the sense of the polis, its end or *raison d'être* would be to establish and keep in existence a space where freedom is a worldly reality, tangible in words which can be heard, in deeds which can be seen, and in events which are talked about, remembered, and turned into stories before they are finally incorporated into the great storybook of human history. Whatever occurs in this space of appearances is political by definition. (Arendt, 1954, pp. 154–155)

Conclusions and Directions for Future Work

The main contribution of this chapter has been to build on the principles of collaborative inquiry and connected curriculum and to integrate these in the notion of hybrid protopublic spaces for learning. For this goal, we have suggested some theoretical underpinnings of a framework for analysing practices for networked

learning that may serve as guidelines for integrating these in courses and study programmes (see Table 6.1). Also, three concrete exemplars have been provided that constitute existing practices and which may serve as inspiration for further development of hybrid protopublic spaces at the boundaries of HE. We believe that such practices are going to play an increasingly visible role in connected learning in institutions with students, researchers and practitioners working with real-life challenges. Indeed, we see this movement towards the creation of more hybrid protopublic spaces not as a threat to HE but as a strengthening of core values in HE regarding transparency, openness and justification of knowledge claims. Furthermore, connecting and engaging with societal issues will help to strengthen the social legitimacy of HE. Initiatives like collaborative web annotation of public discourse (Dean, 2018), collaborative development of open textbooks (Falldin & Lauridsen, 2017) and the involvement of students in the process (Mays, 2017) are clear steps in this direction.

An interesting question arising from the development of the framework is the possibility to use the framework not only for analysis of already existing practices but for assisting in the future development of HE didactics. This was not the initial objective of the framework, but albeit it seems that uncovering significant dimensions of already existing and functioning practices can inform and guide the development of similar practices in the future.

The three different exemplars in focus show the many different aspects in which hybrid protopublic spaces are found. Cremers et al. (2017) have provided a set of design principles for hybrid learning spaces, with focus on authenticity, connection of working and learning, valuing diversity, facilitating reflexivity and creating a learning community and ecology including partner organisations and other stakeholders. These principles can also be found in the exemplars proposed. The framework proposed in this chapter has instead a narrower focus on 'collaborative inquiry', and its primary goal is not to define design principles, but to identify challenges and open questions in the design and maintenance of hybrid protopublic learning spaces. There are no concrete design principles for designing a protopublic hybrid space in this framework even though the different dimensions identified could inspire educational designers with this objective in mind. In this sense, the framework could be seen as a resource for future design interventions.

Finally, in regards to both possible new designs and to the learning of the students it is important to stress the fact that we are always educating for a world that is 'irrevocably delivered up to the ruin of time unless human beings are determined to intervene, to alter, to create what is new' (Arendt, 1954, p. 192). To fulfil the task of education, especially in HE, learning must balance the old and the new – what the world *is* and what it is *to become* or as Arendt puts it: learning must 'cherish and protect something – the child against the world, the world against the child, the new against the old, the old against the new' (Arendt, 1954, p. 192). In order to strike this delicate balance, we believe that hybrid protopublic spaces will be a way forward and worth exploring further.

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Chapter 7
Designs for Learning as Springboards for Professional Development in Higher Education

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Abstract The area of Learning Design research holds interesting thoughts and conceptualisations for networked professional development. This chapter identifies some tensions within the broad landscape of Learning Design and more specifically the Larnaca Declaration. Arguing that there are two distinct ideas underpinning the notion of sharing Learning Designs, the terms 'plans for action' versus 'resources for reflection' are introduced. Further different voices in the field alternating between seeing Learning Design as a means for 'effectiveness' versus a means for 'reflexiveness' are identified, and two different views of how to empower and support teachers in developing Learning Designs are suggested. Discussing contemporary challenges for networked professional development and asking whether the notions of Learning Design have a tendency to assume that researchers and teachers are designing for relatively well-known problems and contexts. Drawing on conceptualisations from Engeström, it is suggested that Learning Designs also can be viewed as 'springboards for development'. It is concluded that design and Learning Designs should not only be thought of as predefined design ideas or as incremental exploration based on retrospective reflections on existing courses but also can conceptualise Learning Designs as dynamic, experimental opportunities for the collective design of new practices or what we term 'springboards for development'.

Introduction

The notion of 'design' has become increasingly popular in recent years within research on learning and technology, and it has also held a space within the area of networked learning, e.g. through notions of indirect design, design patterns and Learning Design (Dalziel, 2003; Dalziel et al., 2016; Gleerup, Heilesen, Helms, & Mogensen, 2014; Goodyear, 2015; Jones, 2015). We use 'Learning Design' to refer

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to the area of research and 'a Learning Design' for an instance, e.g. a concrete design in a course. Within the Technology Enhanced Learning Circuit, there have been multiple EU projects working with Learning Design from both a conceptual and a more technical perspective, and a range of publications on 'Learning Design', 'designs for learning' and 'teachers as designers' have surfaced (Conole, Dyke, Oliver, Seale, & Seale, 2004; Conole, 2007; Goodyear, Carvalho, & Dohn, 2014; Goodyear, Retalis, Bartoluzzi, & Ronteltap, 2004; Laurillard, 2012). Simultaneously, we have witnessed a surge of interest in areas such as 'design-based research', 'educational design research' or 'formative interventions' (Barab & Squire, 2004; Markauskaite, Freebody, & Irwin, 2011; McKenney & Reeves, 2012; Sannino, Engeström, & Lemos, 2016). Clearly, the idea of 'design' has received wide attention and is being addressed from multiple perspectives (Dohn & Hansen, 2016). While these different areas may have overlapping interests, they could potentially also hold very different fundamental understandings of what 'design' and Learning Design might mean. With this chapter we wish to open up a dialogue amongst networked learning researchers and practitioners around the values, understandings, meaning and underlying perspectives associated with 'design' and 'Learning Design' and how this relates to networked professional development.

We initially discuss some tensions we see within the field of Learning Design. We do this because we believe the area of Learning Design research holds potential for networked professional development, but equally, we argue a need to be aware of different underpinning ideas, such as the concept of sharing Learning Designs or the role of the teacher within networked professional development. We argue that we can distinguish between sharing 'plans for action' and 'resources for reflection'. While the former are more prescriptive, software-based packages of learning activities that specify the roles and responsibilities of teachers and students, the latter are more flexible, narrative accounts that can be adopted by teachers as resources for reflection. Further, we discuss how these are related as perspectives on 'effectiveness' versus for 'reflexiveness' and of how we can empower and think of supporting teachers in developing Learning Designs as we relate these discussions to the ideas and values of networked learning pedagogy.

We also question whether our notions of design and Learning Design might have an inherent bias or tendency to assume that we are designing for relatively well-known professional problems and contexts. With reference to the cases presented in this book, we discuss contemporary challenges for networked professional development. Drawing on conceptualisations from Engeström (2004), we discuss how we might approach design processes where the context and the problems to address might not be clear, but emerge as a part of collective learning and design processes. Here we draw on Ross and Collier's (2016) call for embracing complexity, mess and 'not-yetness', adopting speculative design methods (Ross, 2016). We briefly discuss the notion of 'formative interventions' as a promising avenue for thinking about design processes. In this way, we argue that Learning Designs might not only be 'plans for actions' or 'resources for reflection' but rather can be viewed as 'springboards for development'. Design and Learning Designs should not only be considered as predefined design ideas or retrospective reflections but can be conceptualised

as dynamic, experimental opportunities for the collective design of new practices. In other words, designs and Learning Designs can be considered as 'springboards for development'.

Design and Learning Design

> 'Design is to design a design to produce a design'
> (Heskett, 2002, p. 3)

The term design can be understood as (1) a domain, (2) giving form, (3) the process of forming, (4) as a sketch, (5) the immediate manifestation of an idea for design and finally, (6) as a result, as illustrated in Heskett's (2002) quote. Historically, the concept of design originates from the field of design of specific physical products and their functionalities (Jensen, 2005). Over the past 20 years, there has been a shift in how we conceptualise 'design'. In the past, design concepts tended to be linked to predictability and uniformity, such as in the notion of 'industrial design'. Newer definitions are more aligned with artistic and architectural practices, emphasising aesthetics, creativity and 'formable' solutions that can be adapted to a specific situation (Dohn & Hansen, 2016, p. 22). Today, the idea of design has expanded to include conceptual representations such as Learning Designs and the planning of teaching and learning processes. These diverse and sometimes conflicting perspectives can make it difficult to converge upon a shared interpretation and understanding of the concept of design. Dohn and Hansen (2016) note that Learning Design covers all the dimensions illustrated in Heskett's (2002) quote and can be understood as a domain, the process of designing learning and learning activities; visualising, representing and sharing Learning Designs; as well as the final product. As highlighted by Mor, Craft and Maina (Goddard, Griffiths, & Mi, 2015), Learning Design is a complex field of enquiry covering diverse (and sometimes conflicting) perspectives, theories, methodologies, design tools, artefacts and software solutions, which can lead to confusion for both practitioners and researchers entering the field. Our purpose in this chapter is not to introduce this web of theoretical perspectives, design tools, representations and software tools. Rather we aim to unearth some fundamental distinctions and differences that underpin this area. On the surface these surface different ideas of sharing and representing Learning Designs but also embody distinctive, underlying ideas of education and the role of the teacher. These distinctions are established in the introduction to *The Art & Science of Learning Design* (Goddard et al., 2015) when introducing Koper (2006) and Conole's (2013) different definitions of Learning Design:

> "Learning Design" is defined as the description of the teaching-learning process that takes place in a unit of learning (e.g., a course, a lesson or any other designed learning event). The key principle in learning design is that it represents the learning activities and the support activities that are performed by different persons (learners, teachers) in the context of a unit of learning. (Koper, 2006, p. 13)

> A methodology to enable teachers/designers to make more informed decisions in how they go about designing learning activities and interventions, which is pedagogically informed and makes effective use of appropriate resources and technologies. This includes the design of resources and individual learning activities right up to curriculum-level design. A key principle is to help make the design process more explicit and shareable. Learning Design as an area of research and development includes both gathering empirical evidence to understand the design process, as well as the development of a range of learning design resource, tools, and activities. (Conole, 2013, p. 121)

This conceptualisation gives a sense of the different foci and understandings of the field, understandings and foci Mor, Craft and Maina (Goddard et al., 2015, p. xii) attribute to the different roots within Technology Enhanced Learning research:

> The first is the construction of computer systems to orchestrate the delivery of learning resources and activities for computer-assisted learning. The second is in the need to find effective ways of sharing innovation in TEL practice, providing an aid to efficiency and professional development for teachers. Koper's definition above represents the first tradition, while Conole's is derived from the second. (2015, p. xii)

We agree with Mor, Craft and Maina (Goddard et al., 2015) that there are marked differences between the enterprises of developing software systems and conceptual tools as 'an aid to efficiency and professional development for teachers'. However, we suggest that these distinctions are not only associated with 'software versus non-software', but include the difference between 'effectiveness' and 'reflexiveness'. We explore this distinction through a recent declaration from scholars in the field of Learning Design, as expressed in the 'Larnaca Declaration on Learning Design'. We have adopted this particular declaration, since it embodies the tensions between these two perspectives. From the 'Larnaca Declaration,' we draw out two distinct ideas of sharing and representing Learning Designs, which we term 'plans for actions' and 'resources for reflection'. We discuss these terms in relation to 'effectiveness' and 'reflexiveness'.

The Larnaca Declaration on Learning Design

The Larnaca Declaration was formulated as a result of a number of research collaborations, conferences and projects that took place within the first decennium of the twenty-first century. In 2012, a group of researchers agreed to formulate a declaration (The Larnaca Declaration) through statements, descriptions and discussions about the concept of Learning Design, understood as sharing and building knowledge about fully or partially technology-mediated teaching and learning (Dalziel et al., 2016). The researchers behind the declaration are, amongst others, James Dalziel, Grainne Conole, Sandra Wills, Simon Walker, Sue Bennett, Eva Dobozy, Leanne Cameron, Emil Badilescu-Buga and Matt Bower. The motivation was a shared concern that the adoption of Learning Design within ICT would result in behaviourist pedagogy; passive learners acquiring skills and knowledge as transferred through software and standard curriculum. Foundational projects

that inspired and led to the declaration include the EML, SoURCE, AUTC and LAMS (Dalziel et al., 2016).

Following the Larnaca definition of Learning Design, the main purposes of Learning Design are to develop better learning practices and to share excellent teaching activities in a descriptive language aimed at improving students learning (Dalziel et al., 2016). The Larnaca Declaration is understood and described as a collective term for three components:

1. Learning Design *Conceptual Map*, describing the overall pedagogical landscape, regarding key components of a Learning Design.
2. Learning Design *Framework*, which offers a common language/notation system format/visualisation to describe teaching and learning activities (may be based on different pedagogical approaches).
3. Learning Design *Practice*, which can be described as the consequence of using Learning Design concepts as well as the implementation of teaching and learning activities, also called 'Designing for Learning' (Dalziel et al., 2016).

The Learning Design Framework strives to be 'pedagogically neutral' (cf. Konnerup, Ryberg, & Sørensen, 2018), by arguing that Learning Design should be viewed as a layer of abstraction above traditional pedagogical theories by developing a general descriptive framework for different types of teaching and learning activities (Dalziel et al., 2016). Learning designs are conceptualised as something that can be operationalised across different learning theoretical foundations with a high level of neutrality, as suggested by (Dalziel, 2013):

> Learning Design is not a traditional pedagogical theory like, say, constructivism. Learning Design can be viewed as a layer of abstraction above traditional pedagogical theories in that it is trying to develop a general descriptive framework that could describe many different types of teaching and learning activities. (p. 13)

This descriptive framework is compared to the 'Western music notation system' to explain the idea of pedagogical neutrality and that this system can be used to notate Jazz, Heavy Metal and classical music (Dalziel, 2013). The notional system can then be used to describe a 'Learning Design' (uncapitalised), also called a 'design' or 'sequence' which is a plan for 'potential activities with learners'. The actual implementation of a Learning Design is called a 'running Learning Design' or 'running sequence'. Under these broader headings, however, there are varying understandings of the relations between the notational system, the Learning Design and the running design. For example, the notation system can be more or less intimately connected to a software system, i.e. as being something that can be implemented and executed as a LAMS or IMS-LD sequence inside an LMS, or it can be viewed as inspirations for teachers' further design (LAMS is an acronym for Learning Activity Management System. It is both a software system and a standard for sharing sequences of Learning Activities in LAMS or other LMS. IMS-LD is a specification for describing and sharing Learning Designs that can also be executed in an LMS). McAndrew and Goodyear (2007) refer to this as computer-understandable or human-understandable forms of representation. An example of a human-readable notation system is a Design Pattern Goodyear (2015).

Design Patterns and Designing for Learning

The concept of a Design Pattern builds on the work of the architect Christopher Alexander (Alexander, Ishikawa & Silverstein 1977, pp. ix–xix) including architectural drawings as design patterns and pattern languages (Goodyear et al., 2004). Alexander's idea was to democratise architecture by offering patterns as conceptual resources to ordinary people to shape or reshape their own environment. The pattern is developed and evolves over time and can be reused in similar situations, but without ever doing it the exact same way twice (Alexander, Ishikawa, & Silverstein, 1977, p. x). The pattern-based approach to design has been picked up and adapted to an educational context by, among others, Goodyear (Goodyear, 2005; Goodyear & Retalis, 2010). Educational design patterns intend to provide teachers with design ideas and enable them to build on former design experience. In other words, a design pattern is not a final design that can be used directly; it is more akin to a description, an idea or a template for solving a recurring problem. Goodyear (2005) recommends that design patterns should be written in such a way that they help the reader understand enough about learning and educational issues that they can be adapted and redesigned for her own practice. This indicates that design patterns not only serve the purpose of reusing or inspiring, but also can prompt professional development amongst teachers. Thus patterns serve as a way to bridge the gap between theory and practice.

In terms of the notion of Learning Design, Goodyear (2005) emphasises that we cannot design learning, but we can design *for* learning. The activity of the students, the social relationship, and interactions between humans and between humans and technology are physically and socially situated, meaning that they cannot be determined or prescribed by a Learning Design. What *can* be designed, following Goodyear (2005), is (1) learning tasks, (2) physical and social environments and (3) social organisation and division of labour. The students, however, interpret the designed tasks, tools and organisational forms, by which the activities are shaped. This is what is often referred to in networked learning as the notion of 'indirect design' (Jones, Ryberg, & De Laat, 2015; Jones, 2015).

'Plans for Action' or 'Resources for Reflection': 'Effectiveness' or 'Reflexiveness'

By contrasting computer-understandable or human-understandable forms of representation, we raise questions around how prescriptive or open to negotiation a shareable design is or should be. Whether it is what we would call a 'resource for reflection' and planning (a pattern) or a more pre-figured and pre-programmed sequence, such as a LAMS sequence, which we would term a 'plan for action' (Konnerup et al., 2018). More importantly, these ideas relate to the role and the autonomy of the teacher, raising questions of how we view the role of the teacher, and how to empower teachers. For example, Dalziel (2015) highlights the

'replicability' of well-crafted Learning Designs as an opportunity for teachers to adopt 'successful' designs into their own practice; thus improving teaching, minimising preparation time and making teaching more 'efficient': 'Learning Design offers a more precise way to specify the steps taken in a sequence of teaching and learning activities, and this may allow for more precise comparisons of teaching methods during educational research' (Dalziel, 2015, p. 10).

On the other hand, Dalziel (2015) stresses that teachers will often want to improvise (like Jazz) and need to skilfully respond to the unfolding activity in situ. This is an aspect that, according to Dalziel (2015), has not been sufficiently addressed in Learning Design and has provoked critical response from teachers 'as they feel this element of "live adaptation" is so central to their self-image as teachers that any approach that appears to give it less emphasis is undesirable' (Dalziel, 2015, p. 11).

This points to an underlying tension since the Larnaca Declaration and the objective of Learning Design can seem ambiguous. On the one hand 'The ultimate goal of Learning Design is to convey great teaching ideas among educators in order to improve student learning' (Dalziel, 2013, p. 1); on the other hand, the goal seems to be that of making teaching more 'efficient' through streamlining education and the teachers´ work. Efficiency of teaching and learning is central to the declaration and the notions 'effective' and 'efficiency' are mentioned no less than 51 times.

While sharing great teaching ideas amongst educators, and effective teaching are not necessarily at odds with each other, there are some tensions in the understanding of how best to empower teachers, which we argue are rooted in a view of 'effectiveness' versus 'reflexiveness'. One voice emphasises the idea of a Learning Design as a 'plan for action', where well-crafted, successful Learning Designs can be adopted by teachers, thus minimising preparation time and increasing 'effectiveness'. Another voice stresses that shared designs are 'resources for reflection' – as resources that teachers can critically consult and get inspired by. By this we do not mean to suggest that Dalziel (2013) or Dalziel (2015), Dalziel et al., (2016) propose teachers are 'un-reflexive', rather we view this position as a genuine wish to help teachers off-load obligations and ease their work. However, this also suggests an intervention in and curtailment of teachers' autonomy, professional practice and identity, as echoed by the critical responses to some of these ideas. These two perspectives are both present in the Larnaca Declaration.

In the next section, we discuss these two perspectives, clarifying how these different ideas of Learning Design relate to and resonate with networked learning and how learning, pedagogy and relationships between students and teachers are understood within this area of research.

Pedagogy and Learning in Networked Learning

Networked learning is rooted in a pragmatist, sociocultural/social-constructionist philosophy of learning that assumes learning and understanding of the world emerges from interactions and relational dialogue, and where collaboration,

participation and taking responsibility play a central role in the learning process. This is also reflected in the values underpinning Networked Learning as summarised by Hodgson, McConnell and Dirckinck-Holmfeld (2012, p. 295):

- Cooperation and collaboration in the learning process.
- Working in groups and in communities.
- Discussion and dialogue.
- Self-determination in the learning process.
- Difference and its place as a central learning process.
- Trust and relationships: weak and strong ties.
- Reflexivity and investment of self in the networked learning processes.
- The role technology plays in connecting and mediating.

Many of these values clearly point to Learning Designs that highlight community building, cooperation and collaboration in the learning process, and as such where the 'learning' emerges through the interactions in the learning process, rather than from predefined learning outcomes. This is underscored by the emphasis on self-determination, reflexivity and investment of the self in the learning process; the learner is a co-participant that is part of developing the meaningfulness and negotiating the relevant 'outcomes' in relation to his or her own direction and interest.

According to Hodgson et al. (2012, p. 293), networked learning can thus be perceived as a proxy for epistemology. Thus we can understand practice as epistemic, as a certain way of seeing and acting and as something that intimately connects theory, activity and learning.

> By seeing practice as epistemic, networked learning can be claimed to exist inside practice and becomes itself an object of inquiry in terms of the theory and behaviours it creates as social action. What is more, the social action and associated behaviours that emerge from networked learning arguably emanate from the epistemology that underpins the pedagogy of networked learning. (2012, p. 293)

This view suggests an intimate link between the teacher's beliefs and the practice of designing and teaching and equally emphasises the importance of teachers skilfully responding to the unfolding activity in situ. Many networked learning researchers and practitioners have argued for the idea of indirect design, which we mentioned in a previous section in relation to Goodyear's argument that we cannot design learning, but we can design *for* learning. This notion essentially draws a distinction between 'plan' and 'action' (Jones, 2015) – what we design for and then what will actually take place. To illustrate how we distinguish a 'plan' from an 'action', we draw on Davidsen and Konnerup (2016) who use Sheets-Johnstone's (2011, p. 420) quotation about improvisational dance. She argues that annotations provide guidelines for dancers, but their interpretation and expression may vary depending on the dancers, environment, history and practice. Sheets-Johnstone (2011) notes that even famous dances should be considered as *this evening's dance*; the expression and the experience of a dance change from evening to evening, from hall to hall, from culture to culture and from dances to dances. What the dancer and the teacher have in common is that they both do not know how the audience will react to their prepared

activity; therefore each performance (or teaching performance) is shaped in the present as a dynamic interaction between the involved actors.

Clearly, this line of reasoning resonates better with the notion of Learning Designs as 'resources for reflection', rather than as 'plans for action'. While we find the aspiration of sharing a Learning Design important, we are somewhat uneasy with some of the more prescriptive formats for doing so, which can be at odds with teachers' practice and autonomy. As argued in the previous section, the focus on 'efficiency' and adopting 'existing successful design' can, from a critical perspective, be interpreted as a way of limiting teachers' autonomy and potentially break the intimate link between the teacher's beliefs and the practice of designing and teaching. This relationship might be better nourished by offering teachers 'resources for reflection'.

The notion of 'plans for action' assume that designs are shared in relatively well-known contexts, addressing well-known problems. However, this assumption could be problematic when examined through the contemporary and emerging landscape for networked professional development. This point will be expanded in the following sections, where we discuss how a Learning Design serves not only as a 'plan for action' or 'resource for reflection' but can also serve as a 'springboard for development'.

Contemporary Challenges for Professional Development in Higher Education

The introductory chapter (Chap. 1, this volume) outlines how forms of professional development, both within and outside higher education (HE), are transforming. Networked technologies have in the past decades been reshaping how learners access HE and the forms of education available. Historically, these developments can be traced through the expansion of open universities (pre-dating the internet) (Jones, 2015), the emergence of the internet and the development of networked technologies. Collectively these have altered the format of traditional 'distance education' to 'online courses' and more recently to 'massive open online courses' (MOOCs). However, much online provision has attempted to mirror traditional distance learning, falling within what Weller (2007) refers to as within the 'Broadcast' model of education or what Conole (2007, p. 17) refers to as 'the web page turning mentality linked directly to assessment and feedback'. This practice has also been associated with the so-called xMOOCs (highly structured massive open online courses) that have been criticised for claiming they are based on radically 'innovative pedagogy'; however these courses are based on an online version of traditional, distance pedagogy. Our objective here is not to criticise the pedagogy of online courses but rather to highlight that these typically are in the form of 'courses' hosted by an HE provider and targeted at a smaller or larger group of 'students' that follow the course (in a cohort or self-paced) or receive credit.

The chapters in this book highlight that these traditional models and pedagogies are being challenged by new formats and ways of organising for 'networked' or 'hybrid' professional development: Chap. 6 (this volume) and Chap. 5 (this volume) focus on how networked technologies bring the university into the public space and the public into the university, as professional development supporting informal or collegial learning and knowledge exchange amongst practitioners as in Chaps. 10, 13, 11 and 12 (this volume). Similarly, Chap. 3 (this volume) examines how MOOCs challenge us to think differently about assessment and motives for participating in professional development or to see them not so much as courses, but as large-scale events for knowledge exchange. In Chap. 2 (this volume) MOOCs are viewed as large-scale events that can take the form of simulations or exercises, extended in Chap. 4 where crisis management training involves multiple participating organisations and stakeholders mediated by mobile technologies. These ideas challenge and destabilise concepts such as educational institutions, courses, students, teachers, formal/informal and assessment and explore new relations between the actors, as well as unconventional locations for learning to take place.

These ideas form the core of various models for designing for learning. For example, the Learning Design conceptual map in The Larnaca Declaration is underpinned by terms such as programme, module, session, engaging with students, assessment, feedback and evaluation. Similar concepts are, for obvious reasons, also central to other 'design models' or frameworks (Dirckinck-Holmfeld, Jones, & Lindström, 2009; Laurillard, 2012). We are not suggesting these terms become obsolete but rather that there is a need to reflect on whether new contexts and new problems (or foci) require us to reflect on how we engage in designing for learning. This affects how we can conceive opportunities for sharing Learning Designs.

Different Types of Learning and Design Processes

The preceding sections identified conceptual tensions within the area of Learning Design, arguing for a conceptualisation of Learning Designs as 'plans for action' versus 'resources for reflection'. In this section, we introduce Learning Designs as 'springboards for professional development'. We initially discuss a model to conceptualise different types of learning, presented by Engeström (2004, p. 14) (Fig. 7.1).

Engeström (2004) maps out four basic types of learning that emerge by contrasting 'exploration for new knowledge' versus 'exploitation of existing knowledge' and then 'old object, old activity' versus 'new object, new activity'. The notions of 'object' and 'activity' stem from Cultural Historical Activity Theory as adopted and developed by Engeström (1987), Engeström, Lompscher & Rückriem (2016), who argues human activities can be conceptualised as simpler or more complex activities. Activities are carried out by subjects and directed towards an 'object' that is transformed into an outcome e.g. a teacher (subject) working with students (object) and guiding their learning/transforming them towards becoming e.g. critical,

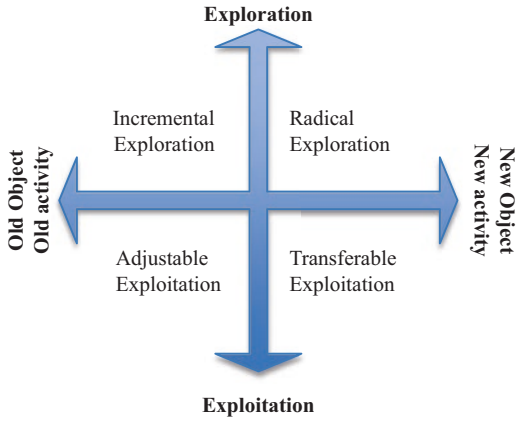

Fig. 7.1 Four types of learning. (Adapted from Engeström, 2004, p.14)

enlightened citizens. This activity is further mediated by artefacts, rules and a division of labour. Activities can be conceptualised and analysed at different levels of scale and can be 'teaching a particular course' or as the wider societal activity of 'school-going' or 'education'. This brief reiteration of activity theory obviously does not do justice to the complexity of the theory, but for this chapter we will not dig deeper into the intricacies of activity theory, and in this chapter, we shall adopt the notions of 'context' (activity) and problem (object), rather than the terms object and activity.

These dichotomies yield four fields in a matrix that Engeström (2004, pp. 14–15) describes as:

- *Adjustable exploitation* is the gradual acquisition of existing knowledge and skills embedded in a given activity or context.
- *Incremental exploration* concerns the construction of new knowledge through experimentation within the given activity or context.
- *Transferable exploitation* is the transmission of existing knowledge to cope with a new problem/object in a new activity or context.
- *Radical exploration* is described as 'learning what is not yet there'. It concerns the creation of new knowledge and new practices for an emerging activity i.e. a qualitative transformation of the entire activity system.

While this matrix was developed to describe types of organisational learning, it has more general currency. The model also structures consideration of the various types of learning related to the development of courses and educational interventions. In the previous sections, we distinguished between 'plans for action' versus 'resources for reflection'. Although we problematised the idea of sharing Learning Designs as 'plans for action', we acknowledge that these might be helpful in situations where context and problem are well known. For example, a LAMS sequence that has proven very useful amongst 2nd graders in a primary school to understand a particular aspect of mathematics could perhaps be meaningfully adopted by another 2nd-grade teacher coping with the same problem. However, in cases of

incremental exploration and transferable exploration, where either new knowledge is sought within the given context or where existing knowledge (from another context) is needed to address a novel problem, we are less certain that 'plans for action' are helpful. In these cases, 'resources for reflection' (e.g. patterns) might be more useful, since as the main idea of patterns is to solve recurrent problems and patterns are designed to be reused in similar situations. These, however, might not be helpful in unknown contexts.

Engeström refers to 'radical exploration' where knowledge needs to be developed for (yet unknown) contexts and problems and where there is a need to 'learn what is not yet there'? Do these contexts limit the sharing of Learning Designs? Put differently, when we conceptualise the design processes in relation to educational designs, do we assume we are designing for known problems and contexts? This question raises challenges around how we think about sharing designs and, equally, how we imagine designing for new contexts and new problems. To address these issues, we will introduce two different and concurrent lines of thinking in relation to design processes: speculative design methods and formative interventions.

Speculative Design Methods and Formative Interventions

In their chapter on 'Complexity, Mess and Not-Yetness', Ross and Collier (2016) and Ross (2016) mount a critique of discourses of 'best practice', notions of 'accountability' and 'evidence-based teaching'. These tendencies are echoed in some of the conceptualisations of Learning Design and particularly associated with what we have termed 'plans for actions' and the discourse of 'effectiveness'. Rather than assuming educational design can be neat and orderly if based on 'solid design principles' and 'best practice', they argue that we should embrace values of complexity, mess and 'not-yetness'. Particularly when it comes to integrating emerging digital technologies in education, since we cannot know in advance how these technologies can or will affect interactions or how they might afford or inhibit activities. In terms of Engeström's matrix educators will often sit between incremental and radical exploration, or what Ross and Collier (2016) refer to as not-yetness.

In addressing how to design for complexity, mess and not-yetness, Ross (2016) argues for the adoption of 'problem making' and 'speculative design methods'. Citing DiSalvo (2012, p. 109), Ross (2016, p. 5) argues that speculative methods are 'the use of designerly means to express foresight in compelling, often provocative ways, which are intended to engage audiences in considerations of what might be'. There are two specific ideas we would like to draw from this; the idea of 'foresight' and 'what might be' and the notion of 'engaging audiences'. For the former, this highlights the uncertainties associated with designing but extends beyond what is captured through the notion of indirect design – we cannot design learning, since unexpected activities will evolve when students respond to the design. Indirect design suggests that the design idea or plan is stable, but, in practice, people will interpret and perhaps act differently than expected. However, 'foresight' and 'what

might be' suggest that the very idea or plan for the design remains open to continued scrutiny, as expressed by Ross and Collier (2016, p. 19):

> We need practices that acknowledge and work with complexity to help us stay open to what may be genuinely surprising about online learning and teaching intersecting with emerging technologies (Mason, 2008, p. 2). In this sense, our focus as educators should be on emergent situations, where complexity gives rise to "new properties and behaviours … that are not contained in the essence of the constituent elements, or able to be predicted from a knowledge of initial conditions" (Ross and Collier, 2016, p. 19).

Secondly, there is the idea of 'engaging audiences', or what within professional development would be the students or practitioners. While most courses build on the learning objectives or competencies students should acquire as an outcome of a course (and which can be assessed), an alternative way of considering at 'objectives' would be to invite the learners into co-constructing and exploring what might be 'objectives' that are of value to them. This concept is included in many of the chapters in this book where authors write about dealing with TLG groups, viewing learners as change agents or exploring new ways of bringing the public into the university and bringing the university into the public space. In all these cases, e-learning objectives are not set and emerge through the interactions between learners and 'teachers' and are perhaps what Engeström (1987) refers to as 'expansive learning processes' meaning the collective development of societally new practices and activities (Engeström, 1987; Sannino et al., 2016). While this might be an unintended outcome of a learning intervention, Engeström, Sannino, and Virkkunen (2014) and Sannino et al. (2016) argue that such processes can be stimulated and 'guided' through the use of formative interventions:

> Collectives conduct formative interventions on themselves to address unsustainable contradictions and transform their activities—we call such efforts intraventions. When researcher-interventionists are part of the process, their role is to intervene by provoking and supporting the process led and owned by the learners. […] When researchers intervene to provoke and support the learning process they have specific instructional intentions. These intentions, however, are seen as only the starting point, which a truly expansive learning process typically confronts and deviates from if the learners are to produce their own collective designs. (Sannino et al., 2016, p. 2)

Through these processes learners or participants have a distinct role and agency that goes well beyond achieving a predefined learning objective. The learners become part of 'learning that is not yet there', and act as co-explorers in identifying problems and designing for new context and activities.

This type of learner agency is different from most models for pedagogical design, for example, the Larnaca model, where a teacher-developed design is carried out/tested, evaluated, reflected on, changed and leading to incremental change or refinement by the teachers for the purpose of redesigning and improving the intervention for 'new' students. Thus, 'designing for learning' may encompass different understandings of the degree to which the design itself is malleable and changeable throughout the process and differences in the learners' agency in shaping the design, or even making 'their own collective design'. Rather than viewing Learning Designs as 'plans for action' or 'resources for reflection', we suggest we can also look at 'Learning Designs' as 'springboards for development'.

Concluding Discussion

In this chapter, we have discussed the notion of Learning Design and more specifically discussed some tensions we see in this field related to the sharing of Learning Designs. More specifically we traced, as a case in point, this tension in the Larnaca Declaration and highlighted how there are different voices that seem to alternate between seeing Learning Design as a means for 'effectiveness' and for 'reflexiveness' suggesting two different views of how we can empower and think of supporting teachers in developing Learning Designs. Associated with these views, we identified two different ways of sharing Learning Design: 'plans for action' and 'resources for reflection'. The former are more prescriptive, software-based packages of learning activities and the roles and responsibilities of teachers and students, whereas the latter are more flexible, narrative accounts that can be adopted as resources for designing for learning, such as for example patterns, which are more congruent with how learning and the role of the teacher is conceptualised within the area of networked learning. However, in discussing contemporary challenges of HE and professional development in the light of Engeström's matrix for different types of learning, we have suggested we should not only think of Learning Designs as plans for action or resources for reflection but as 'springboards for development'.

Reflecting on the cases in this book we believe it is increasingly urgent to understand how we can design for contexts and problems that do not fit nicely into existing categories, or what we would usually term 'courses within formal networked professional development'. How about cases in which the context nor the problem are clear from the outset? Drawing on Engeström (2004), these are what we term cases of 'radical exploration'. In such cases, we have discussed ideas of 'speculative design methods' and the framework of 'formative interventions' as potential avenues of thought for approaching these kinds of designs. This entails understanding such interventions as 'springboards for development', i.e. where the end goal is not known from the outset and learners and teachers take up mutual responsibility and agency in developing collectively new practices and designs.

This seems, for instance, to be the case in the Chap. 6 by Caviglia, Gislev, Larsen and Young (this volume) and Chap. 5 by Nørgaard, Mor and Bengtsen (this volume), where new forms of engagement between the university and the public are developed and where the two contexts fold into each other in unexpected ways as an emergent property of the unfolding of the 'course'. This also illustrates that we should not view 'plans for action', 'resources for reflection' and 'springboards of development' as mutually exclusive constructs; rather the chapters illustrate that patterns as resources for reflection can be the outcome of a bold experiment with new formats of education. Such bold experiments, we should say, hinge upon our willingness as educators to embrace, as suggested by Ross and Collier (2016), complexity, mess and not-yetness rather than assuming educational interventions must always be developed based on 'solid design principles' and 'best practice'. In this way we argue that design and Learning Designs should not only be thought of as predefined design ideas or as incremental exploration based on retrospective

reflections on existing courses but that we can conceptualise Learning Designs also as dynamic, experimental opportunities for the collective design of new practices or what we have termed 'springboards for development'. This could encourage us to revisit current methods, theories and tools within Learning Design to understand how such design processes could be supported, or what new tools, theories or methods are needed in such development projects.

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Chapter 8
Design Principles for Professional Networked Learning in 'Learning Through Practice' Designs

Jens Jørgen Hansen and Nina Bonderup Dohn

Abstract The aim of this chapter is to present a coherent theoretical conceptualization of the ways in which learning designs organized as 'learning through practice' can prepare students for future professional practice as well as facilitate different patterns of engagement and knowledge transformation. Three prototypical learning designs are analysed: (1) case-based learning, (2) design-based learning and (3) simulation-based learning. Networked learning is understood as learners' connecting of contexts in which they participate and as their resituation of knowledge, perspectives and ways of acting across these contexts. Learning designs of 'learning through practice' are distinguished by engaging practices outside the formal educational system as ways of developing curricular understanding and, reciprocally, as providing grounds for concretization of curricular content through its enactment in practice. By viewing these learning designs as networked learning, the intention is to highlight their potential for supporting certain connection forms between learners' experiences in target practice and educational practice. The chapter argues that case-based learning establishes a relationship of inquiry between learner and target practice. The relationship established in design-based learning is one of innovation with the aim to support learners in developing understanding of practice through changing it. Finally, in simulation-based learning, relationships of imitation of target practice and engagement in 'as-if' practice are established.

Introduction: Clarifying Central Terms

The aim of this chapter is to present a coherent theoretical conceptualization of the ways in which learning designs organized as 'learning through practice' can prepare students for future professional practice as well as facilitate different patterns of engagement and knowledge transformation. Laurillard (2012) characterizes

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learning through practice as a 'way of enabling the learner to understand and use the knowledge and skills of a discipline. It is sometimes referred to as "learning by doing", or "learning through experience", where the learner adapts their actions to the task goal, and uses the result to improve, without teacher intervention' (Laurillard, 2012, p. 162). The chapter broadens this understanding through pointing out that by engaging with the knowledge and skills of a discipline, more may be learned than the knowledge and skills themselves. Learning through practice need not only be *practicing* practice, that is, learners may also develop a resonance field of practice meanings that can inform curricular content within education. Work practice can act as leverage for different patterns of participation and knowledge transformation also within educational practice.

This is shown by analysing the different connections and approaches to practice involved in the three learning designs of (1) case-based learning, (2) design-based learning and (3) simulation-based learning. These learning designs are all examples of learning through practice because of the following defining characteristics: they engage practices outside the formal educational system as ways of developing curricular understanding and, reciprocally, as providing concretization of curricular content through its enactment in practice. This defining characteristic furthermore determines the learning designs as forms of networked learning in the sense developed by Dohn (2014). They have been chosen, as they differ markedly in the specific way connections are formed between educational and work practices and therefore also in the resulting epistemological possibilities they present to learners. Thus, between them, they illustrate the learning potentials of 'learning through practice'.

Recent literature highlights that several traditions and understandings of Networked Learning have emerged over the years, with different conceptions of what constitutes the nodes and edges in the 'network' and how the 'network' may be supportive of learning (Dohn, 2018; Hansen, 2018; Jones, Ryberg, & de Laat, 2017). The often-cited definition by Goodyear, Banks, Hodgson, and McConnell (2004, p. 1) uses 'network' to refer to both a technological infrastructure (ICT) and a social structure of relationships between people. Correspondingly, the definition is ambiguous as concerns what make up the edges of the network: ICT mediation or the relationship of 'knowing'. On both readings, the nodes are constituted by people and resources. This definition has been particularly useful for investigating ICT-mediated learning taking place within designated online spaces offered by educational programmes.

Within this book's overall focus on connections between people, some chapters concentrate on those connections which breach institutional walls or contextual boundaries (see Chap. 5 by Nørgård, Mor and Bengtsen and Chap. 6 by Pedersen, Caviglia, Gislev and Hjortskov Larsen (this volume)). In these chapters, different people are representatives of different contexts; still, this need not be the case, as the crucial point is the development of understanding through juxtaposition of diverging perspectives. The approach taken in this chapter brings this last focus to the fore. Instead of viewing nodes as people, nodes are contexts, and the learner is the one connecting the nodes. The edges consist in the drawing of knowledge from one

context in making sense of the other ones. 'Networked learning' is thus the learning enabled by the connecting of contexts. In particular, it is the learning supported by drawing on contextual meaning from one context to make 'deeper' sense of propositional knowledge in others. Designing for networked learning on this view is designing for learners' coupling of contexts and for them to draw on knowledge, perspectives and ways of acting across these contexts.

The concept of learning design is slippery and is used in a number of overlapping ways, ranging from the *process* of creating rather detailed educational patterns to support specific actions in typical situations (Mor, Mellar, Warburton, & Winters, 2014), to, at the other end, the whole *domain* of designing for learning (Conole, 2013). As Konnerup, Ryberg and Thyrre Sørensen (Chap. 7, this volume) point out, within the field of networked learning, the term has been widely used to designate 'plans for facilitating learning' which can be shared between educators. Typically, the indirect nature of design is emphasized, i.e. that learning can be designed *for*, but not be predetermined (cf. Parchoma, 2018; Parchoma & Deaver-Charles, 2018). For a full discussion of different conceptions of design within the educational field, see Dohn and Hansen (2018). In accordance with the distinctions drawn in this work and the general use of the term within the field of networked learning, 'learning design' can be defined as a *plan for a course sequence which articulates the intended overall organization of learning possibilities for the course sequence*. A learning design, thus understood, has four primary dimensions: (1) purpose, (2) content, (3) methods (including intended learning activities and roles for students and teachers), and (4) underlying learning-theoretical basis. The four dimensions reflect basic aspects of the intended learning situation: its why (purpose), its what (content), its how (method) and its reason for the why, what and how (theoretical basis). The theoretical basis should explain how the use of the content and methods in question can lead to learning of the desired kind for the learners. A learning design is operationalized through *design principles* which explicate what teachers should do to enable the intended learning possibilities to emerge. Design principles are thus operational guidelines for teachers' construction of learning possibilities. Furthermore, they designate intended learning trajectories for learners. Design principles therefore both refer to intended learning activities for students and to teachers' facilitation of these activities. The models presented in the following sections accordingly depict both an intended trajectory for learners and the corresponding guidelines for teachers' facilitation hereof.

Konnerup, Ryberg and Thyrre Sørensen (Chap. 7, this volume) argue that learning designs can be understood to have two primary uses: as plans for action and as tools for reflection. Actually, a third use can be discerned: experimental development of educational practice. Firstly, teachers can try to realize the plan in practice to support students' learning. Secondly, because the learning design explicates intended objectives, content, activities, and roles of learners and teachers, it can be used as a tool for communicating: To oneself and others in planning course sequences, with others in sharing ways of organizing learning possibilities, and with oneself and others in reflecting on ensuing educational practice. Thirdly, because realization in practice often leads to new insights about the learning design and

about teacher and learner interaction, it can be used experimentally to develop pedagogical practice. Focusing on this aspect, Bell, Hoadley, and Linn (2004) state that design principles are 'generated inductively from prior examples of success and are subject to refinement over time as others try to adapt them to their own experiences' (p. 83). This goes for learning designs themselves, too. However, the quote underestimates the significance which theoretical deduction may have in deciding which learning designs should be tried out in the first place, for there to be 'prior examples of success' at all. Instead, learning designs develop in an interplay of theoretical considerations and practical experimentation. This chapter contributes to the interplay by articulating a theoretical conceptualization of 'learning through practice' at this moment in the development of educational research, given the practical experimentation that has already taken place. The conceptualization is provided utilizing the understanding of networked learning presented above.

The research questions for this chapter thus are:

For each of the three learning designs:

- How can the purpose, content, methods and theoretical basis of the learning design be conceptualized and what types of connections between target and educational practice can be established?
- What design principles can guide the educational operationalization of these learning designs?
- How can these learning designs prepare students for a future professional practice?

In the following, 'practice' and 'practices' are understood at two levels, corresponding to the level of the activity itself (narrow sense) and the overall context in which activities take place (broad sense) (cf. Dohn, 2007):

1. Micro-level of action: Human activity of some regularity, i.e. a bodily-mental engagement with the social and material environment where it is possible to discern between the (more or less) adequate and the (more or less) inadequate.
2. Meso-level of action: The sense-bearing context(s) within which human activity (micro-level) takes place, e.g. the context of an educational programme or of a workplace.

The term 'target practice' refers to the practice (at both levels) outside of the educational system, which the learning design engages and aims at. The target practice may be a specific workplace or type of professional context (both meso-level) or it may be an activity within the workplace or professional context such as the writing of a report for one's employer or the teaching of genre theory to a fifth grade (both micro-level). The point of the approach to networked learning taken here is that engaging in activities (micro-level) within sense-bearing contexts (meso-level) will supply the learner with tacit experience which may be drawn upon in new contexts. This is so, both at the concrete level of doing the activities, and at the overall level of the sense and value accorded to the activity within the sense-bearing context.

The Learning Design of *Case-Based Learning*

Case-based learning is a well-established learning design in both nursing and medical education (Ertmer & Koehler, 2014) and business (Barnes, Christensen, & Hansen, 1994) where it is used to facilitate the development of professional skills. The purpose of working with case-based learning is to develop understanding through inquiry and hereby engage learners in active and reflective participation in a sense-making process. Case-based learning is thus based on a learner-centred inquiry approach also involved in Problem-Based Learning (PBL) (Savery, 2015). However, essential to PBL is investigation of problems with the aim of solving them. In contrast, case-based learning does not necessarily involve problem-solving but focuses on developing an understanding of the case with its possibilities, challenges and dilemmas.

Case-based learning may be used to support different objectives and may involve different kinds of content and methods. Firstly, cases can be pedagogical examples of academic knowledge concerning concepts, principles and theory. This potentially gives learners a richer understanding of e.g. an abstract concept. Secondly, cases can be used as tasks where learners are asked to apply a theoretical approach, e.g. organizational analysis, in order to develop certain analytical skills. Thirdly, cases from target practices can provide detailed descriptions rich in contextual information, what Geertz (1994) would call 'thick descriptions' and Shaffer and Resnick (1999) 'thick authenticity'. The learner is challenged to make sense of the thickly described situation and thereby to theoretically 'deal with the complexity of workplace situation' (Jonassen & Hernandez-Serrano, 2002, p. 68). This latter form is used in nurse education as an effective learning and teaching method (Kantar & Massouh, 2015; Yoo & Park, 2015). Fourthly, the learners can themselves undertake an inquiry of situations in target practice outside of education. Cases will then not be decontextualized or well-structured but involve experiences of an everyday professional context. This may stimulate learners' situational awareness. Case-based learning of this latter kind is based on the methods of a case study, which Yin defines as 'an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (Yin, 2003, p. 13). Typical methodological features of a case study are that it calls for an in-depth focus on a specific unit of analysis that occurs in a natural context. The investigation of the unit of analysis is based on multiple data sources and is described with highly contextual details (Van Wynsberghe & Khan, 2007).

Working with the different kinds of case-based learning has the potential of informing learners about a practice they do not have experience with. At the same time, cases may help learners recall their own experience of similar situations. Cases can therefore forge connections between learners' own experiences in other contexts and the curricular content, allowing learners to develop an understanding of the experiences through the lenses of the academic field (Tawfik & Kolodner, 2016).

In terms of philosophy of science, the approach of case-based learning is hermeneutic, since the basic purpose is to gain an understanding of the practice, both at the micro- and at the meso-level. 'Hermeneutic' may here be understood in the classical methodological sense from Dilthey (1927) of simultaneously letting individual data and overall understanding of the practice inform each other. Each new piece of information is interpreted in the light of one's overall understanding, and, conversely, the overall understanding is adjusted along the way, as new information becomes available. Learning theoretically, this methodological view aligns with a basic constructivist approach of 'knowledge building' through assimilation of new input, and accommodation of the overall scheme/knowledge structure, as recalcitrant input is encountered. Alternatively, 'hermeneutic' may be understood in the ontological sense from Gadamer (1990) that an essential characteristic of us as humans is that we are interpretive beings: we are always already in an understanding of the world, and practice will open to us as meaningful on the basis of our Vorgriff ('pregrasp') and Vorurteile ('prejudices' – to be understood positively as the necessary condition for there to be understanding at all). Developing an understanding of practice engages our interpretive being in the 'fusion of horizons' between the horizon of our pregrasp and the horizon of the practice. Learning theoretically, this view lends itself rather to a sociocultural view in line with, e.g. Säljö's (2000) version of activity theory. On this view, the use of cases will allow access to the same overall sociocultural world as the practice that is to be understood. This will supply an initial grasp, to be developed as students become familiar with the more specific activities undertaken (micro-level) within the sense-bearing contexts (meso-level).

Viewed as networked learning, case-based learning allows the learners to interpret the academic concepts and theories which they work with in their education, with the concrete experiential sense of the target practice. Case-based learning prepares learners for future professional practice by providing them with examples of target practice meanings to 'fill out' the words of their academic learning. This will be supported best in the type of case use where learners engage in inquiry in target practice and thus form their own experiences of this practice. The other three kinds of case use will depend on learners' vicariously imagining practice experiences based on descriptions and/or on them recalling experiences from other situations. Students' imaginings are reflected on solely from within the educational context, and they will therefore not experience the 'reality check' of target practice as concerns the imaginings' validity. These types of case use will therefore not prepare students for the need to search out reality checks in their future professional practice, nor for how to accommodate their actions to such reality checks. For these kinds of case use, Dilthey's (1927) classical methodological rendering of case-based learning seems the appropriate one.

For case-based learning as inquiry-in-target practice, the Gadamerian ontological rendering of case-based learning appears most pertinent: it is through engagement of one's own interpretive being that the learners are able to draw the connections that they do, including making initial sense of the target practice through their general background understanding of this kind of sociocultural practice. Immersing themselves in the target practice for extended study can provide learners with at

least some experiential knowledge, if not of the undertaking of the activities themselves (which the learners perhaps only observe), then of the way the activities play out when undertaken by others. This experiential knowledge will supply concrete sense to what participants say about their practice. The concrete sense can resonate in the learners' understanding of the participants' words, and help them develop an adequate contextual perspective on what goes on in practice. Traversing back into the academic context, e.g. to write a report, the experiential knowledge and the contextual perspective may provide concretized sense to the academic theories. This allows the learners a fuller understanding of the theories because they resonate with tacit practice meaning – if learners 'see the connection'. This is due to the fact that dealing with academic theories within education is itself a practice. Therefore, the experiential knowledge and contextual perspective of the target practice have to be resituated to 'fit' into the report. The problem is amplified by the fact that others will not have the same experiential sense to draw on in their understanding of what the learner writes in the report. It may also be amplified by the fact that unless learners are allowed to engage in the actual doing of the activities themselves, the tacit knowledge that they develop will be limited and somewhat vicarious. To the extent that it is, it will not be essential for sense-making for the learners and thus will not 'spring to mind' with the same readiness as experiential knowledge does which has been developed in contexts with which they are actively and emotionally engaged.

The intended student trajectory in this learning design thus is the following: gain access to a case, define an issue of inquiry, engage in inquiry and finally develop understanding of the case. The design principles for teachers guiding students' activities correspond to this trajectory and are illustrated in Table 8.1, together with the intended student trajectory (Fig. 8.1).

The Learning Design of *Design-Based Learning*

The purpose of design-based learning is twofold: to innovate practice and to gain understanding of practice through the process of changing it. The method is used in different domains, e.g. counselling (Hansen & Remvig, 2016), engineering (Barab, 2014) and teacher development (Wang, Hsu, Reeves, & Coster, 2014). The basic method in design-based learning is the design experiment (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; Collins, 1992). A design experiment on the one hand reflects an existing practice with its problems and challenges and on the other hand the innovation of this practice through the design experiment. This two-pronged approach to practice is the content focus of design-based learning. The design experiment is both a process of learning and of problem-solving and will typically include several stages such as defining the problem and identifying the need, collecting information, introducing alternative solutions, choosing the optimal solution; designing and constructing a prototype, and evaluating it. This is an experimental way of working where the learner in working with alternative solutions has a role as a '*bricoleur*' (Gravemeijer & Cobb, 2006, p. 51), who uses the available materials to invent new applications. This process involves the learner in

Table 8.1 Case-based learning: intended student trajectory and design principles for teachers

Intended student trajectory	Design principles for teachers
Gain access to a case: Get a case description by the teacher, get access to a target practice case by the teacher or find a target practice case herself	*Provide access to a case*, either directly or by supporting students in finding one
Define an issue of inquiry, relevant to curricular content, for the case	*Support* students in formulating *an academically relevant issue of inquiry* for the case
Engage in inquiry: experience the case, either in target practice or through vicarious imaginings, and *develop a contextual perspective* through the experiences	For case-based learning in the educational context: *Support* students in their *vicarious imaginings* of experiences and in the development of a contextual perspective through supporting them in making thick descriptions of the case
	For case-based learning in target practice: *plan* the course sequence so that students have *time to actually experience* target practice and develop a contextual perspective
Develop understanding: let experiential target practice sense inform academic theories and concepts	*Support* students in *connecting* experiential target practice sense and academic theories through *questioning their imaginings* (case-based learning in educational context) or *supporting academic reflection* on experiential knowledge (case-based learning in target practice)

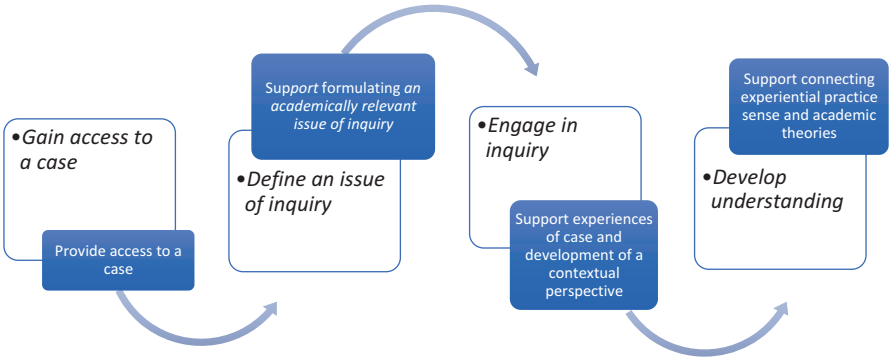

Fig. 8.1 Case-based learning: model of the intended student trajectory and the corresponding design principles for teachers

investigating the target practice as well as in developing and negotiating prototypes in collaboration with practitioners. Design-based learning shares basic characteristics with Design-based Research, in that learners should address

> ...complex problems in real contexts in collaboration with practitioners; integrating known and hypothetical design principles with technological advances to render plausible solutions to these complex problems; and conducting rigorous and reflective inquiry to test and refine innovative learning environments as well as to define new design principles. (Reeves, 2006, p. 58)

That is, like Design-based Research, design-based learning is *pragmatic* with the goal to solve real-world problems. It is *grounded* in both theory and real-world context and utilizes an *iterative and flexible process* of investigation based on collaboration between researchers and practitioners. It integrates a *variety of research methods* and data sources. Finally, the results of the learning process are understood both within the context where the investigation is conducted and envisioned for use in new contexts, as is the case in Design-based Research (Wang & Hannafin, 2005, p. 7).

Design-based learning builds upon the thesis that there is a strong connection between design and learning. There are several possible theoretical underpinnings to this thesis. One is the constructionist claim: that (only) by building something in the world do you understand it. This claim can be justified in different ways: One rationalization would build on Papert's (1993) Piaget-inspired view, according to which constructing something in the physical or virtual world is paralleled and enabled by a corresponding construction of mental schemas. These schemas are then challenged if the physical/virtual construction does not behave as expected. Another version is a variant of diSessa's (2000) point that by taking something apart and rebuilding it, you develop an understanding of the mechanisms by which it works. This can, again, be explained in terms of Piagetian/Papertian (Papert, 1993) mental constructions, but other conceptualizations of what is involved in 'understanding the mechanisms' are possible as well. The dictum often attributed to Lewin (1973) that 'if you want to truly understand something try to change it' signals a rather different way of justifying the aim, especially given Lewin's (1973) Gestaltist approach to understanding organizations and social groups: systemic constraints that are not initially evident become apparent as they effect resistance to change. The point is that a phenomenon may be determined in its complexity, through disclosing concealed factors effecting resistance. Yet another way of justifying the claim would be from the perspective of situated learning, according to which practice has its concrete meaning in participation. Engaging as a participant in practice will necessarily imply changes – for the learner and for the practice – because participation always is a negotiation of positions and appropriate actions. The situated learning justification would focus on the actual changes that come about as a result of participation.

Viewed as networked learning, the basic characteristic of design-based learning is the possibility it offers learners to (1) actually engage in the target practice and develop experiential knowledge and contextual perspectives in the course of this engagement and (2) engage in imaginative processes of designing for an anticipated future practice. Further, these experiences are not just vicarious, based on observation of and dialogue with participants. Instead they are embodied, lived understandings of practice meanings. Design-based learning can thus prepare students for future professional practice by supplying an experiential basis of how to 'do practice', as well as experiences of analysing status quo and working to change it for the better. From this perspective, the situated learning rationalization and the Lewinian (Lewin, 1973) insight that designing for change will bring forth hidden aspects are more adequate learning-theoretical underpinnings of design-based learning than

constructionism. Being engaged themselves in the practice all things equal will be more supportive of learners' developing commitment to and emotional involvement in the practice. The experiential knowledge developed will be available much more readily as tacit semantic content to draw on for the learners in other contexts, too, though prompting, facilitation and scaffolding may still be needed. In particular, it may more easily inform their understanding of academic concepts and theories within educational contexts. Similarly, the contextual perspective of the target practice may supply a concretization of academic texts.

There remains, however, the question of what practice positions learners have in the target practice. Will they be expected to participate alongside participants, partaking in the practice activities, performing participant actions, as they negotiate the design and its realization? Or will they only be allowed to supply ideas – perhaps in the form of a design developed on beforehand and perhaps counselling on their implementation? How these questions are answered in the design-based learning project is decisive for which experiential knowledge and contextual perspectives the learners are de facto able to develop. If they are accorded a position more as commentator and counsellor and less as practitioner, the embodied understanding developed will only to a lesser degree be able to 'fill out' academic theories and concepts with action practice meaning. For the same reason, the design-based learning will also only to a lesser degree prepare them for future professional practice.

On the other hand, there is the risk that learners' involvement in the target practice happens at the expense of their engagement in their education. This may lead to the latter losing significance for the learners. In turn, this may make it more difficult for the learners to 'traverse back' and resituate their experiential practice knowledge in concretized sense-making of academic perspectives.

The intended student trajectory in this learning design is the following: gain access to a target practice, observe or participate in this practice and hereafter develop, test and evaluate design principles and finally develop new knowledge of the target practice. This trajectory and the corresponding design principles for teachers are illustrated in Table 8.2 and Fig. 8.2.

The Learning Design of *Simulation-Based Learning*

Simulation may be defined as tasks within the educational context which mimic tasks in the work situations of target practice. Such tasks are common in learning designs in professional disciplines such as health, medicine and engineering education (Laurillard, 2012, p. 180). The purpose is to 'learn to do practice'. More specifically, the purpose is to develop complex skills and to reflect on action. This is done by involving learners in realistic scenarios from the target practice. Simulation can be used to simulate workplace dynamics and can support the learners' future on-the-job experience and point to 'the essential dynamics of a workplace in a way that allows learners to explore different approaches, test diverse strategies, experience various outcomes, and build a better overall understanding of key aspects of the real

Table 8.2 Design-based learning: intended student trajectory and design principles for teachers

Intended student trajectory	Design principles for teachers
Gain access to local, target practice, either through teacher mediation or of own accord	*Support students in gaining access to a local, target practice*, either directly or by supporting students in finding one
Observe or *participate* in local, target practice with the aim of detecting a problem. *Analyse problem*	*Plan* the course sequence so that students have *time to actually participate in* target practice. *Support* them in detecting and analysing problems by *drawing on academic* theories and concepts and *research literature* on similar target practice problems
Develop, test and evaluate design principles for local, target practice; develop experiential knowledge and contextual perspective in the process	*Plan* the course sequence so that students have *time to develop, test and evaluate design principles. Support* them by *drawing on academic* theories and concepts and *research literature* on similar target practice problems
Develop understanding: *of target practice* based on its resistance to employment of design principles; *of curricular content*: let experiential target practice sense inform academic theories and concepts	*Support* students in *connecting* experiential target practice sense and academic theories through *supporting academic reflection* on experiential knowledge, especially of target practice' resistance to employment of design principles
Develop generalized design principles for target practice beyond the local instance of it	*Support* students in developing generalized design principles by *supporting academic reflection* on the limitations of the local, target practice and its (lack of) representivity for target practice in general

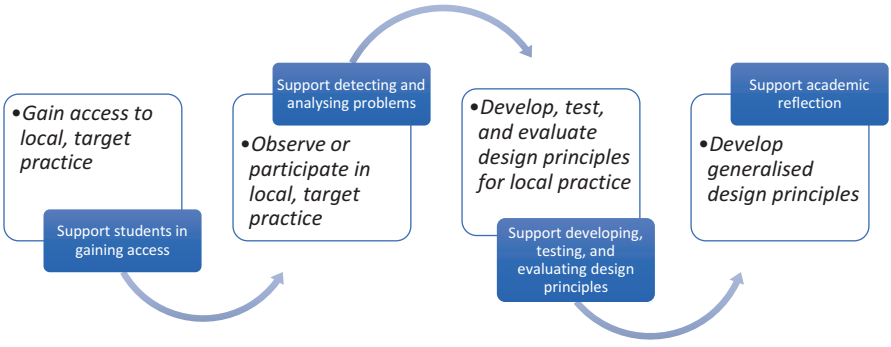

Fig. 8.2 Design-based learning: model of the intended student trajectory and the corresponding design principles for teachers

world' (Shapira-Lishchinsky, 2015, p. 3). Simulation-based learning supports learners in learning important target practice skills.

However, it is also important for learners to step out of the simulation and reflect on their problem-solving and on the skills learnt. Learners should in this situation be supported in reflecting on the workplace identity which they engage in and on its relation to their own identity as future practitioners. Simulation-based learning

therefore involves two connected learning spaces: the simulation space and the reflection-on-action space. The method of simulation-based learning is characterized by the learner conducting a process in response to a sequence of tasks simulating a typical target practice issue. The learner gets to act similarly to a practitioner and to make use of knowledge appropriate to the target practice issue. Depending on how much of target practice the simulation emulates, it may enable learners to experience participation 'as-if' in a professional practice and 'involvement in a yet-to-be-fully-experienced activity' (Beach, 2003, p. 46).

The aim of simulation is to 'learn to do practice'. Again, there are several ways in which this may be conceptualized learning theoretically, depending not least on what one construes 'doing practice' as involving. From a behaviourist, instructional design viewpoint, simulation is training of practice skills, relatively narrowly construed, as behaviour that solves specified tasks (Grierson, 2014). A criterion for simulation-based learning is therefore that there is functional task alignment between learning and future use situation rather than high fidelity understood as physical faithfulness of the former to the latter (Hamstra, Brydges, Hatala, Zendejas, & Cook, 2014). From a constructivist viewpoint, learning to do practice involves constructing the relevant cognitive and behavioural schemas that skilful acting consists in. Simulation may be utilized to develop these schemas and will be particularly relevant if experimentation in target practice is dangerous (e.g. aviation, medicine), unethical (e.g. medicine) or not easily accessible (e.g. space flight). From a sociocultural viewpoint, 'doing practice' involves the broader participatory understanding of the value ascribed to such skills by practitioners and of their significance to the broader sense-bearing contexts in which they are used. It also involves the development of practice-specific ways of engaging with other practitioners and of understanding the sense-bearing contexts and one's place in them. Simulation from a sociocultural point of view should therefore concern not only specific tasks but the practice as such. However, there are decisive limits to the degree to which one can establish 'functional practice alignment' (to paraphrase the behaviourist term) between a simulated practice and the target practice, because the significance of activities (micro-level) will always be determined to some extent through the broader sense-giving context (meso-level). In particular, simulating a target practice e.g. through role-play within an educational practice will endow the activities with a complex mediational status (resulting e.g. in 'breakdowns' in the form of laughter on the part of role-playing participants). This status is perhaps better captured by the term 'as-if-and-yet-not' activity rather than by Beach's (2003) phrase 'yet-to-be-fully-experienced activity'.

Viewed as networked learning, the basic characteristic of simulation-based learning is the possibility it offers learners to develop experiential knowledge of activities (micro-level), which have their counterpart in target practice, though in very different sense-bearing contexts (meso-level). The networked learning perspective here again sides mostly with the sociocultural construal of simulation. On the other hand, it stresses that the micro-level of specific activities is significant, too, and should not be overlooked. Importantly, the experiential knowledge attained e.g. through role-playing different practitioner perspectives will also supply a tacit dimension to

descriptions of the target practice as well as to academic concepts and theories, and in particular to descriptions of the practitioner roles. These experiences will help prepare students for their future professional practice.

However, given that the sense-bearing contexts involved in simulated and target practice are very different, learners' experiences of practitioner roles (and thus the tacit semantic content they supply) cannot be expected to align closely with actual practitioner experiences. For the same reason, it is debatable to which extent simulation-based learning offers the possibility of developing contextual perspectives to inform academic concepts and theories. Arguably, what simulation may facilitate in this regard is the development of mediational contextual perspectives, which are neither those of the target practice nor fully those of the educational practice, but rather ones of the mediational practice of target practice as contextualized in education. In Beach's (2003) terms, simulation-based learning supports learners in making mediational transitions between educational and target practices. Through doing this, the learning design may support learners in transforming and resituating their academic knowledge as actionable knowledge in the simulated practice. Conversely, it may also support them in resituating their simulation experiences as tacit semantic content to resonate in their understanding of the academic perspectives. When the target practice is accessed within the educational practice it opens rich possibilities for learners and teachers to reflect together on the differences between target and simulated practice at both micro- and meso-level. In comparison with the other learning designs, where the learner can be relatively alone in establishing the connections between target and educational practices, simulation-based learning allows much more direct teacher support. This constitutes a clear advantage of simulation-based learning that may outweigh the lack of real experiences with target practice and the resulting lack of development of target practice contextual perspectives and experiential knowledge at the meso-level.

The intended student trajectory in this learning design is for the student to engage in simulated target practice, reflect on skills, values and identity of simulated and real target practice and finally develop practical and academic understanding of target practice. This trajectory is depicted in Table 8.3 and Fig. 8.3, along with the corresponding design principles for teachers.

Concluding Remarks

This chapter has analysed three different examples of 'learning through practice' as forms of networked learning: the learning designs of 'case-based learning', 'design-based learning' and 'simulation-based learning'. Through the analysis of the purpose, content, method and theoretical basis of the learning designs, it has been identified which connection forms the different learning designs facilitate between learners' experience in target practice and educational practice. This has further allowed the articulation of design principles for each learning design. For the teacher, the analysis contributes with theoretical conceptualizations which may

Table 8.3 Simulation-based learning: intended student trajectory and design principles for teachers

Intended student trajectory	Design principles for teachers
	Devise simulated target practice work situations, either directly or support students in devising them
Engage in simulated target practice work situations, develop experiential knowledge, resituate academic knowledge as actionable knowledge, train specific skills and/or participation in the practice as such	*Plan* the course sequence so that students have the *time needed to train skills/participate in simulated practice. Support* them in carrying out the tasks as target practice practitioners would (engaging academic knowledge in resituated form)
Reflect on skills, values and identity of simulated and real target practice; on *mediational practice of simulation*; and on *differences* between educational context and target practice context	*Support* students in *reflecting* on skills, values, identity and mediation in simulatio
Develop understanding: let experiential simulation knowledge inform academic theories and concepts	*Support* students in *connecting* experiential simulation knowledge and academic theories by *supporting academic reflection* on experiential simulation knowledge

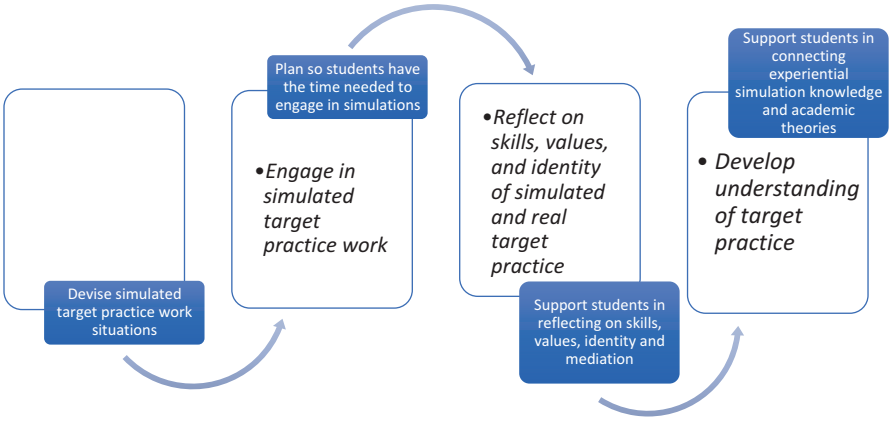

Fig. 8.3 Simulation-based learning: model of the intended student trajectory and the corresponding design principles for teachers

support pedagogical planning, reflection and experimentation. Table 8.4 summarizes the rationale, theoretical basis and considerations for practical use for the three learning designs. Because of space limits, it has not been possible to discuss challenges for educational institutions involved in implementing the designs in practice which go beyond these considerations.

By way of conclusion, a few last points about the learning spaces and the roles of practice in the three learning designs should be made. Firstly, the three learning designs create different spaces for learning: Case-based learning creates a study space supporting a relationship of inquiry between learner and target practice aimed

Table 8.4 Summary of rationale, theoretical basis and considerations for practical use for the three learning designs

	Case-based learning	Design-based learning	Simulation-based learning
General rationale	Students develop understanding through inquiry, by connecting academic knowledge and target practice meanings	Students innovate practice through design experiments and develop understanding of practice through changing it	Students develop experiential and practical knowledge and learn to do practice by mimicking tasks in the work situations of target practice
Theoretical underpinning	Hermeneutic theory, constructivistically or socioculturally construed	Constructionism, Lewinian systems theory or situated learning theory	Behaviourism (training of practice skills), constructivism (construction of schemas) or sociocultural theory (participatory understanding of skills, values and identity)
Considerations for practical use	There is no automaticity for students in establishing connections between their experiential case-related knowledge and the academic theories and concepts. Therefore, they need to be supported	Students need to take on four different roles (analysing practice, developing solutions, testing solutions, generalizing findings) when engaging in design-based learning. They need to be supported in negotiating and manoeuvring between these roles and in resituating knowledge across them	Unreflective combinations of guidelines from different learning-theoretical positions may result in tensions for learners. It is important to create a space for reflection on the mediational character of simulation practice

at the development of understanding. Design-based learning creates a workshop space supporting a relationship of innovation between learner and target practice aimed at the development of understanding through change. Simulation-based learning creates a space for role-play, simulation and reflection-on-action by establishing a relationship of imitation and engagement in 'as-if' practice. The different learning spaces support different learning trajectories and enable learners to experience practice from a student point of view and to develop knowledge through active engagement with it. They thus allow learners different perspectives on curricular knowledge from the ones they can get within education and, in particular, allow them to make connections between experiential and curricular knowledge.

Secondly, the different roles of practice in relation to education and learning should be pointed out: (1) Practice is a curricular object or domain, i.e. something that students must *learn about* and develop relevant skills and knowledge to understand. (2) Practice is an organizational unit which students *participate in* as a part of

vocational and professional training for a limited period of time. (3) Practice is also a set of purposeful activities which students can *learn through* by engaging in its problems and challenges through epistemological activities of understanding, solving and/or innovating. In this role, practice is not just an example to illustrate academic knowledge or the application of it to a concrete work situation. Instead, practice constitutes a potential learning opportunity for *situated knowledge transformation*. Involved in this is the transformation of knowledge from particular academic disciplines into 'patterns of participatory processes' in target practice (Tuomi-Gröhn & Engeström, 2003, pp. 33–34).

From a meta-perspective, the approach of analysing learning designs through a specific understanding of networked learning helps qualify both: It allows the perspective of networked learning, understood as learners' connecting of contexts in which they participate, to become clearer through use. Similarly, for learning designs, it disclosed the specific ways in which different connection forms between target practice and educational practice can facilitate distinct forms of learning, participation and the situating of practice. As a result, it is possible to reformulate the definition of learning design presented earlier more specifically for networked learning: Learning design for networked learning is a *plan for a course sequence which articulates the intended overall organization of learning possibilities as a matter of facilitating learners in creating connections between contexts,* e.g. *work life practice and educational practice*.

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Chapter 9
Teachers' Beliefs About Professional Development: Supporting Emerging Networked Practices in Higher Education

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Abstract During recent decades society has gone through major changes related to social and technological developments. These changes have impacted higher education. This has led to emerging networked practices that professionals and the organisations they work within need to respond to. In answer to this challenge within higher education, several efforts in professional development have arised. This chapter discusses teachers' beliefs about such professional development interventions. Particularly, it focuses on how networked practices in higher education are supported and fostered by professional development projects. The study was based at a Swedish university and included the dissemination of teacher beliefs from three different departments that participated in two professional development projects. The data materials were collected by using semi-structured interviews from a sample of 19 teachers. The results revealed that professional development trajectories concern beliefs on both individual and collective levels. Within these levels, teachers related their professional development beliefs to both social and technological networks.

Introduction

During recent decades, higher education has gone through major changes. However, these changes are not isolated to higher education institutions. They are related to larger changes in the surrounding society and are changes that higher education needs to respond to. Among others, the development within the field of information and communication technology, in terms of a shift from desktop-based solutions to more mobile and networked solutions, has had significant impact on societal development. This impact has included participation in higher education, working life or

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professional development and private life. Although practices building on networked technologies nowadays include the implementation of Internet-based technologies such as wireless portable devices and various applications that support communication by bridging time and locations, the introduction of such networked technologies follows the footsteps of earlier developments. Networked technologies, such as telephones, radio and television, have all had an impact on learning, societal development and how people live their lives including private life, working life and participating in education. Some scholars emphasise these changes as the emergence of a networked society (Castells, Fernández-Ardèvol, Linchuan Qui, & Sey, 2007; Goggin, 2012). In short, the emergence of the networked society has had an impact both on the organisation of higher education and its relationship to the surrounding society (see Chap. 5, Nørgård, Mor, & Bengtsen, and Chap. 6, Pedersen, Caviglia, Gislev, & Hjortskov Larsen, this volume).

In the process of change, higher education has also been appointed a key role as a change agent, including contributing to societal development and globalisation through applied science and an increase in the recruitment of students. Moreover, the rise in enrolment has included lowering the student/teacher ratio, widening participation to embrace groups of students who earlier had low enrolment in higher education and increasing the number of international students (Jones, 2015; Nicholls, 2014). By assigning more tasks and students to institutions of higher education, governments seek to solve societal problems such as being competitive on a global market that relies on networked technologies, rectifying high unemployment and supplying society with professional development built on academic standards. From this perspective, it could be argued that networked technological developments also are an incentive for social change. To be able to fulfil these hopes, networked technologies need to be implemented within higher educational settings. However, despite fast technological development in society, the implementation in higher education is a challenge that can be described as work-in-progress. This work involves a scholarship of teaching that builds on and utilises participation in social and technological networks as a resource for nurturing ideas and enhancing learning. In other words, working as a professional in higher education means including the emergence of the idea of a networked participatory scholarship (Veletsianos & Kimmons, 2012).

Building on the emerging networked society and its impact on practices within higher education, this chapter builds on the implementation of networked technologies in terms of trials and professional development projects. Such projects have been a common feature to support professional development of higher education teachers and nurture the emergence of networked practices. Results of professional development projects for teachers have been identified by higher education institutions as critical for successful implementation of networked technologies. Therefore, studies of this kind are important to yield insight into how such practices could be developed. Finally, this study builds on a potential relationship identified between beliefs and practices (Buehl & Beck, 2015) and on the impact of teachers' beliefs on their actual use of networked technologies in educational settings (Haixia, Koehler, & Wang, 2018). In order to strengthen

future networked professional development, it is important to explore and discuss teachers' beliefs, since professional development needs to be linked to teachers' beliefs and experiences (Tondeur, Van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). To achieve this aim, the following research question was explored:

> What beliefs do teachers in higher education have about professional development that embraces social and technological networks as tools for learning educational technologies?

Thus, this chapter analyses teachers' beliefs of how professional development interventions support the emergence of networked learning practices in higher education.

Networked Learning and Professional Development in Higher Education

The introduction of networked technologies in higher education has enabled the development of a range of educational settings. These settings are founded upon the relationship between networked technologies on the one hand and the interplay between people and online resources on the other. This relationship is the foundation of the idea of networked learning, which is commonly defined as 'learning in which information and communication technology is used to promote connections between one learner and other learners, between learners and tutors, or between a learning community and its learning resources' (Goodyear, Banks, Hodgson, & McConnell, 2004, p. 1). To be able to teach in these sorts of educational settings, specific types of experience and knowledge are needed. Teachers working in higher education can develop this expertise and knowledge in different ways, for example, through courses or self-study (Töytäri et al., 2016), through participating in development projects (Crompton & Traxler, 2018) or by working with more experienced colleagues (Bennett, Agostinho, & Lockyer, 2015). Thus, knowledge and expertise in networked learning can be developed in several ways and requires higher education institutions to invest in different forms of professional development for teachers.

Professional development for higher education teachers is a complex phenomenon that can be viewed at the individual and the collective level (Nicholls, 2014). Professional development embraces change at both levels. At the individual level, higher education teachers need to develop abilities, behaviours, knowledge and skills to deal with a range of issues they face within their profession. At the collective level, professional development in higher education is a phenomenon related to the practices associated with teaching. At this level, professional development contributes to the ability of higher education institutions in being up-to-date in their educational processes and technological products, improving their competitiveness. Thus, professional development is important for higher education professionals as well as the organisations, particularly in a networked society that emphasises knowledge as critical asset at the heart of higher education.

Professional development is a phenomenon that relates to both informal and formal attributes of learning. In professional development, informal and formal attributes 'are inextricably interrelated' (Malcolm, Hodkinson, & Colley, 2003, p. 313). Formal attributes, sometimes described as 'training', are related to event-driven professional development activities. Examples include participation in courses, seminars and workshops. Formal attributes of professional development could also include assignments (Noe, Wilk, Mullen, & Wanek, 2014). Informal attributes of professional development embrace a wide range of activities. A common feature of these activities is that they occur during participation in ongoing, job-related tasks and in everyday work-based settings (Fuller & Unwin, 2011). A characteristic of informal attributes is engaging in (work-related) tasks where learning is a secondary purpose, rather than the primary goal. As work tasks are performed, learning emerges as an important by-product that can be related to individual and organisational professional development and change. Thus, it could be argued that professional development commonly takes place in everyday work-based settings, including the work of higher education teachers.

In summary, in the contemporary workplace, professional development can support learning and can be enhanced by networked technologies. This comprises how such networked technologies support professional development in terms of both formal and informal attributes of networked learning. Therefore, the relationship between formal and informal attributes of learning and networked technology enhancement is a feature that needs to be taken into consideration while designing professional development interventions. Professional development supported by social and technological networks could include collaboration as well as individual development. Long-term change of practice could be sustained where professional development activities include opportunities for teachers to apply and reflect on knowledge in practice in collaboration with their peers (Holmes & Sime, 2014).

Teachers' Beliefs

How teachers conceptualise teaching and learning with technology appears to have significant and interrelated impact upon their students' experience of learning (Kirkwood & Price, 2013). Hew and Brush (2007) report that professional development may be used to access many of the internal and external barriers to teachers' beliefs and that these may be related to experiences when implementing technology in their teaching. This includes professional development which goes beyond the sort of 'one-size-fits-all' technology training that is fundamental to teachers' technology use. If the integration of networked technologies in teaching practice is to be successful, it is important that teachers' fundamental beliefs about teaching and learning are taken into consideration during their professional development (Kirkwood & Price, 2013).

Drayton, Falk, Stroud, Hobbs, and Hammerman (2010) suggest that teachers need both professional development and time to discuss content, students' work,

pedagogy and technology. Moreover, the use of technology and the shift from technology to pedagogy takes time (Ertmer & Ottenbreit-Leftwich, 2013). It appears important to focus on teachers believing in their own abilities and the possibility to work in a culture that embraces a form of professional development which intertwines technological, pedagogical and subject-related didactic competences (Ertmer & Ottenbreit-Leftwich, 2010; Mishra & Koehler, 2006; Voogt, Knezek, Cox, Knezek, & Brummelhuis, 2013). Here, professional development should seek to support teachers' beliefs through supporting conceptual change, in order to have an impact on teachers' conceptions of and approaches to teaching with technologies (Englund, Olofsson, & Price, 2016). Towndrow and Wan (2012) emphasise the importance of teachers' collaboration through seeking and sharing. Moreover, Vrasidas (2015) argues that for professional development to work it should be collaborative in form and situated in teachers' everyday work-based settings and inbound practice. Thus, teachers' beliefs related to the use of networked technologies in teaching appear to support the notion that: 'technology itself is not the agent of change: it is the teacher' (Kirkwood & Price, 2013, p. 336). Building on this insight, the next section discusses the context of and the professional development projects reported in this study.

Emerging Networked Practices in Swedish Higher Education

Even though the Internet was developed during the 1960s, its impact on the society and higher education was limited until the 1990s. Even in the early 1990s, networked technologies' impact on Swedish higher education was limited (Jaldemark, 2008). Back then only 7% (approximately 15,000 students) of enrolled students participated in some of the 600–700 courses and 40 programmes that applied networked technologies to teaching. These educational settings used three approaches. The first approach involved applying non-digital, networked technologies, such as teleconferencing, to teaching. The second approach built on the notion of open learning and independent learning. This approach deemphasised networked learning by building on one-to-one telephone tutoring. The third approach was founded upon a decentralised model of education, such as self-study of learners located in a network of different physical locations (such as local study centres and university campuses) where students and teachers could meet. This third example was the most commonly applied approach (Gustafsson, 1993). Since these early days, educational settings in higher education have expanded in several ways, including the emergence and inclusion of Internet-based networked technologies. Today, networked approaches in Sweden routinely embrace blended learning practices, located both off and on-campus and enhanced by different asynchronous and synchronous technologies. For the academic year 2016/2017, there were approximately 215,000 enrolments in educational settings enhanced by networked technologies in approximately 500 programmes and nearly 7000 courses offered in the Swedish system. Teacher education is the most common of these programmes (Gröjer, Berlin Kolm, & Lundh, 2017).

Two Professional Development Projects

The data reported in this study were based on professional development projects run at the Mid Sweden University (MSU). MSU has two campuses located approximately 190 km from each other. The university has approximately 1000 employees and enrols 13,500 students into 80 programmes and 350 courses. Due to separate campuses and the related geographical issues, the university has for decades built its teaching strategy on enhancement by networked technologies. Networked learning is encouraged and various projects have been introduced to keep up-to-date with recent developments in the field. In this strategy, the university has focused on different professional development projects that in a later stage could be disseminated among its employees. Preliminary results from the two professional development projects discussed in this chapter have been reported in other publications (Håkansson Lindqvist, Jaldemark, & Mozelius, 2018; Mozelius, Jaldemark, & Håkansson Lindqvist, 2018).

One example is the MUML project (Mid Sweden University and Mobile Learning), a predecessor to the two projects reported in this study. The MUML project supported the professional development of higher education teachers by focusing on the implementation of mobile networked technologies (Jaldemark & Lindberg, 2014). Teachers teaching in seven different courses performed trials and participated in workshops and seminars to foster the practice of teaching with everyday networked technological solutions. The project encouraged teachers to engage in 'Bring-Your-Own-Device' (BYOD) activity as well as allowing them to use enterprise systems. Through cumulative and iterative processes, teachers were encouraged to share ideas and learn from each other's practice as they experimented with technology in their teaching. The results of this project were disseminated throughout the university to allow teachers across the organisations to learn about new forms of networked technological practice that had been introduced. The two projects reported in this chapter built on the results of the MUML project.

The first project, the Campus-Distance (CD) project, was run for 3 years with 35 teachers who participated on a voluntary basis. These teachers worked within two different departments, including the department where the MUML project was run. The project aimed at supporting professional development and networked learning practices within six higher education programmes. Five of these programmes focused on teacher education, and the sixth programme was based on the subject of behavioural science. The teachers who taught within this behavioural science programme were also active within the teacher education programmes. One aim of the CD project was to support the development of expertise in blended and mobile learning practices. Professional development within this project emerged through an iterative design comprising the following five features (Fig. 9.1): participating in a competence development course, planning trials, conducting trials, evaluating teaching and participating in a pedagogical seminar. The second round of competence development was also voluntary, took place in a less formalised format and included fulfilling different teachers' needs. For example, this could be participation

Fig. 9.1 Model of professional development in the first project

in seminars and workshops arranged by university, or conferences and symposia arranged by other institutions. Lessons learned from these sessions were used in a later stage to inform the next round of trials.

In the project, institutionally owned, enterprise equipment was used alongside a BYOD approach. Throughout the project, teachers worked towards enhancing their own networked learning practice, using both asynchronous and synchronous technologies. For example, they learned how to apply different networked tools, external websites, screencast technologies, social media, video conferences to their teaching and explored how they might improve their use of the learning management system.

The second professional development project originally included five teachers and was later expanded to 15 participants from the computer science programme in informatics at Mid Sweden University. The initial name of the project was ConCurrent Design (CCD), but later the name changed to Structured Multidisciplinary Project (SMP). The computer science department had been continuously discussing teaching technology and pedagogy outside the project and had organised visits to other universities to exchange experiences. Under both names, the project had the aim of developing expertise in how to apply networked technologies within blended learning settings. Later, the initial focus on asynchronous applications shifted to blended synchronous learning, and how to support student collaboration and group work. One of the objectives of the project was to develop a distributed CCD version (DCCD) for geographical independence and collaboration in virtual meeting rooms. The basic premise of DCCD was to use the Internet

and rich media technologies to combine expertise in a virtual space instead of a physical venue. Discussions and problem-solving were carried out in the virtual room following an adapted CCD process.

The last part of the second project focused on DCCD and how to maintain the CCD process quality in a distributed educational setting. Identified benefits of a DCCD process were increased possibilities for distance work, access to expertises that are difficult to move geographically and reduced transports. An important part of CCD is concurrency and how the various parts of the process could be handled in parallel, but presence was also of importance. Transferring the control and quality of a CCD process to a DCCD educational setting requires networked technologies that enable personal presence and the possibility to share documents. One project activity was to test various video conferencing systems with the possibility of using break-out rooms to divide a larger group into subgroups. This was carried out as online sessions between teachers from the three universities. Lessons learned were later compared with best practice and challenges in practice at other universities that use blended synchronous learning on a regular basis.

Method

Data was gathered through semi-structured interviews (Kvale & Brinkmann, 2015) with 19 higher education teachers from the two projects. From the first project 12 of 35 teachers, seven women and five men, were interviewed. From the second project, a total of seven of 15 teachers, three women and four men, were interviewed. The interview participants represented a variation in demographics, including academic degree, disciplines and experience of networked learning. These participants represented the three academic departments and seven different programmes involved in the two projects. During the interviews, the teachers and the interviewer discussed themes that were agreed in an earlier study of the MUML project (Jaldemark & Randevåg, 2016). In the interviews, an interview guide was used. Among others, the guide included the following topics: teachers' beliefs on social and technological networks and its relation to professional development; their views regarding the professional development which they had seen in their programmes and at the department; and their beliefs on the need for continued professional development.

The data collected in the interviews were analysed using an inductive, data-driven process according to the thematic analysis model described by Braun and Clarke (2006). The model includes six recommended steps: (1) Get familiar with the data, (2) Generate preliminary codes, (3) Identify patterns and themes, (4) Review patterns and themes, (5) Create and name categories and (6) Present the analysis. In this study, strict ethical guidelines were followed, as recommended by the Swedish Research Council (2017).

Results

This section outlines the results of the interviews with the teachers. An overarching theme of the interview responses was that teachers' perceived professional development at two distinct levels: *professional development at the individual level* and *professional development at the collective level*. These levels included several categories, as presented below.

Professional Development at the Individual Level

When analysing teachers' beliefs concerning professional development in regard to learning networked tools on an individual level, several categories were identified. These categories involved *just-in-time learning, trying to catch up with technology, technological responsibility, information overload, maintaining an optimistic stance* and *individual learning as a base for professional development at the collective level*.

Just-in-Time Learning

At the individual level, professional development was discussed in the form of taking on new skills *just in time*. One teacher described this as just-in-time, individual learning to use a networked tool at the point of need: 'Well, it is a type of trial and error. I don't learn first and then test it and use it a bit, I just get into a situation where I have to use Skype'. Another teacher expressed this as taking on networked technology at the right time: 'There are so many versions. I don't know which to choose, should I learn this one or will there be a better version in a few months?' This teacher chose to learn just in time when the technological knowledge was needed.

Trying to Catch Up with Technology

Other issues related to keeping up with technology were associated with individuals updating their knowledge of technological innovations. For one teacher, professional development involved continually trying to catch up and with advances in new networked tools. This left him/her with a feeling of insecurity:

> But clearly, I can feel that the technological development is going faster than what I can keep up with and learn to use it, so there is the feeling that I am always behind. This is my experience. If you think of all of the things you can use, there are always more functions than I use. So, even if I feel that I am developing, it is far from enough.

This teacher realised the need to continually learn about new technologies to be able to apply these in his/her teaching while at the same time acknowledging the huge number of technological functions that were available, but that were not used. Another teacher hoped in the future to see 'less complex systems that can interact with each other'.

Technological Responsibility

There are a large number of challenges at an individual level that continued to be problematic, and could be associated with a paucity of support networks for help. As networked tools continued to develop and become more user-friendly, the individual technological responsibility for use of the tools increased. One teacher noted being tired of all of the technological troubles and the related responsibility: 'It takes so much time and I have noted, that as the technology develops, there is more and more that we have to do ourselves. I feel a bit frustrated about this, because it happens a lot, and we put a lot of time into it'. In another interview, a teacher claimed that it was important to 'let go and have the courage to explore things on your own'.

Information Overload

Even when support networks were in place, there could be difficulties in learning new networked tools. One teacher explained the need for individual support in learning a new tool, as well as the overwhelming amount of information necessary to take in all of the features of a tool:

> I think that I am still more on the analogue side than on the digital side, that I am not as motivated although I think that it is fun. I want to have someone who sits next to me and tells me, that you can do this and that and this. I just know that when I was having everything installed with a person from Helpdesk, it took one and a half hours. We went through everything. When he left, I felt physically ill, I could not take in one more thing.

Several teachers highlighted the need for professional development and more 'concrete hands-on courses'. A number of shorter courses on networked tools that could support learning were developed and provided by the university, but a teacher commented: 'the discussions are on a rather abstract level, for our daily use we need more hands-on training'. Another teacher pointed out that 'our IT Helpdesk seldom has any solutions' and that 'I learn about new tools by myself and together with the colleagues'.

Maintaining an Optimistic Stance

Many of the teachers held a positive view of new networked technologies, which one teacher expressed as 'It's the constant tinkering that leads further, and I see new tools as a part of my job, and a way to learn new things'. Viewing the use of networked tools and technologies in teaching as interesting challenges was most common among teachers working with the computer science programme. This was also the group that had the most optimistic expectations of future technological developments. One example of a visionary view of the use of technologies was a teacher who believed that it would soon be possible to collaborate online using 'a common and never ending real time whiteboard' as a new way to enhance and improve existing practices.

Several teachers expressed a belief articulated by one teacher as 'it's improving. It's getting better', that the situation today is easier to handle than it was a decade ago. Results indicated that the general quality of networked tools had improved and that communication features were more stable than they were 10 years ago. On the other hand, the speed of technological development created problems for teachers working on all programmes and increased the need for professional development.

Individual Learning as a Base for Professional Development at the Collective Level

Teachers also perceived professional development at an individual level as a foundation for potential collective professional development and collaborative learning. One teacher noted that professional development, seen as an item on his/her own individual list, also provided the opportunity to share experiences and learning within a collective network of colleagues: 'We have used these active learning [classrooms]… and this is on my list for development....and here I see that there are many possibilities for development both for me, but for learning and co-learning'. A condition for professional development as an individual, and in turn, for the collective can be viewed as an optimistic outlook:

> Well, I think that I, to be able to show this, I must also develop my own technological skills and be able to demonstrate it well and give good examples. It is like everything else, if you are optimistic … If you want to promote something, well then it creates many positive effects and this spreads.

Having good skills in working with networked tools was seen to be important. It was also important to be able to present them well, and use them in a positive light. This use provided opportunities and an optimism related to the tools which spread between colleagues.

Professional Development at the Collective Level

In the analysis of teachers' beliefs concerning professional development in relation to learning networked tools at the collective level, several categories were identified: *professional development within limited time constraints, new and accessible strategies for professional development, creating new spaces for networked learning through easily accessible learning networks,* and *scaling up informal and formal attributes of networked learning opportunities within and beyond the university.*

Professional Development Within Limited Time Constraints

During the interviews, teachers often articulated challenges around finding time for networked learning with colleagues. Emerging networked practices were described as well as the need to create more time for these networks: 'We have meetings where we sit and discuss and share and help each other and talk to each other about how we can improve, what we can develop… Here, one would like to have more of this time. But I still think that we do this, we try all the time'. Another teacher expressed this as a double challenge that could be related to both time and location: 'There are two parts to this, one is that somewhere there has to be a place to meet to make this exchange and the other is to have the time to do it'. A third teacher pointed out that 'it can be helpful just to test new tools together'.

New and Accessible Strategies for Professional Development

With limited time available for professional development, teachers needed to find new and accessible strategies for professional development. This involved finding ways to use the short periods of time during teachers' everyday work schedules for just-in-time and efficient professional development: 'A requirement for a staff member who needs professional development is to actually be able to do it, with a half an hour more or a half an hour less in their schedule. It is extremely difficult to create the time for this meeting'. Beyond time and space, flexibility and accessibility of systems appeared to be a critical condition for networked learning: 'We need to build another way to exchange experiences, but how can this be done and easily accessible and not a burden of additional systems to log into, additional systems to learn'.

Time also seemed to be an important aspect to promote collaboration in networked learning. At the collective level, groups of teachers communicated with each other to decide what resources they could produce by themselves and what resources they could find and disseminate. However, locating, evaluating, sharing and disseminating these resources for collective purposes within a network of colleagues took time:

> We have discussed academic writing many times, in teachers' education. We could use films about writing references and so on. If we do our own films, and now we have ended up in that there are so many resources on the Internet and you can use them… Here, there are lots of discussions, which resources there are and what we need to do by ourselves, and new things. And it takes time to find them.

Here, teachers appeared to see possibilities in the networked tools and resources available, but also the need for collaborative discussions which networked learning could provide.

Creating New Spaces for Networked Learning Through Easily Accessible Learning Networks

Another challenge was also evident according to another teacher. This challenge was related to a conflict of interest between individual professional development and networked learning through collaborative professional development: 'We must create possibilities to discuss collaboration in other ways. But is also problematic in relation to the resources that we have and the time we have for professional development, but there are individual needs'. Another teacher expressed a need for more opportunities for networked learning. This would involve time, but would also create a creative space for expanding informal networks to formal networks for collaborative learning. Here, informal networks appeared to provide some of the information needed, but the focus continued to remain on the individual level:

> I miss the pedagogical conversations, if that is what you can call it. In my experience, a lot is ventilated between people who have the same interests, you get a little input, a few ideas, but there has never been the time or the room for discussing this more in detail. You can see and you hear that things are going on. There are many skilled colleagues who do lots in their courses, but you never really have the opportunity to learn about it because everyone is so focused on their own thing.

Another teacher also articulated emerging network learning processes. This teacher described the informal dissemination of information and learning processes which took place:

> What we do right now, we do so much sharing in the corridors, we spread 'she has done this and she has done that' and 'they have tested this' and so on. But here, we could put together a number of examples for changes or for ideas, ideas for development, and together, look at them, collaboratively think of them and collaboratively see, how can we, ok, how can we use this in other situations?

Emerging networked learning processes were also described by a teacher who noted perceptible changes in practices:

> It is spreading, we talk about Moodle in a different way. Both culturally, how we think, how we get the students to be active, how we can do this strategically, how we think about Moodle, how we work with Moodle and so on. It is slowly spreading, we are talking about this and I think I can see it or I see it. Not just think … I can see it.

What most teachers agreed on was the strength of *the collegium*, a collegial network where all kind of issues could be discussed. The collegium could be a channel for sharing best practices and lessons learned. Teachers also mentioned that a network of colleagues brings them comfort during their daily work, and could be viewed as an important complement to the official support channels. The collegium was also depicted in an answer as 'a flexible networked collaboration with subgroups or sub-collegia'. Teachers also claimed that in the collegium there are no clear boundaries between new technology and new pedagogy and that these phenomena today are intertwined.

Scaling up Informal and Formal Attributes of Networked Learning Opportunities Within and Beyond the University

At the university level, there were opportunities for professional development; however, according to this teacher, these activities were not given a high priority: 'There are many good possibilities to go to seminars…courses held by the university. This is good. But, people often have a hard time to find the time to do this, but they are offered now and again and more and more people go'. Another teacher expressed the need to expand networked learning beyond the university, creating opportunities for networked learning with other universities: 'But looking at us as universities, we need to collaborate. We are sitting and thinking ourselves […] there are not really any good collegial structures for developing this'. Finally, a teacher discussed creating new conditions for networked learning and professional development within the university as well as between universities. An example of a fruitful inter-university collaboration was when the department of computer and system science initiated a dialogue with another department of computer and system science. A concrete outcome of these discussions was the introduction of a theoretical framework that later was used in their work as teachers.

Discussion

Returning to the research question posed in this chapter regarding beliefs teachers in higher education have about applying social and technological networks as tools for professional development of higher education practices, there is evidence that emerging network practices can be seen on the individual level as well as the collective level.

While many of the teachers view individual professional development as a condition for collective professional development, networked learning is emphasised as a phenomenon including both informal and formal attributes. While some teachers see emerging network learning processes as slowly but surely developing over time (Bennett et al., 2015), other teachers see stronger effects such as the collegium. Therefore, teachers' beliefs also appear to confirm the notion that professional

development takes time (Ertmer & Ottenbreit-Leftwich, 2013). In other words, the emerging professional development trajectories could also be discussed in terms of a networked participatory scholarship (Veletsianos & Kimmons, 2012).

Professional development which takes place on the individual level alone may make it difficult to keep up with changing technology. It is most likely that new solutions are needed to support individual and collective professional development (Hew & Brush, 2007). The results of the present study indicate that teachers' professional development today requires more than just the official training that is provided by the university. The constantly changing situation in networked technologies needs complementary resources both for technological and pedagogical novelties in which pedagogy and technology are intertwined (Ertmer & Ottenbreit-Leftwich, 2010; Mishra & Koehler, 2006; Voogt et al., 2013). Such intertwined resources could embrace practice-based professional development projects (Crompton & Traxler, 2018; Vrasidas, 2015) that involve seminars where ideas could thrive and be disseminated and discussed between teachers through sharing (Drayton et al., 2010; Towndrow & Wan, 2012).

Creating conditions through networks for professional development to discuss, reflect and exchange experiences results in a collective human knowledge bank of best practices and challenges in practice. This appears to take place primarily in an informal way. However, more opportunities for networked learning are provided through formal systems and structures. This seems to take time and these networked learning opportunities compete with other teaching duties. The idea of teachers and subject matter experts as a collegium with sub-collegia looks promising for the sharing of ideas and best practice. The collegium could provide a bedrock for formal and informal attributes of higher education teacher training.

While teachers learn about new networked tools individually and collectively to support student learning, time is an important factor. Several teachers highlighted a low level of resources, and emphasised that lack of time was the most crucial. University teachers in Sweden have in general 20% of their working time for personal development, but this time is also used for research, updating subject matter expertise and course development. In this study, teachers focus on individual and collective aspects of networked tools to support students' learning. At the same time, it is difficult to see any thoughts in these teachers' beliefs about how these skills could be facilitated through online solutions for professional development, i.e. supporting their individual and collective professional development through the use of flexible networked tools. These possibilities for networked learning could be provided by the university, in order to provide the same networked learning opportunities for teachers and other university employees as for students.

The results suggest that contemporary teacher professional development interventions must extend beyond the formal training provided by the university. Formal attributes of professional development trajectories tend to be offered in a top-down way, where technology and pedagogy are discussed at a high level of abstraction. Thus, the authors recommend combining formal top-down models of professional development with self-organised, bottom-up structured networks that emphasise informal attributes of learning, therewith acknowledging the teachers' beliefs

(Englund et al., 2016; Kirkwood & Price, 2013; see Chap. 13, Spante, Johansson, & Jaldemark, this volume). The continuously changing context of networked technologies and the need for professional development that includes pedagogy and technology intertwined will likely increase. For Mid Sweden University, as for other universities, it will be important to reinforce the current professional development for teachers in higher education both individually and collectively.

Conclusion

The results of this study identified that the teachers involved in this study perceive social and technological networks as a means to cope with the urgent need for contemporary professional development in higher education. Furthermore, the results indicate that professional development comprises both individual and collective aspects. A key challenge identified in this study is for universities to create and support networks that are sufficiently dynamic to extend across and maintain both aspects, and at the same meet the social and technological needs of higher education. In these professional development endeavours, teachers' beliefs should be acknowledged. Finally, future research is needed to investigate how universities might systematically support dynamic networks that embrace informal and formal attributes of learning to enhance professional development among university teachers.

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Part III
Networked Professional Learning in Teacher Learning Groups

Chapter 10
Learning to Teach in a Remote School Context: Exploring the Organisation of Teachers' Professional Development of Digital Competence Through Networked Learning

Fanny Pettersson and Anders D. Olofsson

Abstract This chapter takes a school management perspective and investigates an upper secondary remote school in northern Sweden and its ambitions to create conditions for teachers' professional development (TPD) of digital competence. More specifically, the chapter explores possibilities and challenges in how TPD of digital competence can be organised, facilitated, and sustained. By means of Cultural–Historical Activity Theory (CHAT), the results and analysis show that the development of teachers' digital competence requires a school management that is supportive in creating a culture of change that can be sustained beyond single TPD actions and activities. Moreover, teachers need support to elaborate and negotiate on what type of tools, rules, roles, and divisions need to be added to the activity for the networked learning to take place and to proceed both in a short-term and long-term perspective. It is also shown how the school management needs to be sensitive to when and how the learning network is in need of encouragement and external support, that is, the importance of finding a balance between when the learning network can be self-organised and when it is in need of being externally directed with support from the school management.

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Introduction

In July 2015, a Swedish government decision provided new opportunities for Swedish schools to expand the use of remote teaching (The Swedish Government, 2015). Remote teaching is mainly carried out in a synchronous and interactive mode characterised by collaboration between teachers who are geographically separated from each other and is an attempt to, for example, decrease the number of students moving out from remote areas (cf. Pettersson, 2015) and to make it possible for several remote school units to share their teacher capacity and resources (Zhang, 2018). Remote teaching brings with it an increased digitalised educational practice (Yu & Chen, 2016), and teachers have to develop digital competences in order to plan, design, and conduct teaching and learning. In turn, this has put pressure on Swedish schools to create conditions and strategies in order to help teachers develop such competences.

This chapter explores a remote upper secondary school in Sweden and its ambition to create possibilities for teachers' professional development (TPD). Previous research shows both that the school management (school leaders and educational technologists) plays a central part in turning ambitions into practical work (Pettersson, 2018) and that networked learning can facilitate teachers in collaboratively developing strategies to learn and execute digital competence in their daily practice (cf. Chap. 13 by Spante, Johansson, and Jaldemark, this volume). Of importance here is also, as put forward by, for example, Krumsvik (2014), as well as Pettersson and Olofsson (2013), that if teachers are to be prepared to work in technology-rich educational contexts they need to be part of activities that develop their digital competence, including their ability to use digital technologies in a pedagogical way (cf. Niemi, Kynäslahti, & Vahtivuori-Hänninen, 2013). However, attaining digital competence takes time (Pettersson, 2017), and the related TPD often seems to comprise short and decontextualised formal courses with a rather limited connection to teachers' everyday practice (Olofsson & Lindberg, 2012). Alternative ways of organising TPD for the development of digital competence are needed. In this chapter, one such attempt is reported.

With this brief backdrop, the aim of this chapter is to take a school management perspective (school leaders and educational technologists) in order to explore the possibilities and challenges in how teachers' professional development of digital competence can be organised, facilitated, and sustained in a remote educational context. The following research questions are hereby raised:

- How are structural and organisational conditions constructed as a possibility for facilitating teachers' professional development of digital competence through networked learning?
- How do structural and organisational conditions shape the possibilities for sustained professional development of teachers' digital competence?

Following this introduction, the concept of digital competence is described. After this some words about networked learning and learning networks are provided and the theoretical framework, Cultural–Historical Activity Theory (CHAT), for analysis is introduced. Next, the method is presented followed by results and analysis. The discussion and conclusions end this chapter.

Digital Competence

The concept of digital competence has gained increased interest in terms of learning and navigating in today's digitalised knowledge society (Ala-Mutka, Punie, & Redecker, 2008; Balanskat & Gertsch, 2010), and the field of education is no exception (From, 2017; Hatlevik & Christophersen, 2013; Krumsvik, 2014). Today, digital technologies are in some way part of most western educational practices, something that in turn has made the question of digital competences rather central for both school leaders and teachers.

Since the term "digital competence" was coined, researchers have tried to elaborate on what constitutes the concept (Pettersson, 2017). One example is From (2017) who talks about pedagogical digital competence as teachers' pedagogical use of digital technologies, as well as their ability to plan and conduct and to continuously evaluate and revise teaching and learning activities in their educational practice. Another example is Krumsvik (2008, 2014) who argues for digital competence as teachers' pedagogical use of digital technologies. With the inclusion of pedagogical aspects in the concept, Krumsvik defines digital competence as "the teacher/TEs' [teacher educators'] proficiency in using ICT in a professional context with good pedagogic-didactic judgement and his or her awareness of its implications for learning strategies and the digital Bildung of pupils and students" (2008, p. 45).

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Some Words About Networked Learning and Learning Networks

In broad terms, networked learning concerns connections and social relations between individuals in different social settings. In 2012, Haythornthwaite and De Laat defined social networks as "the configurations of connectivity that exist when people interact with each other by communicating, sharing resources, and working, learning or playing together, supported through face-to-face interaction as well as through the use of educational, and information and communication technology" (p. 352). Adding the dimension of learning, the notion of networked learning has been described as the process in which different aspects of configuration of connectivity support and facilitate learning and development among participants (Hanraets, Hulsebosch, & De Laat, 2011). In this chapter, the concept of networked learning refers to the activities taking place in the network, while the idea of a learning network relates to individuals gathering around a joint task or interest.

According to research, while some learning networks are framed and supported within organisational settings (Gleerup, Heilesen, Helms, & Mogensen, 2014), others are emergent and flourishing with runaway objects beyond formal settings and regulations (Goodyear, Carvalho, & Dohn, 2016; Schreurs & de Laat, 2014). This chapter is concerned with the former description – networks that at some point are organised and that are organisationally supported to be sustained within a specific organisational and educational context in a similar manner to the teacher-learning groups (TLGs) described in Chap. 12 by Vrieling-Teunter, Wopereis, van den Beemt, de Laat, and Brand-Gruwel and Chap. 13 by Spante et al. in this volume. Furthermore, this work is concerned with structural and organisational conditions, as well as support being constructed within and between boundaries of learning networks as a means to facilitate learning and collaboration between participants (e.g. teachers) from a long-term perspective. This also means that less focus is directed towards networked learning that spontaneously occurs and then fades away within educational contexts without any specific support, e.g. relations and connections that "happens 'as they go along' without any attempt at designing for learning" (Dohn, 2016, p. 148). Therefore, in the following sections, aspects of how networked learning can be organised, facilitated, and sustained will be further elaborated on.

Organising for Sustainable Learning Networks

In regard to facilitating and organising for sustainable learning networks, researchers argue for a distinction between what can be organised and designed for and what is emergent (see Ryberg, Sinclair, Bayne, & De Laat, 2016). Goodyear et al. (2016) highlight the need to distinguish between formulated tasks and the actual "doing" in learning networks. These researchers further argue that while tasks and the

boundaries of learning networks can be organised for, at some point the "doing" and "activity" (p. 96) of the participants is generally emergent and is informally constructed as the learning network takes form and develops over time. Conole (2007) points out that the physical and material setting as a boundary can, at least to some degree, be organised for and externally facilitated. This includes, for example, bringing together and connecting participants with digital tools and software to help the networked learning develop and proceed. According to Goodyear et al. (2016), such a physical setting is "often important, but is under-researched and under theorized: it is often taken for granted" (p. 94), and they go on to say that deeper knowledge of the physical setting would help researchers and practitioners "suggest what needs to 'come to hand' for the activity to proceed successfully" (p. 94). This chapter intends to contribute such knowledge.

Formal and Informal Learning Networks

Another central aspect when discussing the organisation, emergence, and facilitation of learning networks is the notion of formal and informal learning. Within school organisations, TPD of digital competences often refers to either formal initiatives that are approached and organised by external experts or informal learning that emerges between teachers in their daily practice (Lindberg & Olofsson, 2010). However, instead of making a clear distinction, Vaessen, Van den Beemt, and De Laat (2014) suggest "a hybrid form of informal-formal learning" (p. 57). Importantly, according to de Laat (2012), "Making a better connection between formal and informal learning will help to make professional development efforts sustainable" (p. 13). Moreover, formal–informal learning "stimulates the appreciation of informal learning formally through sponsorship and calls upon formal training initiatives when needed" (p. 19). De Laat's description can be understood as a way of expanding both formal and informal learning when the school is organising for connected and shared spaces for teachers working towards the same learning goals.

Supporting the Transfer from Externally Directed Learning to Self-Regulated Learning

Because learning networks might be formal and externally directed within an organisation, Akkerman, Petter, and De Laat (2008) point out the importance of enabling participants to also learn in a self-organised manner (see also Hanraets et al., 2011). According to Vrieling, Bastiaens, and Stijnen (2010), such a transfer from externally directed learning to self-organised learning should, however, be a step-wise process supported by facilitators helping to develop functional structures and guiding the group towards a shared object. Following Akkerman et al. (2008), there are

two central questions that can be used by facilitators to drive the process: (1) "How are we relevant to each other?" and (2) "Who are we and where we are going?" (p. 398). Vrieling, Van den Beemt, and De Laat (2016) report that when "the group facilitator discusses these questions at an earlier stage with group members, a meaningful, shared context within the group develops with the promise of a development towards an active, self-regulating group" (p. 280).

Networked Learning as an Object-Oriented Activity

For exploring and analysing how TPD of digital competence can be organised, facilitated, and sustained in a remote educational context, this chapter draws on Cultural–Historical Activity Theory (CHAT). CHAT is a historical- and contextual-oriented theory focused on the development and formation of learning practices within a given context (Engeström, 1987; Vygotsky, 1978). The basic view of CHAT is that learning and development is embedded in, and is a result of, object-oriented activities that are undertaken and driven by a group of individuals (in this chapter, the teachers). Learning is created and negotiated in a specific context, mediated by culturally and historically developed tools and artefacts. This mediated act (between *subjects*, *objects*, and *tools*; see the upper part of the triangle in Fig. 10.1) also means that individuals' learning and doing are constantly shaped and regulated by cultural tools developed and made available in the given context. In this regard, structures and mediating tools are developed and made available within the given context (in this chapter, the school organisation) and become central for both how and in what form knowledge and practices can be developed over time.

Building on the concept of mediation, Engeström (1987) paid attention to collective structures and forces that were framing and regulating activities. He expanded the concept of mediation to also include aspects of the *rules* regulating the activity, the *division of labour* between individuals participating in the activity, and the *community* in which the activity is taking place. Moreover, it is important to account for how these components or elements influence the formation of knowledge and practices in a long-term perspective.

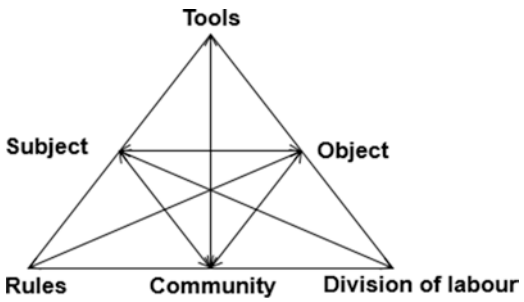

Fig. 10.1 An illustration of Engeström's (1987) structure of a human activity

In this chapter, networked learning is understood as a collectively created activity in the upper secondary remote school and, furthermore, as an activity that takes place within an educational context and with the shared object of TPD. Within the collectively created activity, the architecture, structure, and framing are understood as being important for the potential to learn and develop. The networked learning activity is understood as being shaped by available tools (digital technologies, learning spaces, and knowledge of teaching and learning methods), rules and regulations (decisions, regulations school and educational structures, and time), and the division of labour between participants (agreements influencing the conditions in the group, connections, and roles). Moreover, it is a community in which different people (educational technologists, school leaders, teachers) with different competences are involved.

The use of CHAT shall be read as an attempt to unravel the complexity in how networked learning can be organised, facilitated, and sustained as different sociocultural elements shape and regulate the ability to achieve the object of TPD of digital competence. In the analysis, special attention will be on how, and in what way, the school management acts in relation to different elements of the activity system, for example, how shared learning objects are formulated as well as how actions are taken towards making tools, rules, and aspects of community available and how these organisational and structural conditions might facilitate, support, or hinder how the networked learning activity is given room to proceed and sustain itself over time. This analytical framing should also be read as allowing for the exploration of the networked learning activity's potential to move back and forth between being formal and being externally regulated, towards informal and self-regulated learning. Put differently, the study explores how the school management acts in terms of being supportive, regulating, or waiting for the network to flourish on its own.

Networked Learning in the Upper Secondary Remote School

In Sweden, remote teaching is mainly carried out in a synchronous and interactive mode characterised by collaboration between teachers who are geographically separated from each other. This specific mode of teaching is looked upon as important for schools having difficulties in meeting the need for qualified teachers on site in combination with organising and carrying out teaching due to a continuously decreasing number of students (cf. Yu & Chen, 2016).

The context for this study is an upper secondary remote school that, since the beginning of 2010, has consisted of four schools located in four different municipalities in Sweden. The number of students ranges from approximately 200 to 1000, and the distance between schools varies between 94 and 240 km. The motive for this arrangement can be seen in light of an ongoing political strategy to facilitate remote teaching between schools in rural areas in Sweden and, by means of remote teaching, to attract and offer students a wider range of programmes to attend. Furthermore, it is designed to enable students to stay in their municipalities and, in

the long run, thereby strengthen the supply of competence in the region. During the 2016 school year, a total of 10 subject courses were offered to the students by means of remote teaching. The remote courses were conducted online, primarily synchronously through live-streamed lectures, seminars, and group work. Most of the remote teaching courses included a blend of students online and students located in the same school as their teacher. Among the remote teachers, there was also a mix between those sharing the physical classrooms with their students and those conducting their lectures in another room, facing all students online. All lectures were synchronous (often by means of Adobe Connect®), meaning that the students had the opportunity to interact with the teacher and other students during the lecture. A specific remote facilitator was also available for supporting students who were online. The remote facilitator helped the teacher and students to start up the lecture and was ready to give support during the lecture. The remote facilitator also had the possibility to support the teacher in administrative and in some pedagogical aspects during the lecture. To facilitate remote teaching and learning, the learning management system (LMS) Moodle was used for distributing hand-outs, instructions, and schedules. Some teachers also used Moodle for uploading short lectures and other teaching and learning materials for the students to use whenever needed during the course.

At this upper secondary remote school, the development of TPD of digital competence can be traced back to 2012 and the developmental needs when facing challenges in how to teach with digital technologies. Since then, TPD activities have been implemented intermittently and have taken different forms depending on teachers' learning needs. To shape the possibilities for the sustained TPD of digital competence, a number of organisational support measures and organisational conditions have been developed and constructed. This includes, for example, supporting teachers in formulating learning objects, the careful selection of tools supporting learning and collaboration, the development of rules regulating and directing learning, and the elaboration of the division of labour between educational technologists, remote facilitators, and teachers. These aspects will be further elaborated on from a school management perspective (educational technologists and school leaders) in the final parts of this chapter.

Method

This study is the first in a larger research project investigating remote teaching and learning in upper secondary school. It targets the school management perspective on the networked learning initiative for TPD of digital competence, while the two forthcoming studies will target the teacher and the student perspectives. Data were collected through semi-structured interviews in order to be able to capture a qualitative understanding of how structural and organisational conditions (a) are constructed as a possibility for facilitating TPD of digital competence and (b) how they shape the possibilities for sustained professional development of teachers' digital competence. These interviews were conducted in June 2017 with educational technologists

($N = 3$) and school leaders ($N = 3$) who were on the steering committee for the upper secondary remote school. A semi-structured interview guide was constructed to guide the talk (Kvale & Brinkmann, 2009) and concerned, in broad terms, three different themes – (a) networked learning, (b) organisational support, and (c) ways of facilitating and organising for TPD. The goal of the interviews was to capture deep and comprehensive discussion related to these themes. The approach used for guiding the talk can be described as inspired by in-depth interviewing (see Johnson, 2001), embracing questions like "tell the story about how you…" and "give examples and discuss possibilities and challenges you have experienced in…". This enabled the respondents to talk freely on the given themes while still providing possibilities for guiding the respondents through the interview. The interviews were conducted via telephone and lasted between 38 and 98 minutes. The main reason for conducting telephone interviews was the busy schedules of the project and school leaders and the fact that telephone interviews made short-term scheduling changes possible (cf. Pettersson, 2015). All interviews were subsequently transcribed.

In order to analyse the data generated from the interviews, we sought a systematic process in order to understand and make meaning of the data. The process followed three step inspired by Kvale and Brinkmann (2009). During the first step, segments and sentences were coded by giving them names and descriptions. During the second step, the codes and descriptions were compared and in different ways related to each other. Related codes were placed into broad categories bearing different meanings. During this step, CHAT and theoretical concepts such as community, division of labour, rules, and tools were used to guide the process. Also during this step, alternative categories from both an empirical and theoretical perspective were elaborated on (Guba, 1978). In the third step, CHAT was used to produce a deeper analytical and theoretical meaning and understanding of the data and the research questions – (1) How are structural and organisational conditions constructed as a possibility for facilitating teachers' professional development of digital competence through networked learning? and (2) How do structural and organisational conditions shape the possibilities for sustained professional development of teachers' digital competence?

Results and Analysis

In this section, aspects on how, and in what way, the school management acts in relation to different elements (*object*, *tools*, *rules*, *community*, and *division of labour*, see Fig. 10.2) of the activity system will be analysed. This includes, for example, how shared learning objects are formulated as well as how actions are taken towards making tools, rules, and aspects of community available and how these structural and organisational conditions might facilitate, support, or even hinder how the networked learning activity for the development of digital competence through TPD is given room to proceed and to sustain itself over time. School managements' responses are coded ET (educational technologists) and

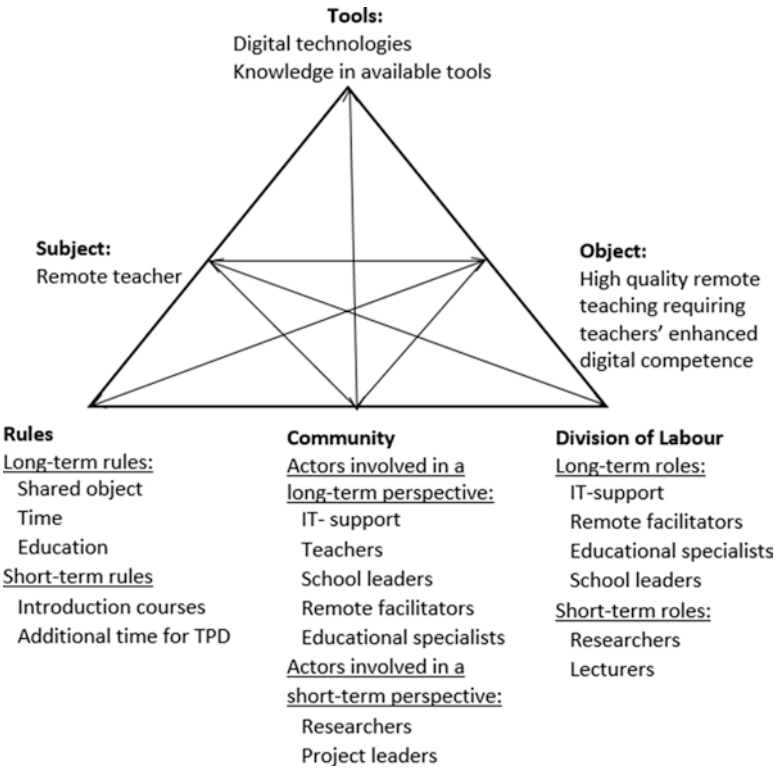

Fig. 10.2 Conditions for TPD of digital competence in a long- and short-term perspective

SL (school leaders). Each sub-section starts with a theory-driven question that will help to make clear the focus in the sub-section and to maintain stringent descriptions of the results that were generated and the analysis that was performed.

Object: The Formation of a New Learning Object

What is the reason for the networked learning activity to take place, and what is the object driving the activity? Through the lens of CHAT, initiating TPD of digital competences in a remote educational context calls for a shared object, formulated by either the subjects in the network activity or by the organisation in which the activity is taking place. When first implementing remote teaching in the upper secondary remote school, the object and structure of TPD and the networked learning were fragmented. The teacher group was given the task of planning and conducting remote teaching activities without having any specific competence or support. The willingness to learn appeared to be rather limited, and teachers struggled in finding ways to collaboratively learn and develop. When discovering this struggle, and the

need for additional knowledge, competence, and support, the school management seemed to agree in supporting the teachers. In doing this, the formulation of shared visions of digitalisation and TPD slowly started to emerge:

> We have had a vision of having all teachers as far as possible into the digital world … a vision of digital development. (SL)

In this case, visions of learning and development were primarily initiated and formulated by the school management. However, for the learning object to progressively take form and to stabilise within the school organisation and in the teacher group, some school leaders described how they needed to find ways to own the object together:

> A leadership that succeeds in reaching out with the message. We [the upper secondary remote school] need to own this message together – that this is actually important for this part of the country and that we are doing a good job, because this is our chance. I think that works quite well to drive the development. (SL)

To develop sustainable learning and development, an important aspect also seemed to be for the learning object to be rooted in and to align with larger organisational and political goals as well as having visions anchored in the overall school culture, which was expressed as (see also the citation above):

> Digitalisation, for example, should be a process taking place over a longer period of time … not only in terms of rather specific and concrete goals because the technology is changing, but also in larger, general goals … it is also something that should be rooted in the entire school organisation. (ET)

> It is of importance to work with the implementation as a process [digital competences, digital technologies, and remote teaching] over a number of years. (SL)

Tools: Designing the "Physical Setting" and Securing Sufficient Resources to Sustain Learning and Development

What tools and resources need to be in place to support subjects in reaching the learning objects of the networked learning activity? When using a shared object, there is a need for some tools to be developed and added to the activity in order for learning and collaboration to proceed.

When implementing networked learning, a central aspect was the selection of relevant digital tools for teachers to use, learn, and collaborate with. Of importance here was to first identify the specific technological and pedagogical needs of the teachers and then to help the teachers to limit the number of digital tools to be used and collaboratively elaborated on:

> We have [over the years] noticed that we cannot burden our teachers with too many technological solutions – they have enough work teaching students. (ET)

> In the school organisation, we had to ask ourselves 'what do we really need?' We couldn't provide support for ten different [digital] systems. (ET)

According to the analysis, limiting the number of digital tools to, for example, the LMS Moodle® and Adobe Connect® facilitated a common ground, making it easier for the teachers to collaborate, learn, discuss, and share ideas. However, adding such tools to the activity created new challenges. The lack of teachers' *basic* digital competences seemed, for example, to cause problems in terms of starting to learn, use, and collaborate:

> It is very important that everyone [the teachers] is gaining basic knowledge in the [digital] programmes. …What I know about a programme sets the limits of what I can do – what is beyond my knowledge and competence does not exist. How can I have a desire to learn and use something that I don't even know exists? (ET)

> There were and still are many teachers feeling that 'I don't understand what I should do with these technologies'. This slows down the process and makes it more difficult to learn. (SL)

This also represents the need for a certain basic digital competence as a prerequisite for teachers to be able to start to elaborate on technologies, to develop their digital competences, and, more specifically, to formulate what they want to do and what they want to learn:

> We [the upper secondary remote school] are trying to help teachers to express their learning needs so that we understand what they want to do: […] 'now I have a computer, I want to do this, how do I do it?' – you need to risk expressing your needs. (ET)

Due to such challenges, basic introductions to digital tools such as the LMS Moodle® and Adobe Connect® were conducted with the aim of "connecting tools and people". Teacher blogs, online learning spaces, and physical learning cafés were also developed and introduced to the teachers so that they would have places to meet, discuss, and share ideas. The school management also initiated and booked formal meetings for teachers to fill with informal content. In these meetings, teachers had the possibilities to, in a more informal setting, share ideas of "best practice" and discuss needs as well as technological and pedagogical challenges related to remote teaching and learning.

Rules: A Balance Between Steering and Hearing

What rules are needed in order to shape and regulate the activity? According to the analysis, some rules or directions were of central importance for providing structure to the networked learning. One such example was the standardisation of digital tools used by the teachers. This standardisation was explained by the school management as a way of steering teachers towards developing a shared language or linguistic to be used in the teachers' teams, that is to make sure that everyone, through communication and collaboration, is talking about the same functions and procedures. The learning was also regulated by the fact that support and introduction courses were

given exclusively on some specific digital tools that were collaboratively decided on beforehand in the network:

> Before, we had many different [digital] systems. So I think that this one contributes with good conditions for development. (SL)

> From the very beginning we [the school management] saw a need to standardise our digital tools. The collegial learning becomes much easier than having teachers using different [digital and non-standardized] systems. … Standardising the development of introduction courses that fit everyone is also a way of helping new teachers to enter the teaching practice more smoothly than the more routinised teachers did a couple of years ago. (ET)

Another aspect related to rules is how the school management used the learning object as a rule to encourage TPD to proceed and to sustain itself. Professional learning and educational change was, for example, communicated by the management as a shared goal in the school organisation, but also as a strong recommendation of something for school staff to strive for:

> It is important that everyone knows why this [remote teaching and TPD] is essential for the school and what is expected from me as an employee … this process is not optional but is an expected development that I am required to be part of. (SL)

Another example of steering the activity was the school management's decision to schedule for both teachers' informal learning and for formal meetings that teachers could fill with informal content. Time and possibilities in the schedule for informal and formal activities seem to have been used intermittently as a way to provide fuel to the learning network during times of low activity. This indicates the importance of regulating the learning network whenever necessary and to be sensitive to teachers' needs. Furthermore, for rules to be aimed at regulating network structures rather than the teachers' learning processes.

Community: Enabling Different Voices

Who is included in the community in which the activity is taking place? The community represents the group of individuals sharing the same object of change and development. A central aspect when initiating networked learning is to consider the community in which the TPD is taking place. One important task for the school management was to include different voices in terms of different professions with different competences that could help drive TPD of digital competence:

> We [the school management] are trying to find as many forces as possible that are moving forward in the same direction. Not making them into formal employments, but trying to find those who can influence the development in a positive direction in both smaller and larger aspects. … If it appears to rely on three or four enthusiasts, it won't be sustainable in a long-term perspective. It is dependent on having as many as possible who know as much as possible and who also understand why we are doing this and what we want to achieve. (SL)

This indicates the importance of providing a structure for networked learning by locating and adding the 'right' actors and competences that are able to contribute. Furthermore, building a community includes introducing teachers and their competences to each other. This seems to have been done through formal meetings (learning cafés, introduction lectures, etc.) where teachers had the opportunity to meet with colleagues and to discuss and elaborate on shared problems in their teaching practices.

Division of Labour: Creating Conditions in the Teacher Team

What tasks need to be done, and who is doing what in the community? According to CHAT, to make a collective networked learning activity flourish, the division of labour between participants might need to be elaborated on or even re-designed in order to facilitate learning and development. There were several challenges related to division of labour over the years. To make learning flourish, the school management has, for example, supported teachers in formulating, adding, and distributing new roles in the network. For example, there have been changes to the division of labour when it comes to certain learning tasks and processes needed for TPD of digital competence. One example is the role of educational technologists, who, besides being responsible for the technological support structure, also aimed to help teachers to develop their technological and pedagogical competences. Another role was played by remote facilitators and educational technologists who supported teachers in determining and formulating shared and emerging learning needs, and who arranged meetings to discuss them as well as supported teachers in both their everyday teaching practices and in their professional development of digital competence:

> The remote facilitators are very skilled in helping with the technology when it struggles. It is very important having them here. (SL)

> By means of introduction and the role of remote facilitators, the teachers have felt safe in their teaching situation relatively quickly. (SL)

> There are also possibilities to book meetings with educational technologists. It is, for example, possible to discuss and elaborate on issues like 'How can we solve this problem? How can we use this tool?'. (ET)

Creating Conditions for Facilitated and Sustained TPD of Digital Competence

The learning network at the studied school had been intermittent for several years and seemed to have included periods of both high and low activity. The school management described how teachers' self-organised collegial learning seldom

appears to be enough for driving the learning and development needed in a longitudinal perspective. Thus, to create conditions for facilitated and sustained TPD of digital competence, the school management had to be sensitive to both when and how the teacher group was in need of external support. In our analysis, it is indicated how the school management needs to work with both short-term and long-term support in order to give fuel to teachers' learning and collaboration. One such example is how the school management elaborated on and negotiated what type of roles and competences that could be added to the learning network – in both a short-term and long-term perspective (see Fig. 10.2). While some roles, such as IT support and educational technologists, seem to be added on a more permanent basis, guest speakers, researchers, etc., are temporarily added to inspire the learning network. Another example is the arrangement of formal meetings for teachers to fill with informal content. This as an opportunity for teachers to (once again) connect and find ways to collaboratively learn and discuss technological and pedagogical issues during times of low activity. Also, rules vary and are put on and off during different periods of time. Long-time rules include, for example, developmental demands (all teachers are required to develop certain digital competences), while short-term rules include introduction courses to new digital tools, additional time for TPD, and so forth.

Other aspects for creating sustainability were the school management's support in transforming the networked learning object as learning needs change. After a number of years of working with TPD and networked learning, it seemed as if the developmental focus was primarily on technological competences in terms of learning the LMS Moodle®, for example, how to upload course materials, and how to use Adobe Connect®. A central challenge noticed by the school management seemed here to be supporting teachers moving towards development of more *pedagogical* digital competences with the possibility of reflecting more deeply on remote teaching and new remote educational designs. Examples of such a result emerging from teachers' pedagogical reflections on remote teaching were new ways of arranging group work and discussions in the remote classroom and new ways to steer questions among students. Another result from the teachers' pedagogical reflections and elaborations was the solution of having all students online, meaning that the teacher could concentrate on one design (online) instead of two (online and traditional classroom). However, as indicated in the analysis, such a transformation of the learning object still seemed to be a challenge:

> We started to identify a need for additional [digital] competences. An inventory that wasn't really there from the beginning. (ET)

This is also an example of trying to sustain learning and development by transforming the object into new and important learning needs.

Discussion and Conclusions

Running a school in a remote area requires the school management to think creatively and to have a willingness to continuously try new ways of TPD (Pettersson, 2018). TPD activities organised by the school management have in this regard been intermittent for a number of years, and many lessons have been learnt. With a certain focus on how TPD of digital competence through networked learning can be organised, facilitated, and sustained, as seen from a school management perspective, we will now shed light on some of these lessons.

As the context and boundaries of learning networks are constantly changing and transforming, it can be hard for school management, to find reusable ideas when organising and facilitating learning networks (Goodyear et al., 2016; Ryberg et al., 2016). However, in this chapter, CHAT served as an analytical tool to unravel the complexity in how learning networks can be organised, facilitated, and sustained as different sociocultural elements shape and regulate the ability to reach the object, in this case, TPD of digital competence. One example that was highlighted in this study was the development of the physical and material setting in terms of selecting specific digital tools for teachers to use, and another example was bringing together and connecting teachers with digital tools and software to help the networked learning develop and proceed (see Conole, 2007). Similar to Goodyear et al. (2016), our analysis also showed how using the same pre-selected tools help teachers to share experiences and also imposes a common ground for learning. Other examples of externally facilitating the network included helping teachers to select roles and competences for the community (educational technologists and remote facilitators), elaborating on the division of labour, and introducing teachers to regulating rules and the object of enhanced digital competence (see also Vrieling et al., 2010, 2016 for self-organised and externally directed learning networks). It appears that helping teachers to discover actors, boundaries, and tools that are important for their learning and collaboration is important in times of low activity. Put differently, this supports teachers knowing what and with whom they can connect when the object is transformed into new learning needs (cf. Chap. 11 by van Amersfoort, Korenhof, Nijland, De Laat & Vermeulen, this volume). However, in a remote teaching context, one role that could further be elaborated on in the community is the role of the remote facilitator. Because remote teaching is a relatively new phenomenon in Swedish schools, the methods and structures for using and taking advantage of remote facilitators have not been developed yet. The remote facilitator, being involved in a variety of remote classroom situations, and facing wide a range of teaching and learning designs, might be used more thoroughly for picking up and spreading ideas and solutions within the school community.

Aspects of importance when organising for networked learning, as indicated in this study, also seem to be related to the networked learning object. For example, the learning object needs to be aligned with greater organisational and political goals, and learning visions need to be anchored in the overall school culture (Pettersson, 2018). In this

study, the object of enhanced digital competence by the teachers seemed to be strengthened by being anchored in broader political and organisational visions of digitalisation and educational change. Informal learning objects emerging within these bigger political objects and strategies was easier for school management to support. However, a challenge for management is to be facilitating teachers to transform the object to include both technological and pedagogical competence, needed when developing new educational teaching and learning designs (Lindberg & Olofsson, 2010; Niemi et al., 2013; Olofsson & Lindberg, 2012). In this study, it is apparent that technological competences will not be enough for students to sufficiently learn and develop in a remote teaching context. Teachers also need to reflect on their pedagogical choices when designing for remote teaching and learning. However, such TPD takes time (Pettersson, 2017), and poses a major challenge for the school management in terms of sustainable professional development in the remote educational context.

To conclude, this chapter asked the questions of how structural and organisational conditions are constructed as a possibility for facilitating teachers' professional development of digital competence and how they shape the possibilities for sustained professional development of teachers' digital competence. Our analysis showed that school management can support and facilitate, but also hinder teachers' learning through efforts to develop and maintain the school organisation. The school management described how teachers' self-organised collegial learning seldom appeared to be enough for driving the learning and development that was needed. Therefore, when organising for TPD of digital competence it is important that school management is sensitive to when and how the learning network is in need of encouragement and external fuel. In other words, for the school management to find a balance between when the network can be self-organised and when it is in need of being externally directed with support from the school management. The analysis also shows how school management together with educational technologists needs to support teachers in elaborating and negotiating on what type of rules, roles, and divisions need to be added to the activity in order for the networked learning to take place and to proceed in both a short-term and long-term perspective. While some roles (educational technologists and IT support) need to be added from a long-term perspective, others ('guest actors' such as researchers) can inspire and give fuel to the learning network on a short-term basis. Therefore, in this study, sustainability could be seen as being a fine balance of moving back and forth between being self-organised and being externally directed both in a short-term and long-term perspective. This does not mean that teachers are hindered from finding their own strategies to collaboratively learn and develop, but rather that the structure and use of the networked learning is facilitated and supported by the school organisation during times of low activity. Moreover, that the school management is supportive in creating a culture of change that can be sustained beyond single TPD actions and activities at the school. Focus for future research could therefore be how school management create conditions for cultures of change. Moreover, how different school management create balance between networks being self-organised and externally directed within the school organisation.

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Chapter 11
Value Creation in Teacher Learning Networks

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Abstract Research shows that teacher professional learning is most effective when it is characterised by active engagement of teachers, a direct connection to their daily practice, and high levels of collaboration. Increasingly, networked professional learning is promoted to enable teachers to make better use of the potential of their social context and improve the quality of their learning. This chapter explores value creation in teacher learning networks and investigates how value creation is affected by contextual factors. The study was conducted in two projects that aimed to promote and facilitate teachers' networked professional learning. The findings showed little difference in teachers' networked learning activity itself, but substantial differences were found in leadership commitment, time, and opportunity for networked learning and voluntary network participation. Overall, the study shows how creating connections between teachers may lead them to redefine their idea of what learning could be like and reframe the value of their peers for learning. Interestingly, the combination of committed leadership and mandatory network involvement appeared to have helped teachers to have positive networked professional learning experiences.

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Introduction

It is widely acknowledged that teacher learning is essential for school improvement and enhancing the quality of learning and teaching (Kyndt, Gijbels, Grosemans, & Donche, 2016; Opfer & Pedder, 2011). Teacher professional learning is most effective when it is characterised by active engagement of teachers, a direct connection to their daily practice, and high levels of collaboration (Opfer & Pedder, 2011; Prenger, Poortman, & Handelzalts, 2017). Teachers' participation in various forms of social learning is linked to an array of positive outcomes, including enhancing teacher professional development, raising student performance, and driving school improvement (Earl & Katz, 2007; Moolenaar, Daly, & Sleegers, 2010).

However, teachers' work is often structured in a way that allows little room for teachers to connect and collaborate (Vaessen, Van der Beemt, & De Laat, 2014). Therefore, there has been a great increase in initiatives that aim to stimulate learning and collaboration through teamwork, teacher networks, and professional learning communities (Chap. 13 by Spante, Johansson, & Jaldemark, this volume; Prenger et al., 2017; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006; Vrieling, Van den Beemt, & De Laat, 2016). Indeed, promoting connections between teachers, facilitating the emergence of teacher learning networks, and creating awareness of the opportunities that social relations have to offer might enable teachers to make better use of the potential of their social context and improve the quality of their learning (Hodgson, 2017; Jackson & Temperley, 2007; Vaessen et al., 2014).

As current policy climates require schools and teachers to continuously demonstrate the outcomes of their actions, it is important to capture the outcomes of social forms of professional learning. However, traditional frameworks are not sufficient for this purpose (Eraut, 2004; Fenwick, 2009). An alternative framework has been proposed by Wenger, Trayner, and De Laat (2011) who suggest that learning in networks and communities can be grasped in terms of value creation. This chapter draws on their model to explore value creation in teacher learning networks and investigates how value creation is affected by contextual factors.

Networked Learning

Research into teachers' networked learning has been greatly influenced by social constructivist and social capital theory (Muijs, West, & Ainscow, 2010). From a social constructivist perspective, people construct their understanding of reality through a continuous process of individual and collective sense-making (Vygotsky, 1981). Our experience of the world and our engagement in it can thus be framed as the constant negotiation of meaning (Wenger, 1998), where knowledge is thought of as 'embodied in actions and interactions with the environment and others' (Muijs et al., 2010, p. 9). Learning, as such, is situated, embedded and maintained in the daily culture of shared and connected practices (Hodgson, De Laat, McConnell, &

Ryberg, 2014; Lave & Wenger, 1991). From a social constructivist perspective, engagement in networked interactions thus contributes to our understanding of the world around us.

Closely related to a social constructivist understanding of learning is social capital theory (Muijs et al., 2010). Nahapiet and Goshal (1998, p. 243) have defined social capital as 'the sum of actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit'. According to these authors, social capital consists of the patterns of social connections between people, the qualities of their relations, and the shared meaning that enables productive interactions between them (Nahapiet & Goshal, 1998). Engaging in networked interactions and strengthening social capital provides access to a rich web of resources, increases the flow of information within that network, and creates opportunities for social action (Muijs et al., 2010; Nahapiet & Goshal, 1998).

Research that draws on social capital theory has shown that an extended and diverse network with both weak and strong relationships is crucial for both personal and professional development (Daly, Moolenaar, Bolivar, & Burke, 2010; Hansen, 1999; Levin & Cross, 2004). Weak relationships are particularly useful for sharing simple, routine information (Hansen, 1999) and gaining access to new knowledge and perspectives (Granovetter, 1973). Conversely, strong relationships have been found to be particularly valuable for sharing tacit or complex knowledge (Hansen, 1999; Reagans & McEvily, 2003). Building on these insights, researchers have shown increasing interest in the role that social relations can play in teacher learning.

In education, there has been particular interest for professional learning communities (PLCs) as a venue for networked professional learning (Prenger et al., 2017; Stoll et al., 2006). Much alike communities of practice (Wenger, 1998), they are bound together by a shared vision and values, and a collective responsibility for the quality of their work (Stoll et al., 2006). Combined with strong mutual relationships, PLCs can be seen as a particular form of close-knit social structures that enable teachers' networked learning (Wenger et al., 2011).

Indeed, research on various networked approaches to teacher learning has shown that a shared purpose, interest, or struggle connects teachers and makes their interactions useful and compelling (e.g.Borg, 2012; Katz & Earl, 2006). Similarly, it has been found that effective PLCs are characterised by active collaboration and participation, creating a space for reflective dialogue, promoting both individual and collective learning, and deprivatising practice (Prenger et al., 2017; Stoll et al., 2006). With regard to the qualities of relations, trust is a crucial factor in using social relations for learning (Katz & Earl, 2006; Prenger et al., 2017; Stoll et al., 2006). For instance, Levin and Cross (2004) found that trust plays an important role in exchanging knowledge in both weak and strong relationships.

Networks facilitate collaboration, but eventually it is through teachers' agency that they actually leverage their relations for learning (Hodgson et al., 2014). Their learning needs, for example, affect how they deal with the pace, the content and the access to a network (Walton, 1999). They may also take up different roles, such as leading particular initiatives, actively participating in collaborative groups and sharing their expertise (Earl & Katz, 2007; Lieberman & Wood, 2002). To optimise

learning, most networks will continuously combine or integrate multiple aspects of social learning and emphasise different aspects at different times (Vrieling et al., 2016; Wenger et al., 2011). Yet, as teachers' agency plays such a central role in networked learning, networks might be prone to a lack of direction and unclarity about the time and resources they require to be effective (Croft, 2015).

Inherently related to teachers' agency are the affordances that are available in their environment (Billett, 2001), and a vast body of research has focused on understanding the conditions that facilitate teacher learning (e.g. Kyndt et al., 2016; Prenger et al., 2017). For instance, research suggests that networked professional learning benefits from supportive leadership (Büchel & Raub, 2002; Earl & Katz, 2007), as well as from time and resources provided by the organisation (Borg, 2012; Lieberman & Wood, 2002). Similarly, research has shown that transformational leadership, which is characterised by vision building, individual consideration, and intellectual stimulation, contributes to a collaborative and innovative school climate (e.g. Moolenaar et al., 2010).

Autonomy within the organisation and voluntary participation have also been reported to be important affordances for teachers' networked professional learning (Borg, 2012; Scribner, Hager, & Warne, 2002). However, Timperley, Wilson, Barrar, and Fung (2007) concluded that active engagement in the learning process was more important for effective learning than the extent to which teachers did so voluntarily. These findings exemplify that much is still unknown about the influence of contextual affordances, such as organisational support and autonomy, on the processes and outcomes of networked professional learning. Accordingly, this study aimed to explore how contextual affordances affected the value created through teachers' engagement in networked learning. The following section describes how the study framed value creation in that context.

Value Creation

People are engaged in the constant negotiation of meaning in order to make sense of their environment. According to Wenger (1998), this negotiation of meaning consists of participation in social practices on the one hand and reification on the other. He describes reification as 'giving form to our experience by producing objects that congeal this experience into "thingness"' (p. 58). To capture the broad spectrum of outcomes that flows from network engagement, Wenger et al. (2011) developed a framework for assessing value creation. Value creation is an iterative process that travels across cycles of immediate, potential, applied, realised, and reframing value (see Table 11.1). Value, in this context, is an attribution made by teachers themselves and their stakeholders.

Several studies (e.g.Bertram, Paquette, Duarte, & Culver, 2014; Cowan & Menchaca, 2014; Pataraia, 2014) have shown that the value creation framework was a useful lens to grasp the outcomes of learning in networks. These studies did, however, consistently find an unequal distribution of value creation amongst the cycles,

Table 11.1 Descriptions of value creation cycles

Value creation cycles	Description
Immediate value	Activities and interactions as having value in and of themselves (p. 19)
Potential value	Activities and interactions can produce knowledge capital, whose value lies in its potential to be realised later, i.e. personal assets; relationships and connections; resources (pp. 19–20)
Applied value	The ways in which practice has changed in the process of leveraging knowledge capital (p. 21)
Realised value	The effect that application of knowledge capital has on the achievement of what matters to stakeholders, including members who apply a new practice (p. 21)
Reframing value	The reconsideration of the learning imperatives and the criteria by which success is defined, as caused by social learning (p. 21)

Adapted from Wenger et al. (2011)

with a decrease from immediate to reframing value. In this study we use the framework to study the value creation that is reflected in teachers' experiences of networked learning. It will be interesting to see how the distribution of value creation amongst cycles is affected by contextual factors and how that distribution compares to the patterns found in previous studies.

This chapter reports on an exploratory study that was the first in a larger research project focused on understanding learning and value creation in teacher networks. The study took place in two primary school districts in the Netherlands, which aimed to facilitate teachers' networked professional learning. The investigation was guided by two main questions:

1. What value creation is reflected in teachers' reports on their networked learning?
2. How does the context affect value creation in teacher learning networks?

Context

The study was conducted in two practice-based collaboration projects (Heron & Reason, 2006) where researchers, school management and teachers worked closely together in local planning groups. Researchers provided background information on networked learning to the local planning group and teacher networks, and facilitated network activity when needed. School management and teachers had full ownership over the projects and network activity, which was also expected to increase sustainability (Ketelaar, 2012). In this collaborative process, a working theory was developed which combined insights from literature on teacher professional learning and networking with practical guidelines for teachers. It encompassed the following guiding principles:

- Networked learning is embedded in daily practice. Networks connect teachers' practices and create opportunities to develop and share solutions to practical challenges and everyday problems.
- In a network, teachers actively leverage their contacts to make use of each other's experiences, knowledge, and viewpoints. Colleagues are a valuable source for learning because they can provide quick, practical and relevant solutions and answers to teachers' questions. As such, participating in a network provides a teacher with an active and approachable network of expertise with whom they can share their passion and that supports their everyday work.
- Teachers shape their own learning experiences and their learning needs are leading: they decide what they want to talk about, with whom, and at what pace.
- Networks are open and dynamic and as a result, new ideas are given a chance. Connecting with colleagues and experts from other schools provides access to new information and perspectives, which can trigger curiosity and reflection and can stimulate exchange and innovation.
- Networks are initially established around a particular practical problem but can become stable learning networks over time.
- Networks can exist within or between schools. Network members decide who participates and whether they are ready to expand beyond the borders of their school.

Method

The two projects each involved a group of schools: the Oak Tree schools ('Oak Tree') and the Riverside Alliance ('Riverside'). We interviewed 13 female and 3 male teachers, 16 in total, which corresponds with the gender distribution amongst Dutch teachers (CAOP, 2017). At Oak Tree, eight teachers were interviewed 14 months after the project's kick-off meeting. As reflected in Fig. 11.1, the collaboration project with the Riverside Alliance came into being at a later point in time than the Oak Tree project, and kicked off 10 months after Oak Tree. Interviews with four Riverside teachers took place 5 months after the project launch, and another four teachers were interviewed after 10 months.

Interviewees ranged from 25 to 55 years old and taught different grade levels, ranging from first to sixth grade. These semi-structured interviews of approximately 1 hour

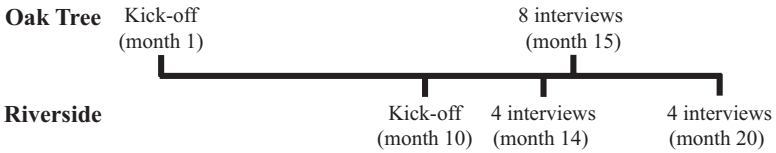

Fig. 11.1 Data collection timeline

covered teachers' definitions, views, and experiences regarding networked learning, supporting and constraining factors, and the value of network involvement.

Data analysis was conducted by a team of four researchers. Coding took place in two distinct rounds: one round was aimed to map the contextual factors that teachers reported to have affected learning in their networks (research question 2), and the other was focused on capturing the value created in teachers' networked learning (research question 1). In the first round, three members of the research team assigned open codes to all relevant statements of ten interviews. Then followed a comparison and combination of these open codes into preliminary categories, a discussion of how the categories fit the data, and a refining of the coding scheme (cf. Miles, Huberman, & Saldaña, 2013). Inter-rater reliability was then established at a Cohen's kappa of 0.70 (cf. Lombard, Snyder-Duch, & Bracken, 2002). The remaining interviews were coded by the principal researcher. For the second round of coding, we used Wenger et al.' (2011) value creation framework to code all interviews for the value creation reported by teachers. While all coding in this round was conducted by the principal researcher, other members of the research team re-read the coded data to ensure the quality of the interpretations. The final phase of the analysis consisted of within- and between-case comparisons at the project level, to gain a deeper insight into how different factors related to value creation (cf. Miles et al., 2013). The interpretations were discussed and verified in the research team.

Findings

In the following sections, both projects are described to understand the contextual factors that might have affected value creation in teachers' networked learning which enabled an answer to the second research question. To paint a more encompassing picture, these descriptions draw on information from operational project evaluations in addition to the interview data. A comparison of the two projects is then provided and followed by a description of the main patterns of teachers' networked learning engagement. Together, these offer a backdrop for understanding the subsequent presentation of the findings on value creation in teacher learning networks.

Project Description: The Oak Tree Schools

The first project was initiated by the headteachers of four primary schools in a small town in the Netherlands: The Oak Tree schools. In collaboration with the university, they wanted to promote teacher professional development through 'between-school' networks. To enhance knowledge sharing and to make network products available for teachers throughout the entire district, a digital SharePoint environment was created. However, only a limited number of networks put something on their page, and

the environment was scarcely used so teachers' networked learning was limited to face-to-face meetings.

The project at Oak Tree kicked off with a 'knowledge marketplace' event, where all teachers from the four schools shared their areas of expertise and the challenges they faced in practice. By the end of that event, teachers had formed initial networks around shared themes. Eventually, all teachers (approximately 50) were involved in at least one of 14 learning networks. Both within and between-school networks had emerged, covering a range of topics such as 'social-emotional development of second grade pupils' and 'ICT in education'.

The Oak Tree headteachers were greatly committed to the networked learning project. Although there was no formal requirement, there was a strong expectation from the headteachers that teachers participated in a network. To encourage and support teachers' engagement in networked learning, the headteachers provided time and space in the form of:

1. Bi-monthly networking days, where all teachers would get together with their networks. Network coaches from the university attended these days to support networks where needed;
2. Meeting-free weeks, aiming to provide flexibility for between-school networks to meet after teaching hours;
3. Teacher cover, which was arranged when networks wanted to meet during school hours.

Teacher cover was hardly used due to a number of practical barriers. In the interviews, teachers noted that the meeting-free weeks were usually taken up by more pressing issues. The networking days, on the other hand, were found to be useful. While acknowledging the value and importance of these networking days, some teachers also expressed a concern about how these days limited the opportunities they had to work on school improvement internally.

> The complicated thing with those networking days is that those days are indispensable for doing things with your own team. –Rose, Oak Tree

Project Description: The Riverside Alliance

The second project involved three primary schools from the Riverside Alliance, a school district in a medium-sized city in the Netherlands and was initiated by the headteacher of one of these schools. The Riverside Alliance aimed to facilitate the emergence of between-school professional learning networks. These networks would primarily meet face-to-face and were free to develop their own goals and ways of working. The district intended to provide an online SharePoint platform for networks to show what they were working on and share their products with all teachers in the district. However, the three schools involved in networked learning were not included in the roll-out of the online platform during the collaboration project.

At the start of the project, two kick-off meetings were organised for teachers from all three schools who wanted to engage in networked learning. The meetings consisted of various activities, such as professional speed dates, that enabled them to make new connections. Apart from these meetings, school management did not allocate time and space for teachers to connect or meet with their networks. Network coaches from the university attended network meetings to provide ongoing support and offered support for teachers who wanted to join or build a network. By the end of the second meeting the first networks had emerged. Eventually, 25 teachers from the three schools had formed six learning networks around topics such as 'teaching first and second grade combination classes' and 'ongoing teaching/learning trajectories in mathematics'.

At the first kick-off meeting, there was confusion and resistance amongst some Riverside teachers about the voluntary nature of the meetings, as they were under the impression that their presence would be recorded. In response, it was explicitly communicated that attending the meetings and participating in a network participation was entirely voluntary. After that initial hiccup, the project started small with only teachers who were highly committed.

The Riverside teachers who had formed networks arranged meetings at their own initiative. Despite their enthusiasm, they did express how hard this could be in the midst of everyday practice. Accordingly, they expressed the wish to have some allocated time for their network engagement, and expected that such explicit support would motivate other teachers to join or form networks as well.

> I think that school management has an important role in that … they can arrange that there is time and space for networked learning. Eventually the network takes over, but they need to be the instigators. –Cynthia, Riverside

Indeed, teachers' comments about the need for time were closely related with how they perceived school management support for networked learning. Only one teacher felt actively supported by her headteacher, whereas others expressed how they experienced a lack of recognition and facilitation for their network engagement.

> It is about acknowledgement … I don't think he recognises how important this is to me, and therefore it's always scheduled as something on the side. –Sophie, Riverside

Project Comparison

The two project descriptions above show how the same concept can take different directions in different contexts. While time and leadership appear to have played a crucial role in both projects, they have done so in different ways. The Oak Tree headteachers were committed to teachers' networked learning, providing them with time and opportunity, while leaving little room to opt out. Conversely, network participation was voluntary in Riverside, but teachers had to find time for it themselves and experienced little support and appreciation from their headteachers. Teachers in both projects expressed that they found it hard to prioritise their network activity over urgent everyday matters, especially when there was no time allocated by school management.

Teachers' Networked Learning

Despite the differences between the projects, there was not much variation between the projects regarding the main patterns of teachers' networked learning engagement. To frame our understanding of value creation in teacher networks, this section briefly describes these main patterns.

In both projects, teachers worked together in small networks that met regularly to answer each other's questions, solve problems and develop tools for practice.

> Learning from and with each other, with others. So not figuring everything out by yourself, but tackling a topic together, and being able to learn from that through experience and exchange. –Hannah, Oak Tree

The frequency and timing of network meetings depended on teachers' needs around the issues they addressed. Teachers brought structure and focus to their meetings by defining main topics to discuss, and different members took responsibility for different tasks. Between meetings, most networks stayed in touch by email to plan for their next meeting or to share resources.

A recurring theme in teachers' descriptions of networked learning was the two-way process in which they learned with and from one another. The need for network participants' commitment to reciprocity was particularly reflected in teachers' comments on the balance between 'give-and-take' within a network.

> There need to be people that I can get things from. It must be give and take, you get some, you bring some. –Katherine, Oak Tree

Teachers especially valued peers with a certain degree of experience and expertise, a reflective attitude and basic communication and problem-solving skills. Teachers had experienced that an open attitude and motivation to learn were essential for anyone who wanted to join a network.

> You have to be open to each other's opinions, and willing to provide advice … You also have to be open to new knowledge and sharing your experiences with others and really using the advice that others give to you […], you have to maintain and invest in your network … and that you keep your eye out for other people who may want to join the network and have the expertise to add value to the network. –Amelia, Riverside

Teachers also found it important to be in a network with teachers from different schools. They especially appreciated connecting with people who brought in different viewpoints and experiences. They found common ground in their mutual practices, such as teaching the same grade level and having a common interest or struggle. *Having a shared frame that was grounded in their practice* provided a purpose and focus to guide their network interactions. Teachers in both projects stressed the importance of trust, safety, and openness in these relationships which encouraged them to share their experiences.

> If there is a good atmosphere, you feel confident to open up to others and to say what's on your mind. It's all connected to some extent. –Olivia, Riverside

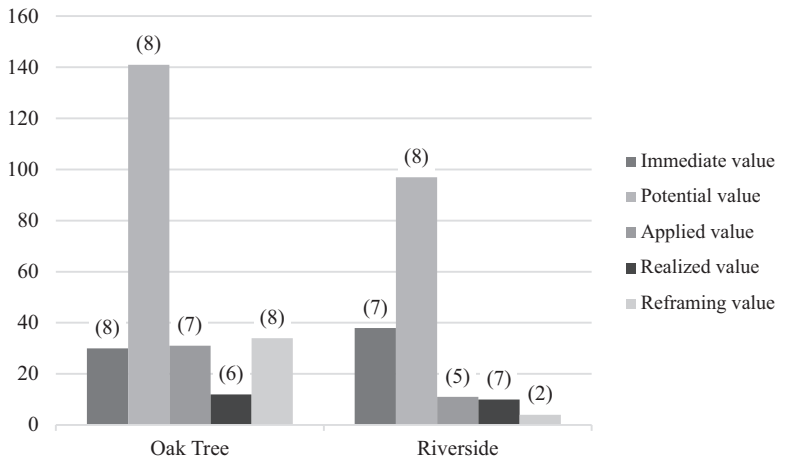

Fig. 11.2 Distribution of comments over value creation cycles by project. The number of teachers who made a comment regarding the cycle is included in brackets

Value Creation in Teachers' Networked Learning

The next section describes the value that was created through teachers' networked learning and enabled answering research question 1. The first thing that stands out in the distribution of teachers' comments (Fig. 11.2) is that teachers in both projects made substantially more references to potential value compared to their comments on the other cycles. When comparing the two projects, no quantitative difference in terms of immediate and realised value was found. Yet, Oak Tree teachers made more references to value creation in the other three cycles.

In the following sections, each cycle is discussed in turn, highlighting the differences between the two projects and noting the aspects of teachers' networked learning that were found to be relevant to the value created.

Immediate Value

In both projects, teachers expressed immediate value in the enjoyment, fulfilment, and enthusiasm when they talked about their networked learning experiences.

> The fun that I just experience by doing it with other people. The conviviality and closeness that you feel then. –Lucy, Oak Tree

The support and feedback from their peers made teachers feel that they were able to cope with the challenges they faced in practice. They enjoyed getting input from others but also found it fulfilling to share and contribute to the network.

> Because if I help a colleague, it feels good, it gives me energy. You should look at networked learning as something positive, for yourself. You give some, you take some. And you get energy from both. –Jack, Riverside

Moreover, teachers' enthusiasm served as a starting point for sharing network outcomes in their schools.

> If you are so enthusiastic, then someone else notices that and gets curious as well, like: 'What's that?' –Grace, Oak Tree

Potential Value

Throughout the interviews, a lot of references to potential value were found when teachers described the networks' contribution to their professional development and the resources they got through their networks. Their networks had provided them with new ideas, inspiration, and insights for improving their practice. It was particularly helpful for them to hear how other teachers did things, to gain access to teaching methods and materials, and to get specific suggestions for classroom activities. When such resources weren't directly available, teachers collaborated to develop their own tools for practice.

Having a network that consisted of teachers from different schools, with different viewpoints and backgrounds, came up as a particularly important source for creating potential value. This diversity provided teachers with new ideas on how they could improve their practice and helped them to reflect on their own practice.

> Another person knows exactly what to point out and says: 'uhm, why are you doing this?' and that makes you think: 'I could also do it another way … Why didn't I see this?' And that is the added value of being in a network with other schools. –Grace, Oak Tree

The expertise and experience that others brought into the network served as an important source for acquiring new knowledge and skills, particularly regarding specific content.

> I've become much more skilled, if I just look at ICT. Through that collaboration with colleagues you get a lot of knowledge and skills from the others. –William, Oak Tree

Teachers also reported that they had strengthened and extended their relationships. While teachers mentioned trust, safety, and openness as prerequisites for meaningful interaction, they also noted that these aspects developed over time and that potential value was created in strengthening their relationships and building friendship with their colleagues. Moreover, they reported extending their personal networks and having a better view of whom they could go to with certain issues.

> I've noticed that I often run into contacts I've made in other networks. So you get to know more people … and you run into those people at other places again and that's often very useful. –Amelia, Riverside

In some instances, teachers shared network outcomes with colleagues within their schools. As reflected in Martin's comment below, teachers believed that the whole school could benefit from their networked learning.

> It contributes to the school that I am operating professionally. So if a colleague has a problem, I can help them immediately … It's some kind of a service-hatch: I get better, and my colleague gets better as well. –Martin, Oak Tree

Applied Value

In contrast to the variety of comments on the potential value that was created, teachers were much more implicit about the applied value that had been created. Teachers talked about applied value when they expressed how they had taken a lot from their networks which they could use in practice. Most of such comments did not get into detail about whether they had actually done so. In some instances, teachers did mention trying things out, adapting their practices, and sharing these experiences within their networks.

> If you see a couple of examples … for me it was like: 'Why am I doing it the way I do? Let's see … What can I do to change that a bit?' … And for the children it is not too bad either when they do or experience different things. –Grace, Oak Tree

Realised Value

Similar to their comments about applied value, teachers gave very few concrete examples of how networked learning had affected their performance. Instead, they anticipated that their network engagement contributed to school performance because their own development and changes in practice had an impact on student learning.

> If my teaching improves and I make those children better, then the whole school benefits. Results get better, children feel better, they function better, and so on. –Rose, Oak Tree

The only examples of realised value teachers gave described how they were saving time as a result of easy access to information and resources, quick feedback from colleagues, useful solutions for practical challenges, and the opportunity to share their workload.

> You can share a part of the work, it doesn't all come down to you […] So you have time to spend on other things. –Emily, Riverside

Reframing Value

In terms of reframing value, our analysis showed that teachers in both projects had reframed the value of the relationships with their colleagues for their professional learning, and had come to realise how valuable it was to be confronted with different perspectives.

> Eventually you find that you can learn a lot from it, because at a certain moment you start looking at things differently. Even though at the beginning you think that you couldn't, later

> on you notice that you do. You start to think about things in a completely different way because you hear opinions that differ from your own. –Helen, Riverside

Having positive network experiences appeared to be an important driver for bringing around such a shift in mindset.

> Once you can make that 'click', like 'I can make use of others and I can provide them with information as well', then I think it can evolve. But that 'click' is very important: knowing you can make use of others. –William, Oak Tree

Other patterns of reframing value were only reflected in the interviews with Oak Tree teachers. For instance, teachers had discovered that professional learning had become more enjoyable and had come to appreciate the importance of an open attitude in learning. While they had noted that an open attitude was required for networked learning, they also believed that it was developed through network engagement. For example, they found it easier and more self-evident to contact other people, open up, and talk about their weaknesses.

> For me it has changed … Before, I felt that I had to do things on my own … but together you get much further, and that, I have definitely noticed. –Martin, Oak Tree

Teachers at Oak Tree observed that norms about sharing and collaboration were changing across their schools. They experienced that it had become common practice to share experiences and materials within and between schools. Interestingly, mandatory participation in the networking days was found to help teachers experience the benefits of networked learning (cf. Chap. 13 by Spante et al., this volume).

> Being forced to join a learning network was a good choice. It did not contribute something because of being forced, but it has been a first step to expand my horizon. –Katherine, Oak Tree

A summary of the different types of value that were reported for each cycle is presented in Table 11.2.

Discussion and Conclusion

This chapter described two projects aimed at facilitating teachers' networked professional learning in order to answer the two main questions:

1. What value creation is reflected in teachers' reports on their networked learning?
2. How does the context affect value creation in teacher learning networks?

With regard to the first research question, reports of value creation across all cycles were found. Teachers shared how they enjoyed learning in their networks and particularly talked about the potential value that was created in a variety of forms. Their references to applied and realised value were often implicit, although they did anticipate that their participation was beneficial for pupils as well. Finally, reframing value was found when teachers talked about how they had redefined their concep-

Table 11.2 Types of value created by project

	Oak Tree	Riverside
Immediate value	Enjoy working together; enthusiasm; nice to share with others; feel safe; reassurance; nice group; enthusiasm spills over to colleagues; easy way of learning	Enjoy working together; enthusiasm; nice to share with others; feel safe; reassurance; nice group; enthusiasm spills over to colleagues; fulfilling to get input from others; enjoyed lesson visits
Potential value	Knowledge; ideas; practical insights; inspiration; skills; reflect on practice; teaching methods; worksheets; lesson plans; new connections; access to resources; knowing where to go; share network resources within school; developed friendships	Knowledge; ideas; practical insights; inspiration; skills; reflect on practice; teaching methods; worksheets; lesson plans; new connections; access to resources; knowing where to go; share network resources within school
Applied value	Improve practice; useful in practice; try out ideas; better execution of activities; used input right away; adapted idea to own practice; feeding experience back to network; improved teaching	Improve practice; useful in practice; try out ideas; better execution of activities; used input right away; developed lessons together; apply useful tip to other subjects
Realised value	Share workload; beneficial to pupils; observing impact on pupils	Share workload; beneficial to pupils; observing impact on pupils; saving resources
Reframing value	New appreciation for and ease in reaching out to peers; developed an open attitude towards learning; changing norms about collaboration; mandatory involvement helped in reframing ideas about own learning; realised advantages of engaging with new perspectives; rediscovered own joy in learning	New appreciation for and ease in reaching out to peers

tion of learning, reframed the value of their peers, and how norms of sharing and collaboration were sharing across schools.

The patterns of value creation in this study, with a strong emphasis on potential and immediate value, confirm those found in other studies (e.g.Bertram et al., 2014; Cowan & Menchaca, 2014; Pataraia, 2014). Although there is no proposed hierarchy in the cycles (Wenger et al., 2011), it is likely that they do come with increased time and effort. Having a good meeting may come easier than, for example, an increase in student outcomes. Nevertheless, it is interesting that teachers came up with little concrete examples of realised value, and regarded it self-evident that their students benefited from their network involvement. Particularly in an age of increasing accountability pressures, awareness of such outcomes might be crucial. Moreover, Wenger et al. (2011, p. 21) assert that it is 'important not to simply assume that improved performance is the case when people change their practice, but to reflect on what effects the application of knowledge capital is having on the achievement of what matters to stakeholders'. In this book (Chap. 12), Vrieling-Teunter, Wopereis,

Van den Beemt, De Laat, and Brand-Gruwel suggest that such reflection places value creation within a long-term perspective and facilitates knowledge creation. For teachers and networks, thinking about realised value could fuel reflection and discussion on how they want their network engagement to impact on their pupils.

For the second research question, the contextual factors and value creation in both projects were compared. This comparison showed little difference in teachers' networked learning activity itself, but substantial differences were found in leadership commitment, time and opportunity for networked learning and voluntary network participation. While these three factors have been found to be important facilitators of networked professional learning (e.g. Büchel & Raub, 2002; Earl & Katz, 2007; Lieberman & Wood, 2002; Scribner et al., 2002), network participation was mandatory at the Oak Tree schools, and both supportive leadership and time support were missing at the Riverside Alliance. With regard to value creation in both contexts, the findings of the study indicate that Oak Tree teachers made more references in terms of potential, applied, and reframing value. Furthermore, they were most articulate about redefining their conception of learning and reported that norms of sharing and collaborating were changing within their schools. Interestingly, some teachers at Oak Tree explicitly stated that mandatory participation had helped them to appreciate the benefits of networked learning (Chap. 13 by Spante et al., this volume).

This finding is in contrast to previous research that stresses autonomy and voluntary network involvement (Scribner et al., 2002). It is in line with Timperley et al.' (2007) conclusion that it is more important for teachers to actively engage in the learning process at some point than it is for them to do so voluntarily. In their synthesis of literature on teacher learning, they also noted that 'the content and form of the professional learning opportunities were more important than volunteering in achieving teacher "buy-in"' (p. 104). In the current study, the fact that networks organised their own learning and emerged around self-chosen themes may have supported teacher 'buy in'. At Oak Tree, supportive leadership appears to have worked together with mandatory network involvement in exposing teachers to situations they would normally not engage in. The time reserved for network meetings may also have helped them to overcome their struggle in prioritising their own learning in the midst of everyday practice. As Pettersson and Olofsson argue in Chap. 10, it may be crucial to find the right balance between self-organisation on the one hand and external support on the other.

In interpreting the findings presented in this chapter, it is important to consider some limitations to this study. Firstly, the findings of the study should be viewed within their particular context, as data were collected from a limited number of teachers in a small number of primary schools who initiated a practice-based collaboration project with the university. Secondly, the value creation framework (Wenger et al., 2011) was only used for data analysis and not for data collection. While this might have decreased the likelihood of socially desirable answers regarding the value created in their networks, it might also mean that not all value creation has been tapped into during the interviews. Differences in the timing of the interviews between the projects might also have affected our findings, as it might be argued that value creation accumulates over time. Therefore, the qualitative effects

of time on value creation would have to be explored in future research. While the value creation framework has already been useful in our analysis, more work is still needed to elaborate both the cycles and the interrelations between them.

Further research is also needed to gain a better understanding of the circumstances under which mandatory network involvement may or may not contribute to value creation. The findings of the study already suggest that initiatives that aim to stimulate networked professional learning could benefit from proactive organisational support. Especially in education, where the structure of the work leaves little room for teachers to connect and collaborate (Vaessen et al., 2014), affordances may be needed to help teachers to prioritise their network engagement over urgent, everyday issues.

Overall, the findings of the study show how creating connections between teachers may lead them to redefine their idea of what learning could be like and reframe the value of their peers for learning. Teachers valued the joy and support they experienced in their networks and appreciated the richness of ideas and experiences they had encountered because of the diversity in their networks. At the Oak Tree schools, teachers even observed that norms about collaboration and learning were changing. In their accounts of reframing value, teachers repeatedly referred to the importance of positive network experiences. Interestingly, the combination of committed leadership and mandatory network involvement appeared to have helped teachers to actually have these positive network experiences. As such, actively enabling and encouraging teachers to experience both the support and richness of networked professional learning may be key for them to reframe their views on learning and the value of their peers.

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Chapter 12
Analysing Social Learning of Teacher-Learning Groups That Aim at Knowledge Creation

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Abstract Teacher-learning groups (TLGs) are an emerging type of collegial collaboration in teacher training colleges. A TLG of teacher educators that was studied aimed to develop a new curriculum for aspirant primary school teachers. This TLG created a sustainable knowledge base necessary to implement a new teacher training curriculum. An extended version of the *Dimensions of Social Learning Framework* (Vrieling et al., Teach Teac Theory Pract 22:273–92, 2016) was used to reveal indicators for sustainable knowledge creation. The adapted framework – in this chapter abbreviated as DSL-E Framework (E, extended) – was informed by the *Social Capital Model* (Ehlen, Co-creation of innovation: Investment with and in social capital (Doctoral dissertation). Open University of the Netherlands, Heerlen, The Netherlands, 2014) and the *Value Creation Framework* (Wenger et al., Promoting and assessing value creation in communities and networks: a conceptual framework. Open University of the Netherlands, Heerlen, The Netherlands, 2011). The usefulness of this adaptation for analysing sustainable knowledge creation was explored with a case study. Results show that the DSL-E Framework is helpful to

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identify indicators for sustainable knowledge creation. First, the use of the DSL-E Framework revealed the collective knowledge working identity as indicator. A gradual development of distributed leadership as well as an inquiry-based attitude appeared necessary ingredients in this matter. Second, institutional value creation was found an important indicator for sustainable knowledge creation. This indicator says that TLGs should involve all stakeholders when starting a joint enterprise and connect actions to institutional goals right from the start.

Introduction

Research shows a growing interest in social learning in teacher-learning groups (TLGs) to stimulate teacher professional development (Boud & Hager, 2012; Hargreaves & Fullan, 2012; Vrieling, Van den Beemt, & De Laat, 2016). Doppenberg, Bakx, and Den Brok (2012) define social learning within a teacher-learning context as 'undertaking (a series of) learning activities by teachers in collaboration with colleagues, resulting in a change in cognition and/or behaviour at the individual and/or group level' (p. 548–549). This definition strongly relates to Wenger, Trayner, and De Laat's (2011) view on social learning that features collaborative knowledge construction through dialogue and social interaction.

In contemporary education, teachers are often expected to anticipate on educational change, preferably with colleagues (Hargreaves et al., 2013). However, traditionally most teachers carry out their work individually, in their own classroom setting (Doppenberg et al., 2012). This isolated position can harm teachers' continuous professional learning and development (Lieberman & Pointer Mace, 2010). In response to this situation, educational managers and researchers regard TLGs as a solution for facing change and solving problems too complex to be solved individually. The purpose of such groups is to increase teachers' learning opportunities, because social learning enhances learning beyond the classroom walls (see also Chap. 9, Jaldemark, Håkansson Lindqvist, & Mozelius, this volume; Chap. 10, Pettersson & Olofsson, this volume; Chap. 11, Van Amersfoort, Korenhof, Nijland, De Laat, & Vermeulen, this volume; Chap. 13, Spante, Johansson, & Jaldemark, this volume; Vrieling, Bastiaens, & Stijnen, 2012). It is argued that a possible tension between individual learning and group- or school-benefits, and growing attention in educational practice for sustainable knowledge creation, posits a need to include these aspects in research on social learning.

Facilitation of Teacher-Learning Groups: The DSL Framework

The traditional individual working mode of most teachers impedes the implementation of social learning in TLGs (Doppenberg et al., 2012; Vangrieken, Dochy, Raes, & Kyndt, 2014). For TLGs to function properly, it is crucial that educational institutions breach the prevailing 'individual way of working', and promote social learning so that professional development on both individual and group level can be induced

(Büchel & Raub, 2002). Social learning in TLGs can be explored with Vrieling et al.'s (2016) Dimensions of Social Learning Framework (DSL Framework). The dimensions of this framework constitute the social configuration (i.e., patterns of behaviour, group constellation, and thinking) of TLGs, and the framework itself can be used as a monitoring instrument to stimulate awareness of the importance of social learning for knowledge creation.

Research on teacher professional learning uses words such as 'teacher teams' (Knapp, 2010), 'teacher communities' (Little, 2003), or 'teacher networks' (Lieberman, 2000) to refer to social learning activities among teachers. These references suggest stable characteristics of TLGs. However, groups of learners are dynamic, and their structure changes over time depending on the needs of the participants. In some occasions, TLGs show aspects of communities, for instance in activities that support mutual engagement in learning, while, in activities focused on a common goal, the term networks or teams applies better (Mazereeuw, Wopereis, & McKenney, 2016; Vrieling et al., 2016). Therefore, the DSL Framework contains aspects of team, community, and network perspectives to help to view the group's activities from an overarching social learning perspective. The framework identifies social learning processes in TLGs on commonalities ('dimensions', see Table 12.1, column 1) and associated characteristics ('indicators', see Table 12.1, column 2).

The DSL Framework includes four dimensions, each consisting of two to four indicators. These indicators help to identify and describe individual and group attitudes and behaviour. The dimensions and according indicators serve as a lens through which the current social configuration of TLGs can be observed. Moreover, based on this analysis, the group can reflect on how the social configuration fits their learning goals and/or adjust their configuration accordingly to improve their learning. Below, the framework is briefly outlined (see the first two columns of Table 12.1). For a full discussion see Vrieling et al. (2016).

The first dimension, *practice*, encompasses the need for a relationship between the knowledge created and shared in the group and teachers' day-to-day activities. This dimension consists of two indicators: (1a) *integrated or non-integrated activities*, representing the extent to which group knowledge and activities are integrated in practice, and (1b) *temporary or permanent activities*, which describe the social learning attitude as reflected in the duration or sustainability of learning activities.

Domain and value creation, the second dimension, is defined as the sharing of experience and expertise among group members. Indicators are as follows: (2a) *Sharing or broadening/deepening knowledge and skills*, reflecting the extent to which the group develops collective knowledge and skills through dialogue, and (2b) *individual or collective value creation*, which describes the level to which the group develops shared value such as group ownership, mutual inspiration, or positive interdependence.

When group members work interdependently with a shared purpose and responsibility for collective success, the group can develop a *collective identity*. This third dimension can be characterised by (3a) *shared or unshared identity*, which is related to group history and social and cultural background; (3b) *strong or weak ties*, which reflect the sense and intensity of general contact among group members; and (3c)

Table 12.1 Social learning dimensions, indicators, original interview questions, and extended perspectives

Dimension	Indicator	Example interview questions	Extended framework
1. Practice	1a. Integrated or non-integrated activities	In what way are the experiences in practice communicated within the group?	
	1b. Temporarily or permanent activities	In what way are the group activities connected?	Perspective of value creation: (1) What are the group's goals based upon? (Strategic Value); (2) Which factors were conducive or obstructive to achieve the goals? (Enabling Value)
2. Domain and value creation	2a. Sharing or broadening/ deepening knowledge and skills	In what way is improvement of the group work visible after the group activities?	Perspective of value creation: (1) How did you experience the group's activities? (Immediate Value); (2) Which gains did the group's activities bring you? (Potential Value); (3) What difference has it made to your practice? (Applied Value); (4) What difference has it made to your personal, students', and school's achievements? (Realised Value); (5) What difference has it made to your understanding and definition of what matters? (Reframed Value); (6) What difference have the group's activities made to your board's achievements? (Strategic Value)
	2b. Individual or collective value creation	In what way reflects the agenda of the meetings the group's goals?	
3. Collective identity	3a. Shared or unshared identity	Which feelings characterise the members' belongingness to the group?	
	3b. Weak or strong ties	Which group members are closely connected?	
	3c. Task executors or knowledge workers	In what way results the group's discussion into future ideas?	Perspective of innovation: (1) In what way is innovation achieved in your group? (2) Can you provide examples of moments when you have learned something new? (3) Which factors were conducive or obstructive for learning in this matter?

(continued)

Table 12.1 (continued)

Dimension	Indicator	Example interview questions	Extended framework
4. Organisation	4a. Directed or self-organised activities	In what way are the group activities organised?	
	4b. Local or global activities	What issues are discussed in the group?	
	4c. Hierarchic or equal relationships	In what way are the relationships between the group members characterised?	
	4d. Shared or non-shared interactional norms	In what way is agreement achieved about the procedure to develop upon the group's goals?	

the extent to which group members perceive each other as *task executors or knowledge workers*, which characterises the degree of group participants working on their tasks but also sharing knowledge within their group in the form of new rules, routines, strategies, best practices, and implementation.

The final dimension, *organisation*, represents how the group is organised. Teacher group organisation can be indicated by (4a) the extent to which the group shows *externally directed or self-organised learning*; (4b) the focus on *local or global activities*; (4c) the presence of *hierarchic or equal relationships*; and (4d) the extent to which the group shows a shared interactional repertoire, reflected in *shared or non-shared interactional norms*.

Facilitating Sustainable Knowledge Creation in Teacher-Learning Groups

TLGs are increasingly required to develop products, output, and gains and benefits, monitored through superiors, boards, or school inspectors that value the quality of the products (Ehlen, 2014). Besides this control for performance requirements (Vaessen, Van den Beemt, & De Laat, 2014), some organisations also aim for TLGs to develop a long-term perspective with a focus on continuous and sustainable development and innovation (Ehlen, Van der Klink, Roentgen, Curfs, & Boshuizen, 2014). In terms of 'structural or organisational embeddedness', Agterberg, Van den Hooff, Huysman, and Soekijad (2009) refer to the extent to which group knowledge is integrated into, and relevant to, organisations of which the groups are part. Groups

such as knowledge-creating TLGs that aim to create sustainable knowledge not only work on their tasks but also share knowledge within their group in the form of new rules, routines, strategies, or best practices (Vrieling et al., 2016).

Earlier findings (De Laat, Vrieling, & Van den Beemt, 2017) suggest that the DSL Framework suits the analysis of TLGs' processes and development. However, the DSL Framework could be adapted to shift attention to a possible tension between benefits for the individual learner and for the group, together with sustainable knowledge creation. Only one indicator, 'the extent to which group members perceive each other as task executors or knowledge workers' (see Table 12.1, column 2, indicator 3c), explicitly addresses sustainable knowledge creation of TLGs. Therefore, similar to the work of Pettersson and Olofsson (see Chap. 10 in this volume), this study searches for additional perspectives to enrich the original framework with the purpose to broaden the sustainable knowledge-creation perspective of TLGs. Sustainability in this context resembles the social learning attitude as reflected in the duration or sustainability of learning activities (Vrieling et al., 2016). When TLGs are proactively discussing work-related topics to broaden or deepen their knowledge and skills in cooperation with people who share the same questions or challenges, temporarily learning activities can develop towards a more permanent social learning attitude. Columns 3 and 4 in Table 12.1 show the extensions to the original framework, which will be discussed in detail below. These follow-up perspectives are integrated into the interview questions of the DSL Interview Method (Van den Beemt, Vrieling, & De Laat, 2015).

The Social Capital Model

Our effort to bring sustainable knowledge creation of TLGs into focus in the DSL Framework asks for a theory that addresses the factors supporting the transformation of the workplace into a setting for learning and innovation. In many domains, social capital is the key concept to describe sustainable knowledge creation (Ehlen et al., 2014). Social capital represents 'the network of social relations, based on shared norms and goals, trust and good atmosphere, by which materials and knowledge resources become available that are useful for the actions of the members of the network' (Ehlen, 2014, p. 89). More specific, Ehlen's model is of interest for our study because it focuses on relations between organisational innovation, knowledge productivity, and social capital in the domain of professional education. The Social Capital Model of Ehlen (2014) distinguishes four (i.e., action, cognitive, relational, and structural) dimensions of social capital that influence knowledge productivity, each requiring a minimum quality to create a rich innovation environment for sustainable results.

Based on the Social Capital Model, supplements were added for dimension 3 (collective identity), indicator 3c (To what extent do the participants view one another as task executors or knowledge workers?). Accordingly, innovation was taken as a follow-up perspective in the DSL Interview Method adding three questions (see Table 12.1, column 4): (1) In what way is innovation achieved in your

group? (2) Can you provide examples of moments when you have learned something new? (3) Which factors were conducive or obstructive for learning in this matter?

The Value Creation Framework

In line with the dimensions and indicators of the DSL Framework, understanding TLGs' processes could be deepened by analysing how TLGs' members describe the value of social learning activities resulting in sustainable knowledge. Creating this value is defined as 'the value of the learning enabled by community involvement and networking' (Wenger et al., 2011, p. 7). Wenger and colleagues' Value Creation Framework (see also, Chap. 11, Van Amersfoort, Korenhof, Nijland, De Laat, & Vermeulen, this volume) might offer a fruitful additional perspective towards the DSL Framework to gain insight into how sustainable knowledge creation in TLGs is valued by its' members.

The Value Creation Framework focuses on the value that (teacher) groups create when they are used for social learning activities. The Value Creation Framework originally distinguishes five cycles of value creation: (a) immediate value (i.e., social learning activities and interactions as having value in and of themselves), (b) potential value (i.e., knowledge capital whose value lies in its potential to be realised later), (c) applied value (i.e., changes in practice), (d) realised value (i.e., performance improvement), and (e) reframing value (i.e., redefining success). With respect to the DSL Framework (see Table 12.1), the value creation perspective matches the second dimension (domain and value creation), indicator 2a (To what extent does the group focus on sharing or broadening/deepening knowledge and skills?). As a result, the following questions were added to the DSL Interview Method (see Table 12.1, column 4): (1) How did you experience the group's activities? (Immediate Value); (2) Which gains did the group's activities bring you? (Potential Value); (3) What difference has it made to your practice? (Applied Value); (4) What difference has it made to your personal, students', and school's achievements? (Realised Value); and (5) What difference has it made to your understanding and definition of what matters? (Reframed Value).

In 2014, Trayner presented a new version of the Value Creation Framework that puts the framework in a broader context by adding two new cycles: (a) strategic value (i.e., the clarity of the strategic context in which the group is operating and the ability of the group to engage in strategic conversations about the value it creates) and (b) enabling value (i.e., the support processes that make the group's life possible).

The value creation insights added supplements to the DSL Framework (see Table 12.1), dimension 2 (domain and value creation), indicator 2a (To what extent does the group focus on sharing or broadening/deepening knowledge and skills?), adding a new value question to the DSL interview guidelines (see Table 12.1, column 4): What difference have the group's activities made to your board's achievements? (Strategic Value). Besides dimension 2, the value creation perspective was also taken as a follow-up perspective in the DSL Interview Method with regard to

dimension 1 (practice), indicator 1b (To what extent does the group exhibit temporary or permanent social activities?). The following questions were added towards the group's goals questions: (1) What are the group's goals based upon? (Strategic Value) and (2) Which factors were conducive or obstructive to achieve the goals? (Enabling Value).

Problem Definition

The study explores whether it is useful to integrate the social capital and value creation perspectives into the DSL Framework to get a grip on indicators for knowledge-creating TLGs. This brings us to the following research question: Which indicators for sustainable knowledge creation in TLGs are brought into view by using the extended version of the DSL Framework (abbreviated as DSL-E Framework; E, extended)? First, methodological issues of the study are described in the method section. Second, the DSL-E Framework is tested in a TLG with a focus on sustainable knowledge creation for curriculum development (the findings section). Finally, the conclusion and discussion section discusses our findings and elaborates upon recommendations for future research.

Method

Setting and Participants

Gaining insight into social learning activities needs a qualitative research design that is exploratory in nature (Creswell, 2007). Therefore, an in-depth case study was conducted in a teacher training college for primary education in the Netherlands. This college is a small institution that educates approximately 400 students a year. Most students enter its program after graduating from the middle level of general secondary education and the highest level of secondary vocational education.

The college's TLG 'Curriculum Development' was studied which included senior teacher educators (n = 3), junior teacher educators (n = 2), and a manager. Three out of the six group members were female. All participants had indicated their interest in joining the group in arranged meetings before the research period where they could express their ideas about the new curriculum. The group was tasked with starting up developing a new educational curriculum. The group aimed at structuring the curriculum ideas into design principles representing the different perspectives of the organisation, but also putting these ideas into practise in the form of a first small pilot with aspirant primary school teachers. The meetings of the group were planned every four to 6 weeks during one academic year (September until June) with a total amount of seven meetings (see Table 12.2). Every meeting lasted 90 minutes.

Table 12.2 Data collection

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
Interviews					x					x
Meetings (audio)	x		x		x		x	x	x	x
Debriefings					x					x

Instruments

The DSL Interview Method (Van den Beemt et al., 2015) was used to structure the interviews. This method follows a biographical approach (Bornat, 2008) to let participants rethink the group's social processes from the start towards the present. Table 12.1, column 3, presents examples of questions for each indicator within the dimensions of the DSL Framework.

Data Collection

Data were collected with semi-structured interviews, audio recordings of TLG meetings, and audio recordings of peer debriefings (see Table 12.2). The interviews followed the DSL Interview Method that took approximately 1 hour per interview. Its guidelines were used for two cycles of in-depth retrospective semi-structured interviews conducted in January (first cycle, 6 interviews) and June (second cycle, 5 interviews). Each interview was audio recorded and transcribed. In addition to the interviews, audio recordings of the seven group meetings were collected.

Besides the semi-structured interviews and the audio recordings of TLG meetings, an interim (face to face) and final (digital) peer debriefing were organised. These involved presentations and discussions of the results with TLG participants. For the interim debriefing, conducive and obstructing factors for sustainable knowledge creation were deduced from the data to give the TLG members feedback. For the final debriefing, the recommendations from the interim debriefing were compared with the final debriefing situation to demonstrate the professional growth. In this way, the group's social configuration development was analysed. The questions concerned the conducive and obstructive factors that respondents considered most important, the changes as observed, respondents' expectations and wishes, the factors that influenced the group's development, the necessary follow-up steps, and the enabling factors to realise future steps. Respondents were also asked what they considered the most valuable personal and group's benefits of the group activities.

Data Analysis

Collected empirical data from the transcribed interviews were analysed during (January) and after (June) the research period. The analysis was guided by the DSL-E Framework that acted as a coding scheme for elaborating the social configuration of TLGs in relation to the group's learning activities. For the analysis, all findings were structured in a matrix containing the four dimensions and the 11 indicators of the DSL-Framework (see Table 12.1, columns 1 and 2) also including the theoretical perspectives to bring sustainable knowledge creation of TLGs into focus into view (see Table 12.1, column 4).

To enhance the internal validity of the results per indicator, two researchers independently analysed the collected interview data with a content analytic summary matrix (Miles, Huberman, & Saldaña, 2014). In addition, the two researchers reciprocally checked the matrix and discussed similarities and differences in their views. Finally, one of the researchers analysed the audio recordings from the group meetings including the peer debriefings, triangulating for added information towards the matrix. This process resulted in a matrix holding the final data for analysis as well as codes and themes related directly to the DSL-E Framework.

Findings

In answer to our research question, the findings of the case study are elaborated to test the usefulness of the DSL-E Framework for bringing indicators for knowledge creation into view. Grounded on the analysis, two important indicators for TLGs' knowledge creation are presented: (a) collective knowledge working identity and (b) institutional value creation. For both indicators, the synthesised findings are described including fragments from the data that illustrate the findings.

Collective Knowledge Working Identity

In the TLG, it was common to develop collective knowledge and skills through dialogue that included giving and accepting feedback. In this way, knowledge creation was demonstrated by sharing experience and expertise among group members: 'after introducing a theme, it is discussed from diverse perspectives'. The shared interest developed into a basis for a deep level similarity among group members despite their diversity in voices or language. The group members performed collaborative research towards a collective goal (i.e., shared agenda) and consequently generated shared knowledge.

In our TLG, four phases were distinguished (see also Katz & Earl, 2010). The first phase, 'Storytelling and scanning for ideas', was illustrated while participants gained information by exchanging stories in search for specific ideas. Phase two,

'Aids and assistance', occurred in the form of mutual assistance and feedback when group members asked for help. The final two phases also saw an open exchange of ideas and opinions ('Sharing') as well as a feeling of shared responsibility ('Joint work'). Upon the realisation of a shared agenda, two conditions were shown important: distributed leadership and an inquiry-based attitude. In addition it was found that the increase of group participants' skills towards spread leadership and an inquiry-based attitude needed a gradual development ('scaffolding') to enhance knowledge creation. The important role of the facilitator in this matter is described in Scaffolding section below.

Distributed Leadership

A shared agenda for the TLG was demonstrated through the distribution of the leadership activities across multiple group members. Tasks and roles were divided to actively involve all members and stimulate feelings of responsibility for a proper outcome of the group. In the TLG several positions were present. The manager acted as group coordinator. The manager and the senior teacher educators were providers of inspiration and the junior teacher educators mainly acted as creators by translating the ideas into concrete design principles for the curriculum and trying out those principles. These learning positions are examples of how group members collaborate as knowledge workers, which stands in contrast to groups where members are focused on execution of given tasks (see also Haythornthwaite & De Laat, 2012; Wenger et al., 2011). In this way, in our TLG 'the diversity of roles kept the group in balance'.

Inquiry-Based Attitude

TLGs' products often reflect the first four cycles of value creation (i.e., immediate value, potential value, applied value, and realised value) referring to more direct gains of the group activities. The transfer from a 'working' to a 'learning' attitude asks for a changing group mode. For TLGs to develop a longitudinal knowledge-creation perspective, it is therefore important to pay attention to both the inward and outward dimension of an inquiry-based attitude while working and learning (Meijer, Geijsel, Kuijpers, Boei, & Vrieling, 2016). Regarding the inward dimension, the positioning of critical questions and critical feedback appeared rewarding: 'the group members are critical in a positive manner and show real interest in each other's work. The work is thoroughly read and feedback is provided in detail'. To maintain this positive critical working procedure, the group members reflected their need for clear criteria to make judgements about the quality of the products that were developed. Through thinking and reflecting on actions and listening to the perspectives of others in dialogues, new views were examined to alter old views. These dialogues, often enforced by critical questions (Barak, Gidron, & Turniansky, 2010; Leh, Kouba, & Davis, 2005) resulted in reframing (i.e., reframed value). In this way,

the group integrated their views into a new mental construct that was collectively held: 'working in this group resulted in really different thinking towards an innovative curriculum with a totally new approach'.

Upon the outward knowledge-sourcing dimension, the group performed a collaborative literature search and discussed the findings. As a result, their knowledge about curriculum development increased and they were kept up to date with what was happening in the educational field. The curriculum design as intended was also piloted, and data were collected, analysed, and evaluated in the group meetings.

Scaffolding

Since the effects of learning in TLGs vary depending on self-regulation by the participants (Laferrière, Lamon, & Chan, 2006), group members are required to possess sufficient metacognitive skills or knowledge. This team reflexivity (Knapp, 2010) can be viewed as a combination of collective metacognition and team reflection. Although in the group we followed the three overarching regulating roles (coordinator, creator, and provider of inspiration) were present, and tasks were divided, one of the group members (junior teacher educator) did not perform the tasks as intended resulting in a disappointment for both the group and the group member. This stresses the necessity for facilitators to gradually regulate the group activities amongst group members (Vrieling, Bastiaens, & Stijnen, 2010).

In an optimal learning situation, group facilitators gradually decrease assistance when the participants are able to perform more independently (i.e., scaffolding). To reach for this aim, the necessary regulation skills can be modelled to novices upon four regulatory skill levels as distinguished by Schunk and Zimmerman (2007): (1) observation: learners can induce the major features of the skill from watching a model learn or perform; (2) emulation: the learner imitates performances of a model's skill with social assistance; (3) self-control: the learner independently shows a model's skill under structured conditions; and (4) self-regulation: the learner shows an adaptive use of skills across changing personal and environmental conditions. In the TLG that was observed, the participants decided to work in pairs instead of individually.

Institutional Value Creation

When TLGs aim for institutional value creation, it is important to discuss the question what the group's goals are based upon (i.e., strategic value). In our TLG, the overview of short- and long-term goals was lacking: 'it is not clear how our choices regarding the new curriculum will continue on the longer term: what steps are we going to take?'. Therefore, it was difficult for the group to develop a working plan to achieve the goals. To hold on to the shared agenda, the group members stressed

the importance to explicate the group process ('Where are we now and where are we going?') on several moments. In this matter, the group asked for clear criteria for the in-between and final products.

To reflect upon the group's strategic and enabling value, it appeared crucial to engage all stakeholders from the start: 'our professional vision is shared with fellow teachers face to face. We also wrote newsletters to inform all colleagues. However, not everyone reads a newsletter, so we can use more information canals for a broader dissemination. Overall, innovation develops only if it is experienced by the people who work with it'.

Conclusion and Discussion

This study elaborated on the usefulness of the DSL-E Framework to bring sustainable knowledge-creation indicators of TLGs into view. It was found that the perspectives concerning social capital and value creation deepen our dimension theory towards sustainable knowledge creation of TLGs. However, future research is necessary to search for added models and theories to deepen the framework.

The findings show that the DSL-E Framework (see Table 12.1) helps to reveal knowledge productivity of TLGs by identifying conducive and obstructing indicators. As such, the framework can function as instrument for professional development of knowledge-creating TLGs. The DSL-E Framework provided us with a picture of individual and collective value creation. For the benefit of sustainable knowledge creation for TLGs, this raised the question of how both perspectives (individual and collective) are beneficial in this matter, an interesting focus for future research.

Two indicators of the DSL-E Framework appeared important for sustainable knowledge creation in TLGs: (1) collective knowledge working identity and (2) institutional value creation. Collective knowledge working identity develops when TLGs aim for shared knowledge, using a shared agenda. In such group settings, distributed leadership appears an attractive concept to enhance professional development. Based on the expertise of the participants, all members can contribute to problems and challenges concerning school improvement and fulfil diverse positions within groups. A second condition for collective knowledge working identity is the development of an inquiry-based attitude. In line with the findings of Meijer et al. (2016) both the internal and external dimension of an inquiry-based attitude were proven important in this matter. For the internal dimension, a reflective learning environment is needed where providing feedback based on previously formulated criteria and asking positively formulated critical questions is a regular behaviour. In these circumstances, group participants will 'step out of their comfort zone to jump into something new' (i.e., transformative value).

Regarding the external dimension of an inquiry-based attitude, knowledge sourcing appeared an important skill for sustainable knowledge creation in TLGs. Through developing research skills, a strong inward focus for knowledge creation

can be enhanced. In addition, knowledge sourcing also expects an external view of the group because 'weak ties' (Granovetter, 1973) are necessary for an innovative focus of the group. In follow-up research, it is our aim to study multiple TLGs that learn to perform educational design research as a catalyst for professional development.

To enhance distributed leadership and an inquiry-based attitude for sustainable knowledge creation in TLGs, facilitators must give opportunities for novices to gradually move towards a full member of the group (i.e., scaffolding). These skills can be modelled by using the four phases of Schunk and Zimmerman (2007): observation, emulation, self-control, and self-regulation.

The second indicator of the DSL-E Framework that appeared important for TLGs' knowledge development concerns institutional value creation because it puts the learning environment of TLGs in a long-term perspective. It stresses the importance for TLGs to interact with stakeholders and connect with the institutional goals from the beginning of the joint adventure to ensure embeddedness and change on the organisational level. Pettersson and Olofsson (see Chap. 10, this volume) also emphasise the importance to align the learning object with organisational goals and visions to be anchored in the overall school culture. Although the role of the 'strategic communicator' was present in our group, the adaption process appeared difficult. Therefore, how to facilitate the transition from knowledge creation towards adaption on several levels is interesting to analyse in future research.

One limitation of the study concerns the short period (1 year) in which the group was studied. This is a rather short period to analyse sustainable knowledge creation in TLGs. Second, only one TLG in one teacher education college was studied. Therefore, future research should investigate sustainable knowledge creation of multiple TLGs in different settings over a longer period and 'test' the proposed DSL-E Framework.

To conclude, the present study yielded fruitful perspectives to extend the original DSL Framework (Vrieling et al., 2016) towards the analysis of sustainable knowledge creation in TLGs. In this way, more insight is provided in the relationship between theories of DSL, social capital, and value creation for the benefit of facilitating TLGs. For knowledge-creating TLGs, it is recommended to give attention to collective knowledge working identity as well as institutional value creation. For this matter, the DSL-E Framework can be applied to bring the groups' social configuration into view.

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Chapter 13
MakerSpaces in Schools: Networked Learning Among Teachers to Support Curriculum-Driven Pupil Learning in Programming

Maria Spante, Kristina Johansson, and Jimmy Jaldemark

Abstract In recent years, many countries have introduced programming as content in their national educational strategies. This study focussed on how teachers from various K-6 schools met regularly in learning groups to discuss their experiences integrating programming in MakerSpace settings, places equipped with various materials that can be used to construct things to enhance creativity and cross-disciplinary collaboration. The project focussed on studying the activities in an established network in a Swedish municipality (i.e. how teachers experienced the value of network meetings and how they incorporated lessons learned from other participants in the teacher learning group [TLG]). The study addressed the following research question: What are the learning experiences of teachers in K-6 schools that participate in a top-down networked professional development project that focusses on integrating computer programming into the curriculum? A narrative written method was applied to collect data from seven teachers in the network. The results indicated that teachers found it useful to participate in a top-down networked professional development project. They experienced that participating in the TLG helped them develop their professional attitudes, knowledge and practices.

Introduction: Programming as a Practice in School

In Sweden, computer programming has recently been incorporated into the national curriculum, and there has been a lively discussion about its implementation (Jonasson, 2013). Specifically, teachers and school administrators have raised concerns about teachers' competence in teaching programming skills. This new

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prerequisite in the practice of teaching changes the conditions in which teachers work. Therefore, initiatives to develop professional knowledge about teaching computer programming are needed. Nevertheless, introducing programming into the curriculum is not a separate phenomenon for Sweden. Rather, this Swedish initiative is part of an international trend including many countries embracing the idea of programming, coding and computational thinking as important to enhance the capacity to design systems, solve problems and understand human behaviour (Balanskat & Engelhardt, 2015). This trend relates to national and international policy building activities aimed at working life and social change (e.g.Hatlevik, 2017; Hazar, 2018; Spiteri & Chang Rundgren, 2017). In other words, these ideas and capacities are politically emphasised in an era that focusses on developing digital competence among the citizens as an advantage in global competition. To obtain these advantages, teaching programming as a part of digital competence is considered important.

The strengthened emphasis on programming in schools relates to recent decades of development in the field of information and communication technology (Ferrari, 2012). Besides leading to a stronger emphasis on digital competence and programming skills, this development has also lead to a wide dissemination of networked technologies, including applications, mobile devices and wireless networks. This development has had a wide impact on participation in modern working life, resulting in increased integration of networked technologies in the performance of many tasks. Consequently, the professional development of teachers, supported by networked technologies, has emerged.

An approach linked to the emergence of networked technologies and professional development of teachers is networked learning (Jones, 2015). Such an approach in professional development embraces the opportunities to build on the relationships between people, networked technologies and content-related resources. Networked learning is defined as 'learning in which information and communication technologies are used to promote connections between one learner and other learners, between learners and tutors, and between a learning community and its learning resources' (Goodyear, Banks, Hodgson, & McConnell, 2004, p. 1). The emphasis is on connections that could be enhanced by social or technological networks. Nevertheless, scholars in the field have placed various amounts of emphasis on these two kinds of networks. Whatever is in focus, digital technologies and human mediation are at the core of the theory of networked learning (Carvalho, Goodyear, & de Laat, 2017; Goodyear et al., 2004; Jones, 2015; Ryberg, Sinclair, Bayne, & de Laat, 2016).

This chapter focusses on networked professional development of teachers from a Swedish municipality. In the project, a TLG consisting of K-6 school teachers participated in a top-down initiative. The content was focussed on programming and employed a MakerSpace approach. In this setting, the municipality systematically arranged network meetings for the teachers. The project was focussed on studying the activities in the established network, i.e. how teachers experienced the value of network meetings and how they incorporated lessons learned from other participants in the TLG. This chapter addresses the following research question:

What are the learning experiences of teachers in K-6 schools that participate in a top-down networked professional development project that focusses on integrating computer programming into the curriculum?

An introduction of the idea of participating in a MakerSpace setting and its relationship to formal education follows. Second, the theoretical framework for learning unfolds in a professional setting. The third section introduces the reader to methodological aspects such as the case studies, data collection, sampling methods and data analysis. Then, the result section discusses the teachers' experiences of the networked learning approach. Finally, the discussion includes some lessons learned and concluding remarks.

MakerSpaces as a Creative Arena for Learning How to Integrate Programming in Schools

A MakerSpace is a place equipped with various materials that can be used to construct things normally linked to engineering and incorporate coding into the construction of artefacts (Hynes & Hynes, 2014; Sullivan, 2015; Yockey & Donovan, 2015). MakerSpaces have been inspired by the maker movement, which aims to facilitate and support the human passion to create things (Kurti, Kurti, & Fleming, 2014). Formal MakerSpaces have been found mainly in higher education but also increasingly in libraries, enabling pupils to experience new technologies and learn how to programme with the aim of creating and making their creations behave in specific ways.

The argument for MakerSpaces often centres on the ambition to develop a creativity-driven learning practice (El-Zanafly, 2015). This creative and subject-integrated way of working in schools using physical and digital materials—digital material refers to programming when creating digital processes using data logic—has been highlighted as an important way of thinking for pupils (Chu, Quek, Bhangaonkar, & Boettcher Ging, 2015) and adults (Christensen, Hjorth, Iversen, & Blikstein, 2016). In particular, the creative aspects of learning by creating and constructing with the support of the physical materials and digital resources available to pupils at a physical location are addressed in previous research (Brown, 2015; Kurti et al., 2014; Smay & Walker, 2015). MakerSpaces can also function as places for independent and self-directed studies aimed at stimulating innovation, especially in engineering education (Hynes & Hynes, 2014). Furthermore, interest in and initiation of MakerSpaces in educational situations for younger pupils have increased, with a particular focus on joyful learning in a creative educational setting (Chu, Angello, Saenz, & Quek, 2017).

Most MakerSpace activities currently take place in more informal settings such as libraries, science centres and various types of recreational activities (Chu et al., 2017). The rationale for these initiatives is to provide pupils with learning opportunities outside the formal school context where materials and technologies are

available to which they would normally not have easy access. However, a need exists to increase knowledge of this type of learning in schools (Chu et al., 2017). In line with this need, initiatives to establish MakerSpaces in primary and secondary schools as well as in kindergartens are increasing as a response to the need to teach twenty-first-century skills to enhance multiliteracy, collaboration, communication, creativity and/or programming.

The challenge for teachers involved in 'MakerSpaces in schools' in contrast with people working in MakerSpaces (e.g. in public libraries) is that teachers need to stay close to the curriculum and make sure that the MakerSpace activities and creations are linked to specific assessments. Evidently, the introduction of MakerSpaces and programming into educational settings requires competence development of teachers.

Theoretical Framework: Professional Development of Teachers

Many studies emphasise the importance of professional development for teachers and the relevance of social learning processes in teacher groups (Doppenberg, Bakx, & den Brok, 2012; Lieberman & Wood, 2003; Vrieling, van den Beemt, & de Laat, 2016). Such social learning in teacher groups can happen in different various social configurations such as communities, networks and teams (see also Chap. 12, Vrieling, Wopereis, Van den Beemt, De Laat, & Brand-Gruwel, this volume; Vrieling et al., 2016).

However, because the phenomenon of social learning is complex by nature, a strict typology is hard to obtain (Vrieling et al., 2016). Despite the difficulty, it is still possible to provide analytical concepts that guide empirical investigations grounded in practice. Drawing on a networked learning perspective, the nature of relations between participants becomes important (Hanraets, Hulsebosch, & de Laat, 2011) because widespread access to information, support and explicit sharing of perspectives enrich the value of being part of such a network (de Laat, Schreurs, & Nijland, 2014).

By definition, networked learning for teachers occurs when teachers are 'undertaking (a series of) learning activities by teachers in collaboration with colleagues, resulting in a change in cognition and/or behavior at the individual and/or group level' (Doppenberg et al., 2012, pp. 548–549). Additionally, being an active participant in the network can add value to professional development (see also Chap. 11, Van Amersfoort, Korenhof, Nijland, De Laat, & Vermeulen, this volume; Wenger, Trayner, & de Laat, 2011).

Vrieling et al. (2016) developed a theoretical framework for analysing teachers' social learning of various kinds in what they call learning groups. From here on, such learning groups for teachers will be called TLGs. The framework comprises four dimensions linked to the TLG. Furthermore, each of these overarching dimensions

has specific indicators: (1) practice, indicated by the extent of how activities are integrated and how permanent they are in teachers' work; (2) domain and value creation, indicated by the dissemination of knowledge, skills and values within the group; (3) collective identity, indicated by the level of shared identity, strength of the ties between group members and how they perceive each other as task executors or knowledge workers; and (4) organisation, indicated by the groups' levels of self-organisation, focus on global activities, equal relationships and shared communicative repertoire of norms. The ambition is to provide systematic guidance to TLGs but also to acknowledge that it is important to study situated practice for an enhanced understanding of professional development in networks (Vrieling et al., 2016).

Except for participating in a TLG, ideas of how adults learn are relevant to understand teachers' professional development. From a phenomenographic perspective and in line with the idea of networked learning, Bowden and Marton (1998) argue that several questions pertain to the issue of what is learnt and what should be learnt. Their point of departure is that learning implies a change in our way of seeing and experiencing something. This argument counteracts what can be called atomistic and additive learning (putting together small pieces). They call for more integrated curricula that go beyond the specific content and consists of integration, holistic goals, and making the whole greater than the sum of the parts. Moreover, such integrated curricula also need to emphasise supporting the development of capabilities to deal with the subject-specific content of professional situations in educational practices and other professional situations.

Additionally, related to participation in professional development is the focus of learning. Ellström (2010, 2011) describes multiple types of learning in professional settings, distinguishing between adaptive learning and developmental learning. Adaptive learning refers to learning to

> handle certain tasks or to master the norms, practices and routines in an organisation. In another sense adaptive learning is about the learning and reproduction of a prescribed order (e.g. a new policy or procedure) and, thereby, a mechanism of power and managerial control. (Ellström, 2010, p. 8)

whereas developmental learning concerns

> a strong emphasis on the subjects' capacity for self-management and their preparedness to question, reflect upon and, if necessary, transform established practices in the organisation into new solutions or ways of working. (Ellström, 2010, p. 8)

This distinction is important to address because even if learning is achieved, it might be the case that the quality of the learning is not necessarily what was originally asked for in the proposed professional development initiative.

In this chapter, the overarching theoretical framework of networked learning and TLGs will serve as the analytical lens for the study of a TLG and as an inspiration for the analysis of the empirical material. The next section describes in detail how the study was conducted.

Method

The Setting: The Organisation of the Top-Down Professional Development Project

The Swedish national curriculum has included programming since the fall of 2018 (Swedish National Agency for Education, 2018). To prepare for the changed regulations, the studied municipality took two initiatives to support the implementation of programming in their educational system. First, the municipality became a voluntary participant in a national network of 'MakerSpaces in schools'. The activities in this national network were supported by Sweden's Innovation Agency (Vinnova, 2018). Second, the municipality also arranged for a network of 15 selected teachers from 16 schools (one of the teachers served as the contact for two special needs schools) in the municipality. These selected teachers worked in kindergartens, primary schools and special needs schools. In this network, teachers met twice each semester from the start of the project in 2015 to the end of the project in 2017. In total, the teachers met 12 times. The case reported on in this chapter is located in the intersection of these two initiatives in terms of expecting the included teachers to work with developing programming in schools in a MakerSpace setting.

In the project, teachers met in the afternoon at the municipality's administrative office. These sessions took a MakerSpace approach, including participants sharing experiences and ideas and seeking support to solve particular problems. The meetings were hosted by two 'IT in education' coordinators, who also served as project coordinators for the MakerSpace initiative in the specific municipality. The number of participants varied, but six to ten teachers normally attended the meetings.

Typically, the physically situated meetings would start with a round of shared experiences of activities the teachers had worked with since the last meeting, including photos and videos of these activities and examples of pupil creations. Also, interim digital meetings included sharing the same type of visual presentations as in the face-to-face meetings. These digital meetings of the MakerSpace project were linked to a Facebook group where teachers shared their in-class work. Additionally, if teachers used materials available as rental materials from the project coordinators, there was a prerequisite to document and share the activities when the materials were used with their pupils. This documentation was expected to be posted in the Facebook group for other colleagues to disseminate examples of how to use programming in various ways and situations for pupils of various ages and with various capacities.

Capturing the Empirical Data: Value Creation Stories

To understand how the teachers perceived being part of the initiative and what value they thought it gave them as professionals, a narrative method was deployed. The approach included the application of a structured methodology of value creation

that centred on six themes suggested by Nijland, Van Amersfoort, Schreurs, and de Laat (2018). The structured methodology originally builds on Wenger, Trayner and de Laat's (2011) value creation framework as a way of capturing created value while participating in communities and networks.

To provide support for writing their own value creation story, participants were encouraged to use a pre-made template containing six themes. The themes were as follows: (1) a significant network meeting or conversation; (2) my experiences of the significant meeting; (3) useful tips, ideas or contacts from the meeting; (4) changes in practice; (5) results for yourself, your school or your pupils; and (6) new insights. Supportive questions were presented in each theme to inspire the story-writing process. The reason for using a written template rather than conducting individual interviews as the model originally suggested (Nijland et al., 2018) was to address the teachers' limited time for individual interviews. Therefore, the written model was created and organised to support the capturing of stories during a scheduled MakerSpace meeting.

This approach included 7 out of the project's 15 teachers, representing 7 of the schools in the professional development project. Each teacher individually wrote his or her narrative of how he or she experienced participating in the development project. Table 13.1 includes information about the type of school and the age of the pupils they work with. Their names have been altered due to ethical considerations.

Analysing the Stories

From the seven value creation stories written with the template, significant statements were selected and negotiated between the authors. The results were scrutinised from internal and external perspectives because one of the authors was participating in actual TLGs whereas the others did not participate during the project. The process for selecting statements was theoretically driven (see Table 13.2), using statements that could be linked to Bowden and Marton's (1998) ideas of seeing and experiencing and Ellström's (2010) concept of developmental learning. More concrete, it was a search for passages where the participants expressed reflections on their learning. Or, as in the case of Ellström, when the participants saw the

Table 13.1 Writers of value creation stories

Name of teacher	Type of school	Age of pupils
Gustav	Kindergarten	3–5
Julia	Special needs	5–6
Veronica	Kindergarten	3–5
Peter	Primary school	10–12
Isabel	Primary school	7–9
Lena	Kindergarten	1–3
Beatrice	Primary school	7–9

Table 13.2 Theoretical concepts and identification criteria in citations

References	Theoretical concepts	Identification criteria in citations
Bowden and Marton (1998)	Experiencing and seeing	Interpreted utterances of expressed reflections on their (the teachers') learning
Ellström (2010)	Developmental learning	Interpreted utterances relevant to the use of their newly integrated knowledge in their classrooms/organisations
Vrieling et al. (2016)	Framework of teacher learning groups (TLGs)	Interpreted utterances of (1) practice, indicated by the extent of how activities are integrated and how permanent they are in teachers' work; (2) domain and value creation, indicated by the dissemination of knowledge, skills and values within the group; (3) collective identity, indicated by the level of shared identity, strength of the ties between group members and how they perceive each other as task executors or knowledge workers; and (4) organisation, indicated by the groups' levels of self-organisation, focussing on global activities equal relationships, and shared communicative repertoire of norms
de Laat et al. (2014), Hanraets et al. (2011)	Nature of relationships	Interpreted utterances of relationships among the participants in the MakerSpace initiative
Vrieling et al. (2016), Wenger et al. (2011)	Value creation of participation in TLGs	Interpreted utterance of evaluations of the relevance of participating in a network setting in the MakerSpace initiative

relevance of using their newly integrated knowledge in their classrooms/organisations. The analysis also applied concepts from the previously presented framework of TLGs (Vrieling et al., 2016). Specifically, statements that addressed the nature of relations among participants in the group (de Laat et al., 2014; Hanraets et al., 2011) and value creation from being part of a TLG (Vrieling et al., 2016; Wenger et al., 2011) were targeted.

Results: Teachers' Experiences of the 'MakerSpaces in Schools' Project

The results are presented by illustrative quotes from the participants. As the reader will see, a big difference exists between how the participants view the new demands of teaching programming in schools and in how 'mature' they are in their argumentation for the schools' future requirements concerning programming as a subject. The results were categorised and seen as an understanding of new professional practices linked to the integration of programming in MakerSpaces. The results are structured in relation to five emerging themes derived from the value creation stories. These themes capture a developmental process moving from initial

expectations and emerging positive attitudes to how teachers were using materials in their classroom with their pupils and teachers' experiences in relation to bravery to finally address how professional change had occurred during the MakerSpace initiative among participants.

Initial Expectations

Participation in the project gave the participants time to reflect on the process. Some were initially critical and sceptical, whereas some immediately saw opportunities.

> The 'IT in education' coordinators visited our school and presented the MakerSpace project. At that stage, I was totally convinced that this would not suit our pupils at all. (Julia, special needs school)

> There was a meeting at which we were encouraged to try out materials accessible in the MakerSpace project. At the time, I didn't know much about MakerSpace, and I was sceptical about teaching programming to pupils. (Gustav, kindergarten)

> I thought that this was way over my head, but my boss said there was no need to know anything to participate, and that the journey began here and now. I thought, okay, why not? What is the worst that can happen? I actually got quite excited! (Veronica, kindergarten)

The quotations are chosen to illustrate the diversity of points of departures going into a project to develop MakerSpaces and ahead of participation in the TGL (Vrieling et al., 2016). Some were inspired, and some more resistant, but common for all was that they were encouraged by their individual principals to participate in the MakerSpace project.

Emerging Positive Attitudes

After initial hesitation from some teachers, they became positive or maintained their initial positive attitude towards being a teacher who teaches programming skills. This orientation towards future practice and ideas about how to continue based on lessons learnt during the MakerSpace project was clearly perceived as added value for the teachers.

> It motivated me to continue what I normally do, that is, experimenting with materials and work processes. I became even more convinced that we really need to work together as teachers, preferably in thematic practice. How do we inspire a school to do so? (Peter, primary school)

> It was the start of a progression that I truly believe will benefit us later. Supported by that work, we can also develop a progression that can be linked to the curriculum. (Beatrice, primary school)

> I became more eager to try things out together with the pupils. I also started to try out new techniques on my own to learn more about the MakerSpace culture. (Gustav, kindergarten)

In a learning process, it is crucial that the learner grasps the learning task and can see the 'point of learning' (Bowden & Marton, 1998); this can be achieved by presenting materials and models. In the quotations above, teachers expressed the relevance of participating in the project and what they will do going forward at their respective schools. Participation in a TLG can serve as a starting point (voluntary or enforced) for learning. However, it is important to recognise that the learning does not occur by itself. As the statements show, some participants seemed to have undergone 'major' changes, such as starting a progression or trying out new things and techniques with pupils, whereas some stayed within their comfort zone and continued doing what they normally did.

Different Materials in Different Settings

Most of the teachers appreciated the materials presented to them during the project and said it can be the first stepping stone in learning the new subject for them and their pupils.

> We've started to invite one class at a time to demonstrate BeeBots [a specific type of robot designed for children] and MaKey MaKey straws [special straws used for creative constructions]. Pupils have tried out the materials, and we will continue with this practice. (Julia, special needs school)

> I really started to work according to the suggested model in terms of explore, discover, express and develop. I think it's not so intimidating to just go for it without knowing what will come out of it. It's also inspiring to see that others were influenced by that type of attitude. (Veronica, kindergarten)

Bowden and Marton (1998) emphasise the need to see and experience a variety of different materials and methods to achieve learning. In the MakerSpace project, the participants, through their learning, saw the relevance of using the materials in their classrooms with their pupils. This shows that within the TLG, participants also reflected on the different materials/methods used within a variety of educational settings included in the professional development project, such as kindergartens, special needs schools and primary schools. In earlier studies, such diversity of professional backgrounds has been identified as a critical aspect for learning in networks (de Laat et al., 2014; Hanraets et al., 2011), and the teachers in the MakerSpace project also emphasised there was significant value in sharing experiences and ideas with professionals from other schools.

You Need to Be Brave!

Teachers typically addressed how integrating programming in MakerSpace practice ignited the need to become braver in terms of experimenting together with their pupils, trying out new ways of working and developing new competences.

> One meeting really sparked my courage to be braver and try out things such as try, retry and explore and to discover them in my own work in the same way as pupils do. I then expressed and communicated what I explored and discovered, and I tried to develop it. (Veronica, kindergarten)

This quotation illustrates the value creation dimension that is facilitated through participation in the professional development project, including clear statements of the value of participation, both in terms of developing and sharing new knowledge with others—within the TLGs and with other groups/networks (Vrieling et al., 2016). The content of the value creation expressed by the participants is also interpreted here as a sign of increased developmental learning (Ellström, 2010).

Changed or Unchanged

Different teachers expressed a sense of meaningfulness and motivation to use programming. Julia, the special needs teacher who was initially totally convinced that MakerSpace activities with programming were not at all suitable for her pupils, was encouraged to try to do the same things with her pupils that a kindergarten teacher had done with hers. This was triggered by a colleague during the reflection sessions in the TLG meetings, as she was thinking that if a kindergarten teacher could do that with three-year-olds, she could do that with her pupils.

> I was inspired to set up a 'small' group at our school that can really get to grips with digitalisation and develop that locally at our school. We should more often show one another what we actually do and share our practice more! (Isabel, primary school)

> The MakerSpace meetings have given me shape! I needed the pressure to really get started rather than just thinking about what I could do. As a result, my pupils have done a lot of programming this year in particular, and they've really enjoyed it! (Beatrice, primary school)

> I didn't really change my practice, but I got some new ideas to work with. I had worked with programming with my two grade pupils before the project started. (Beatrice, primary school)

Inspiration and encouragement seem to be two of the major benefits the teachers in the group experienced. In relation to the theory of networked learning, diversity enhances learning (de Laat et al., 2014). The diversity of group members in the TLG was significant, not only for professional learning to happen but also to continue or accelerate through the project.

Participation in the project (the attendance at the 12 meetings) seems to have generated a developmental learning process (Ellström, 2010). In some cases, a more holistic view of learning (see quotation from Isabel) supported the professional development of the individual teacher by moving him or her to another level (see quotation from Beatrice).

Discussion

The ‘MakerSpaces in schools’ project used a networked learning structure to bring teachers from different schools into a TLG. The TLG met on a regular basis for a 2-year period working within an intersection of a MakerSpaces approach to programming in schools and a network structure for professional development and sharing of experiences. The analysis suggests that the support of professional development in a specific TLG was beneficial for the participating teachers, their pupils and, to some extent, colleagues who were not part of the professional development project.

This chapter provides some indications of the mutual benefits of the social aspects of networked learning for teachers in the municipality where new competences were both developed and disseminated. New practices emerged as integrated elements of teachers’ daily work. MakerSpaces with programming in schools were new to all teachers who participated in the professional development project. Some of these teachers were initially very sceptical of this new way of creating things and using programming. This scepticism concerned whether it would be possible to reach a good result in terms of learning, not just for them as teachers but also for their pupils. Nevertheless, the scepticism diminished over time because teachers received positive feedback from their pupils when they implemented MakerSpace activities in their classes.

In relation to what Bowden and Marton (1998) describe as learning (i.e. a change in seeing and experiencing something), the iterative and networked process of sharing ideas in the TLG, as well as using new practice in the classroom and getting feedback from pupils, supported teachers’ learning and professional development. The teachers did new things, saw the ‘point of learning’ and became gradually more eager to do more with their pupils and with their colleagues.

Concerning the dimension of practice of the TLG framework (Vrieling et al., 2016), there are clear indications of professional development linked to new networked practices performed in daily work life. This specific type of learning was also seen as a clear indication of developmental learning, as proposed by Ellström (2010). The teachers in the TLG were all in favour of the initiative and to some extent were also surprised they had learned how to programme with their pupils. They also became increasingly brave in trying new things together with their pupils, something that some of them had never even considered possible before. The teachers found that networked practices of sharing ideas and giving each other inspiration were the major benefit. The diversity among participants in networks for learning not only allowed for learning, as identified by Doppenberg et al. (2012), but also became one of the main indicators for professional development in the MakerSpace initiative. However, in terms of deepening the knowledge linked to programming, there seem to be some unfulfilled needs. One of the teachers wrote, ‘I actually wish that we could challenge one another more in the network with more intriguing questions’ (Julia, special needs), and another claimed, ‘I think that I’ve just scratched the surface and would like to learn more’ (Gustav, kindergarten).

For this particular group of people, although they appreciated the participation, there is still more to be done in the future, particularly linked to how the group is organised. The TLG in the specific networked structure of the project had a top-down character and was organised by the municipality. Resources for the network were linked to the 'MakerSpaces in schools' project. Meetings and participating schools were organised externally, with teachers strongly encouraged to participate, and the members of the TLG were defined as key persons by the municipality-employed project coordinators. A self-organised bottom-up initiative might be more supportive for a networked learning project. On the contrary, the MakerSpace project shows that externally organised top-down initiatives were profoundly important for teachers' professional development. It is therefore of value to address the dimensions suggested by Vrieling et al. (2016) and Vrieling et al. (Chap. 12, this volume) to determine which form of organisational practice best supports the intended professional development of TLGs.

In the MakerSpace project, there was strong support for teachers' professional development through networked learning. However, there should have been more activities linked not only to sharing ideas but also to deepening teachers' knowledge linked to MakerSpaces and programming to genuinely enhance the relevance of formal meetings in cross-school teams and to increase learning for pupils. Second, to fully support pupils' learning in MakerSpaces, previous research has identified the need for engaged interplay with materials and creative ideas to help pupils become maker oriented (Chu et al., 2015; Chu et al., 2017). The latter could have been emphasised more in the project in order to enhance creativity linked to programing rather than rule-based learning, as also suggested in current research regarding data-logical thinking in schools (Heintz & Mannila, 2018).

Over time, the teachers who participated in the professional development project experienced an emerging sense of belonging to the TLG. Participating in the TLG created value for them as individual teachers and for their pupils (Nijland et al., 2018; Wenger et al., 2011). In addition, the teachers shared examples of how to further disseminate MakerSpace activities and programming to other colleagues in the municipality. Nevertheless, it is unclear what support the principal of the respective school provided other than the time to participate in the specific TLG. Also, the applied data collection method of writing stories provided less information than would have been the case with individual semi-structured interviews, as originally suggested and developed by Nijland et al. (2018; see also van Amersfoort et al., Chap. 11, this volume). Despite this methodological shortcoming, the template provided a supportive structure for the teachers to follow when reflecting on value creation in their TLG and in the writing of their stories.

In conclusion, for situations where new knowledge needs to be developed and implemented in daily practice (here MakerSpaces and programming), formal organisational structures from the highest level of responsibility become important. In the MakerSpaces study, the top-down initiative from the municipality was crucial. The formal organisational structures from the municipality became valuable not only in creating a sense of relevance but also in giving a strong signal of the importance of teachers' professional development. A networked learning structure that embraces

the combination of teachers with different experiences from different schools was shown to be fruitful in practice. To support value creation for participating teachers, a formal TLG served as a social configuration (i.e. a network) that provided sustainability and built relationships among participants over time. In a social configuration of this nature, participants were encouraged to share ideas and to learn from each other.

Trying out new practices with pupils, as well as meeting in the TLG to share experiences of how this played out in class, was one key dimension of the value created, both in terms of practice and building professional confidence. However, when it comes to deepening knowledge and increasing the dissemination of knowledge from the TLG to a broader professional network, the sharing of insights in the TLG was not a guarantee for successful professional development. The leader of the group meetings appeared to be a significant actor and can help participants to stimulate, deepen and spread their knowledge. Therefore, some problematic issues remain in the formal structure of the TLG that need to be addressed and actively managed in these types of top-down networked learning initiatives in order to reach the overarching goal of professional development.

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Chapter 14
Networked Professional Learning, Design Research and Social Innovation

Peter Goodyear

Abstract This chapter uses a reading of the preceding chapters in the book to develop an argument about the benefits of acknowledging and strengthening some deep synergies within the field of networked professional learning. In particular, it identifies some lines of convergence between professional action, professional learning and the practices of research and design in networked learning. The chapter's unifying constructs include service design, social innovation and (participatory) design research. While it is important to recognise that there can be important differences between the situations of professional action, learning and teaching and research and design, there are also substantial benefits to be obtained from working with their similarities. The chapter locates professional work in the broader context of the search for more sustainable ways of life. It introduces ideas about social innovation, collaborative forms of service design and participatory design research to prepare the ground for a reinterpretation of some common elements of professional work and networked professional learning.

Introduction

In combination, the chapters in this book represent a significant advance in our understanding of the field of networked learning. They investigate three important sites of networked learning practice, using a number of complementary approaches to produce knowledge that can inform our thinking about, and preparation for, future educational design work. Chapters in the first section help render more salient and visible the activities of those participating in learning networks. Designs for networked learning usually assume pro-active, self-managing learners: but we rarely know enough about how they do what they do. Chapters in the second section illuminate ways in which professional work involves collaborative inquiry. They provide ideas for educational designs that can help people sharpen

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their inquiry skills and adopt a more expansive framing of professional learning, action and innovation. They help us discern some deeper resemblances between inquiry in professional, community and academic settings. At first glance, chapters in the third section seem to be narrower and more inward-looking. But actually they touch upon some profound issues about social learning, value and reciprocity, and they help distinguish between incrementally adaptive and more transformational experiences of learning. They provide designers with ideas and language that can help resolve questions of agency and structure, self-organisation and external support. These are just highlights: there is much more to be found in each section.

This book is part of a growing body of work that has emerged from early research and practitioner-led innovation, focused on computer-mediated communications and collaborative learning in communities and/or networks, dating back to the late 1980s (Carvalho & Goodyear, 2014; Dohn, 2018; Hodgson, McConnell, & Dirckinck-Holmfeld, 2011; Jandric & Boras, 2015; Jones, 2015). Within this networked learning tradition, there has been a strong interest in critical and emancipatory approaches to supporting adult and professional learning. These characteristics mark it out from the mainstreams of research and development activity in computer-supported collaborative learning (CSCL), where attention has been much more focussed on small-group learning by school-aged children, and, to a lesser extent, by university students (Goodyear, Jones, & Thompson, 2013). The critical and emancipatory stance that permeates networked learning aligns it more closely with the 'Connected Learning' movement (e.g. Ito et al., 2013), though one might argue that Connected Learning is still driven strongly, and constrained, by its valorisation of conventional school outcome measures. It is regrettable that networked learning is still *terra incognita* to many CSCL researchers, particularly those based in the USA (see, e.g. Kafai & Peppler, 2011). I say this for three main reasons: (i) the networked learning community has been very open and energetic in exploring new theoretical ideas, particularly in the area of socio-material theory, (ii) it has avoided being locked into K-12 education and its engrained practices, values and constraints – enabling it to explore lifelong and lifewide learning (see Pettersson & Olafsson, this volume) and (iii) there is an urgent need for empowering approaches to technology-supported collective learning and action that can help people invent more sustainable ways of life. So part of my motivation in writing this final chapter is to draw together some threads that run through the chapters of the book – ideas evolving among networked learning innovators and researchers – and weave a few additional connections among the concerns of professional action, collaborative learning and inquiry and designing for sustainable living. In so doing, I draw on two related sets of ideas about design, hoping to show how design can be understood as the 'first tradition' in human development – with modes of linking thought and action that give it powers neither science nor art possess (Nelson & Stolterman, 2014) and looking at what expert design can contribute in a world where 'everyone designs' (Manzini, 2015).

Professional Services

Professional work is characterised by the provision of a service to a client for a fee. The right to practice normally depends upon demonstration of appropriate high-level expertise and is regulated by a supervisory professional body, which sets standards. In the last 50 years or so, there has been a softening of the boundaries around professional work, with the formation of so-called 'softer' or 'quasi' professions such as nursing and teaching. There has also been a restructuring of client and fee arrangements, with increasing numbers of professionals working in and for larger organisations, both private and public. Alongside this, the shift in emphasis from primary production and manufacturing to services, in the world's richer economies, means that many areas of knowledge-intensive work are concerned with service provision rather than the production and sale of material objects. Much of what is said in this book about professional work, professionals and their learning also holds true for a broader array of knowledge work and knowledge workers, including those who provide services through the 'gig' economy. For brevity, I will use 'professional' as an umbrella term to cover them too.

Services are often *co-constructed* or *co-produced*: it is not uncommon for effective service provision to depend upon the contribution of a pro-active client. For example, a patient has to take their medicine and they usually have to play an active role in helping their doctor diagnose their condition. A lawyer defending someone accused of a crime depends upon their client for a version of the events that led to their arrest. A student, being taught, has to play an active role in constructing their own knowledge, or they will not learn much.

Professional service provision can sometimes be a routine activity. Problems often present themselves in familiar ways, and established procedures exist for dealing with them. This is especially the case with 'tame' or 'well-structured' problems, where the main challenge for the professional person is to identify the kind of problem the client has brought. The course of action that then needs to be taken flows directly from this diagnostic work. Sometimes, further investigation is needed to fill in missing information, before a decision can be made about what to do next. But this kind of inquiry process is also well-understood by, and very familiar to, an experienced professional in the field concerned (see Table 14.1).

However, professional workers are sometimes confronted with problematic situations in which tried-and-tested routines fail. This may be to do with the novelty of the problem presented, but as Rittel and Webber (1973) argued, some kinds of problems are intrinsically harder to deal with. Their characteristics and structure make them 'wicked' or even 'super-wicked' problems (Levin et al., 2012). These are not just more complex versions of 'tame' problems. They are qualitatively different (Table 14.1).

Among other things, progress on wicked and super-wicked problems depends on active involvement of stakeholders: people who have 'skin in the game'. In such situations, professional *must* work closely with client/stakeholders to co-design and co-create solutions: ways and means for moving forward. It turns out that a good

Table 14.1 Tame, wicked and super-wicked problems. (Compiled from Rittel & Webber, 1973; Nelson & Stolterman, 2014; Goodyear & Markauskaite, 2019; Levin, Cashore, Bernstein, & Auld, 2012)

Solving tame problems	
1. Identify the problem type	
2. Gather more information if necessary	
3. Propose a solution	
4. Test the solution	
5. Modify solution if necessary	
Wicked problems	
Characteristic	*Explanation*
No definitive formulation	With 'tame' problems, the problem solver can be given in advance all the information needed to solve the problem. With wicked problems, the information needed depends on candidate solutions. In other words, 'the formulation of a wicked problem *is* the problem' (Rittel & Webber, 1973, p. 161)
No 'stopping rule'	No criteria inherent in the problem show unequivocally that it has been solved; work on wicked problems typically stops because of external constraints – Such as time or money
No 'true-false' solutions	There are no formal decision rules that can be applied objectively to say that a solution is appropriate; different people/groups will have different views on a solution, but none will be able to finally determine its correctness
No satisfactory tests of solutions	Any solution will generate waves of consequences; evaluation of these consequences will often cause people to reconsider what they previously saw as a satisfactory solution
Every attempt at a solution has consequences	Every solution (or partial solution) has consequences – It changes the nature of the problem
Inexhaustible solutions	Any new idea may become a candidate solution, or part of the solution; one cannot enumerate all possible solutions or solution steps in advance
Super-wicked problems	
Characteristic	*Explanation* (examples relate to action on climate change)
Time is running out	While political expediency can sometimes allow action on social policy issues to be delayed, natural/environmental systems run to their own timeframes and impose their own penalties for delayed action
Those who cause the problem also seek to provide a solution	Everyone who seeks to reduce emissions also causes emissions
The central authority needed to address it is weak or non-existent	There are no governance or co-ordination mechanisms capable of working across regions, economic sectors, policy subsystems and scale levels
And partly as a result (of all three characteristics), policy responses discount the future irrationally	Current/short-term advantages are given undue weight relative to long-term disadvantages (e.g. cheap energy now is valued over long-term climate change)

deal of professional work actually involves the co-production of services, but wicked problems *necessarily* involve co-production. Collaborative activity of this kind involves joint inquiry leading to joint action and also joint design of the means of inquiry (Markauskaite & Goodyear, 2017).

Professional Work, Change and Sustainability

In thinking about the future of professional work and networked professional learning, it makes sense to acknowledge some broader issues playing out in the world. The problems associated with climate change and adaptation, globalisation, inequality, mass movements of people and capital, pollution, food and water security, discrimination and chauvinism manifest themselves in a variety of ways. Their repercussions permeate many areas of professional work.

At a minimum, they affect the circumstances in which professional work is conducted and in which professionals continue to learn and develop. For example, changes in the nature and intensity of the problems that clients bring to consultations with professionals mean that the 'bridges' connecting initial professional education to ongoing professional practice and continuing professional development will become very long and attenuated (Dalsgaard, Chaudhari & Littlejohn, this volume; Hansen & Dohn, this volume). The focus of ongoing professional learning will continue to shift from routine updating of skills and knowledge to participation in the design of new, more 'agile and flexible', forms of practice, including the development of new areas of inter-professional practice and the relational expertise on which it depends (Edwards, 2010; Markauskaite & Goodyear, 2017; Konnerup et al., this volume; Jaldemark et al., this volume).

Quite likely, many professional workers will also find themselves deeply involved in the extensive processes of change needed to find a sustainable future for human life and to navigate paths through the super-wicked problems that neo-liberalism and market-driven ideologies have accumulated. Enzio Manzini refers to this as 'the great transition':

> … a process of change in which humanity is beginning to come to terms with the limits of the planet, and which is also leading us to make better use of the connectivity that is available to us: a dual dynamics merging into a single process …. (Manzini, 2015, 2)

Ideas from design theorists like Manzini can help us think about how we may shape the scope, scale and purposes of our networked learning practices to better align with the circumstances of this 'great transition'. In so doing, we also need to bear in mind that the old order – based on assumptions of limitless resources – will persist for some time alongside the emerging new order and that professional workers and their learning networks will be disrupted and sometimes strained to breaking by these turbulent forces.

Social Innovation and Collaborative Service Design

> Design for social innovation is everything that expert design can do to activate, sustain, and orient processes of social change toward sustainability. (Manzini, 2015, 62)

By definition, intractable social problems – wicked and super-wicked problems – cannot be resolved by top-down government action or by markets. There is growing evidence that more radical solutions are needed: solutions which reframe the problems as posed and reconfigure the relationships and processes involved, often in ways which link local action by those most affected by the problem with more global networks that help analyse and contextualise issues and strategies. This necessarily entails distributed systems:

> … sociotechnical systems that are scattered in many different but connected, relatively autonomous parts, which are mutually linked within wider networks. (Manzini, 2015, 17)

Instead of relying on centralised and/or marketized systems to meet human needs, a shift is underway to more distributed arrangements, where smaller systems can be customised by local people to local needs, without losing the capacity to shift information and other resources around across wider networks ('cosmopolitan localism'). Distributed systems are more amenable to diversity, redundancy and learning – through local experimentation and the sharing of outcomes. In other words, they are inherently more *resilient* than large centralised uniform systems.

Like many others, Manzini sees *social innovation* as essential to navigating the 'great transition'. Social innovations are new ideas, products, services, models, frameworks, etc. that simultaneously meet social needs and create new social relationships. Social innovation involves people in 'creating solutions outside the mainstream patterns of production and consumption' (Cipolla & Manzini, 2009, 45). In other work, Manzini and colleagues also speak of collaborative and relational services. Collaborative services are:

> services that people jointly produce to fulfil their unmet needs by using peer-to-peer and collaborative relationships. When the social form created by these people is bound by a sense of community, it is called a collaborative community. Some collaborative services that address social issues and produce relational goods such as trust, attention, and care are social innovations: they contribute to sustainability and resilience of society because they are known to reinforce social cohesion, thereby creating a positive impact on society. (Baek, Kim, Pahk, & Manzini, 2018, 54).

Relational services are thoroughly entangled with interpersonal relations and are 'based on an approach where benefits are reciprocally produced and shared by the participants' (Cipolla & Manzini, 2009, 47–8). As with design for learning, relational services can only be 'enabled'. In other words, they need to be designed 'in such a way as to start up, support, and continuously sustain interpersonal encounters between the participants' (op cit, 50).

Drawing on the *capability approach* of Martha Nussbaum and Amartya Sen (e.g. Nussbaum, 2000; Nussbaum & Sen, 1993; Sen, 1999), Manzini repositions design as follows:

> In this way of seeing things, the role of design experts is no longer that of developing finished products and services. Instead, their task is to design to expand the capabilities of people to lead the kinds of lives they value. This means that, rather than trying to identify needs and design solutions to satisfy them, design experts should collaborate in creating favorable conditions for those directly concerned to come up with and put into practice ways of living and acting to which they themselves, the protagonists, attribute value. … while design experts, while intervening in the design of the enabling solution, do not determine the way in which people will decide to operate, they do create *action platforms* and *sense systems* thanks to which different behaviour may be more or less viable and more or less culturally commendable, and therefore more or less probable. (Manzini, 2015, 98, emphasis added)

This dual emphasis on action and inquiry (sense-making) is a key theme in conceptualising design-based approaches to change. In their highly influential book on *The Design Way*, Nelson and Stolterman (2014) argue that design activity should be recognised as the 'first tradition' in human development: a tradition that has been eclipsed by both creative art and science. Indeed, the power of design as a way of integrating thought and action is, they contend, obscured by the divisions in Western thought that split science from craft and from the humanities.

> Human intention, made visible and concrete through the instrumentality of design, enables us to create conditions, systems, and artifacts that facilitate the unfolding of human potential through designed evolution in contrast to an evolution based on chance and necessity (Nelson & Stolterman, 2014, 2).

A distinctive feature of design inquiry is that it combines a search for what is true, what is real and what is ideal. In other words, it is a compound of (i) the more abstract forms of principled or law-like knowledge that we associate with science, (ii) concrete particulars of the here and now that afford and constrain certain kinds of action, and (iii) values and desired goals – which are not always self-evident. Design inquiry is closely coupled with design action: making change in the world, through processes of composing and connecting, creating a unified whole.

> Design is about evoking, or creating, the ideal in the real. But design has to be grounded in what is already real, as well as what is actually true. Since the real is overwhelmingly complex and rich, we are unable to grasp the totality of that complexity and richness solely by using the systems of inquiry created to reveal what is true and factual (op. cit., 39–40).

In my view, some of the recent spates of writing in education about design thinking underplay the complexities of design inquiry and weaken the disciplining effects of the imperative to act in the world. (It 'domesticates' design thinking to make it manageable within the confines of the classroom.) This misrepresentation is significant. Kim Sterelny and others who study the evolution of human cognition make strong arguments for the importance of co-operation in the shaping of our species (e.g. Sterelny, 2003, 2012, 2014). Moreover, co-operative action creates opportunities for various forms of apprenticeship learning, mimetic learning or 'learning by observing and pitching in' (Billett, 2014; Rogoff, 2014). Networked learning also offers opportunities to participate in co-operative forms of inquiry and action, and indeed to learn to participate in such practices (Dohn, 2018; see also the earlier arguments of Ivan Illich (e.g. Illich, 1973) and Christopher Alexander (Alexander

et al., 1977) on the value of learning networks). So designing for (and in) learning networks has the potential to connect with and strengthen some deeply important modes of human development and push back against some of the dynamics of the current economic order. As Richard Sennett puts it: co-operation is a craft (that needs to be learned) and 'modern society is de-skilling people in practicing co-operation' (Sennett, 2012, 7). Before exploring this any further, I need to introduce some ideas about design research.

Design Research and Design Knowledge

In his presidential address to the American Educational Research Association in 1999, Alan Schoenfeld spoke about research in 'Pasteur's Quadrant'. The phrase and indeed the underpinning ideas were taken from Donald Stokes' reformulation of the relations between applied and fundamental research (Schoenfeld, 1999; Stokes, 1997). Stokes offered a critique of the prevailing *linear* conception of research and development: one that positions fundamental ('blue skies' or 'curiosity driven') research as both prior to and informing the kinds of applied research and implementation work that are needed to solve practical problems, or to create new treatments, products and services and bring them to market. On this view, *fundamental* research contrasts, and often competes, with *applied* research. For example, commercial pressures can be seen as a threat to research integrity and applied research can be seen as taking time away from fundamental research (which may also be seen as having higher academic status). Stokes, and Schoenfeld after him, reframed the relations between fundamental and applied research by folding a one-dimensional linear representation into a two-dimensional matrix (see Fig. 14.1). On *this* view, research can be both use-inspired and concerned with fundamental understanding. Schoenfeld argued that most educational research naturally sits in 'Pasteur's Quadrant'.

Considerations of use (practical application, etc)?

Quest for fundamental understanding (theoretical/ scientific advances, etc)?	NO	YES
YES	Pure basic research (Niels Bohr)	Use-inspired basic research (Louis Pasteur)
NO	'Bird spotting' (Gilbert White)	Pure applied research (Thomas Edison)

Fig. 14.1 Educational research in Pasteur's Quadrant. (After Schoenfeld, 1999; Goodyear, 2011). (Each cell in the table names an exemplary practitioner of the kind of research involved.)

If we think more specifically about research and its application in the narrower field of networked learning, two large questions spring immediately to mind. What counts as useful knowledge? What are we seeking a fundamental understanding of?

Starting with the first question, about useful knowledge, a line of response can be developed that identifies the main actors involved in networked learning, examines the nature of their activity – looking intently for critical moments when research-based knowledge might make a difference – and considers the kinds of knowledge that might be useful in such work. This is a *pragmatic* view of networked learning research, in the sense that it foregrounds the practical application of knowledge. It should not be confused with an instrumental view, in the sense of valuing *only* what can be used to achieve practical ends. A pragmatic view of networked learning research starts with the real-world activities and knowledge needs of people involved in networked learning. It aims to use a properly grounded understanding of their work practices, capabilities, goals and values, and the constraints within which they work, in order to guide the form and purpose of inquiry and dissemination. Following the logic of this pragmatic view of use-inspired research says nothing about the scope and purposes of curiosity-driven research. It certainly does not question the legitimacy of curiosity-driven research, or insist that the needs of one kind or class of research 'user' should be privileged. Rather, pragmatic use-inspired research avoids *guessing* what people need, and it works with them to find out.

For example, researchers can work with people who are very involved in *interactive teaching* – or online moderation – to get a clearer sense of the kinds of problems and opportunities that emerge in the course of such work, *and* to see how further research might help produce such things as richer pedagogical strategies or more worthwhile monitoring instruments (dashboards, etc.) In other words, it is research with a dual focus. It operates at two levels: identifying *and* meeting users' needs.

As another example, researchers can work with people who are involved in *upfront design* – planning and setting in place the various resources that can help stimulate and support a learning network. Research can focus on both identifying and meeting the needs of people engaged in such design activity. It is important to recognise that there are some substantial differences between the activities of online moderation and upfront design, especially if the former is virtually synchronous. Time pressure constrains the range of research-based guidance that can be consulted and considered in interactive teaching, whereas there is typically greater opportunity to analyse, think deeply, consult, reflect and reconsider during design work (Goodyear, 2015). A well-founded understanding of how educators are actually doing their work can and should inform the production of knowledge that is meant to be useful to them. Otherwise the path from research to application depends on wishful thinking about 'trickle down evidence'.

Manzini uses the term 'design knowledge' to mean 'knowledge that is useful to those who design' and 'design research' to mean research that is aimed at producing design knowledge (Manzini, 2015, 38). Taking the pragmatic view, design research ought not to proceed accidentally: it ought to be informed by a sense of how people who are engaged in design activities actually do what they do – extended, perhaps, with some imaginings of how they might engage in these activities more enjoyably,

efficiently or effectively if only they had some better tools and methods. Manzini's conception of design knowledge is an inclusive one. His central question is about what (expert, trained, professional) designers should be offering in a world where 'everyone designs'. What contribution can people with special expertise in design make to the more diffuse activities of 'amateur' or 'vernacular' designers, whether they be individuals, companies, communities or other kinds of organisation, involved in processes of design and co-design (Manzini, 2009, 5).

If we develop this inclusive conception further, the scope of design research expands considerably, and may start to feel all-inclusive and overwhelming. However, one can pick a way through the space of possibilities opened up. In a world where 'everyone designs', design research covers everything that anyone finds useful in their designerly activities. On the pragmatic (double focus) view, this means design research sets out to address (i) understanding the knowledge needs of vernacular designers and (ii) filling those needs. Moreover, since design involves both inquiry and action in the world, design research ought, in principle, to be able to meet the knowledge needs of those engaged in vernacular design inquiry. The space begins to look endlessly recursive. Except that what keeps recursion intellectually manageable is that it applies the same process (procedure or function) to different objects. In this case, design research can aim to identify and meet the needs of designers, whether they be expert designers or not: clients, professionals, students, teachers, networked learning practitioners, networked learning researchers, etc.

This also helps appreciate the various forms of knowledge that can be of value in design, including design for networked learning and collective action. For example, a deep misconception within educational policy and practice is that the most reliable knowledge takes the form of rigorously produced research-based evidence, laws and principles with wide spans of application. In Nelson and Stolterman's terms, this is *knowledge of what is true*. However, much of the knowledge produced and used within educational practice is *knowledge of what is real*. Understanding the concrete, complex realities of how an actual learning network functions is hard, neglected, undervalued but deeply important (Carvalho & Goodyear, 2014). Seen in this light, educational research has more to learn from ecology than from physics (Ellis & Goodyear, 2019; Hammer, Gouvea, & Watkins, 2018) and design research for networked professional learning can learn from more mainstream approaches to design inquiry. For example, Nelson and Stolterman (2014, 7–8) explain how design inquiry typically makes use of a variety of 'design schemas', such as the following:

- Organised patterns of thinking: models of design inquiry
- Ordered clusters of ideas for guiding design inquiry
- Strategies for gaining design knowledge, with the purpose of taking action
- Knowledge structures/cognitive representations of design thinking
- Cognitive frameworks representing means for managing design-oriented systemic inquiry
- Insights into how to give form to infinitely complex information and sense data
- Cognitive structures that organise subjective, objective and imaginative design-thinking processes

These help stock a toolkit for people involved in design for professional networked learning and design for learning more generally: whether in expert-led or grassroots forms.

Participatory Design Research

Participatory design research can be understood by reference to design research, design-based research and forms of community-based research such as action research and community-based design (Zavala, 2016). Its recent manifestations have grown out of design-based research (DBR) in the learning sciences community (see, e.g. Bang & Vossoughi, 2016). DBR has evolved a set of methods for trialling and incrementally improving an educational innovation. It has a strong commitment to working in everyday educational settings such as schools and universities – partly as a reaction to experiences in educational technology R&D in the 1970s and 1980s, where sophisticated systems that worked well in the lab failed to work in the 'real world' of education. Researchers taking a DBR approach therefore spend a good deal of time and energy trying to understand the additional supports, system tweaks, etc. that are needed to replicate and repeat success in complex educational settings. Although DBR is committed to making a difference in real-world settings, and is concerned to address issues of scaling-up and sustainability, it would be fair to say that it is strongly directed by the researchers' need to contribute to the advancement of theory. Indeed, a criticism of DBR is that it is more concerned with testing the theoretical ideas that inspired the innovation than with understanding the ecology into which the innovation was dropped (Ellis & Goodyear, 2019).

Participatory DBR is, in part, an attempt to shift the balance of power, and initiative, from university researchers (bringing *their* innovation to a classroom) to more carefully reflect the needs and positioning of the intended beneficiaries – those cast in the roles of students and teachers. Design research has at least two meanings: carrying out research by using design methods (researching by designing) and doing research to improve how design is done (researching for design). Most DBR in education is research by designing. In contrast, *participatory design research* is research carried out with the goal of creating design knowledge (knowledge useful to those who design), in ways that include all stakeholders in agentic roles. In Nelson & Stolterman's terms, it connotes design inquiry carried out by those people who are most intimately affected by an intended change, such as a significant social innovation. Such design inquiry *may* be strengthened by guidance from expert designers, but it is not driven by their professional needs and ambitions.

For example, Lucy Kimbell (2011) writes this way about service design as a form of constructivist enquiry:

> I describe designing for service as one specific way of approaching service design, combining an exploratory constructivist approach to design, proposing and creating new kinds of value relation within a socio-material configuration involving diverse actors including people, technologies and artifacts. This conceptualization has implications for other design fields, since it sees service as enacted in the relations between diverse actors, rather than as a specific kind of object to be designed. (Kimbell, 2011, 42)

Mapping Collaborative Encounters

Within the networked learning field, and in education more generally, ideas about 'community' have proven quite powerful, appearing in such terms as 'communities of practice', 'communities of inquiry' and 'learning communities' (Hod, Bielaczyc, & Ben-Zvi, 2018; Jones, 2015; Wenger, 1998; Wenger, Trayner, & de Laat, 2011). They are sometimes accompanied by notions of learning through apprenticeship or 'legitimate peripheral participation'. However, these ideas should not be used without some reflection on the more negative aspects of apprenticeship and community life. Traditionally, apprenticeship learning has sometimes been brutal and exploitative and communities have conservative, repressive and exclusionary powers, as well as their more convivial and congenial qualities. Manzini provides another way of thinking about this matter. He speaks of a growing trend towards 'collaboration by choice'.

> This intentional collaboration lies at the crossroads of two trajectories: one moving from the hyperindividualism of most industrialized societies toward a (re)discovery of the power of doing things together, and the other from traditional communities in less industrialized societies toward more flexible forms of intentional collaboration. (Manzini, 2015, 24)

Networked learning can be thought of in a similar way. Professional workers engaging in networked learning usually do so as a matter of choice and (in most NL arrangements) they retain a great deal of control over how and how much they participate.

As pointed out by Pettersson & Olafsson and van Amersfoort et al. (this volume), networked professional learning takes place in a variety of circumstances. Sometimes a learning network exists only because it is organised and supported by an educational organisation. In other cases, learning networks are self-managing and emergent: flourishing with 'runaway objects beyond formal settings and regulations'. The learning activity within networks may be formally structured or organised spontaneously or a mixture of both. Participants within a learning network may play little or no role in designing key aspects of how the network functions, or such decisions may be core to how the network governs itself. For instance, there may or may not be explicit processes for agreeing modes of inquiry or designing value creation cycles (Wenger et al., 2011; Vrieling-Teunter et al., this volume). The range of possibilities within networked professional learning practices means that the scope for useful design research is also very substantial. But some approaches to representing the functioning of a learning network, at one time or over time, have applicability whether or not the information they generate is used by the participants themselves (for self-managing activity) or by learning network convenors working on their behalf. Examples include the use of methods like Social Network Analysis and Content Analysis or through assessing aspects of value creation.

The example that I want to share here is from Manzini's work. It offers some language for talking about collaborative encounters. It can be applied to tracking the evolution of learning networks and provides some foundations for joint analysis and (re)design activities.

Table 14.2 Four dimensions for mapping collaborative encounters

Degree of active involvement	Users may take quite a passive role – partaking of a service provided by another person – or they may more actively co-produce the service, fielding personal resources as they do so (time, energy, attention, skills, expertise, etc.)
Degree of collaborative involvement	This may range from close to zero (doing almost everything alone or virtually alone) to intense (engaging closely with others)
Strength of social ties	May vary from weak to strong. Weak ties can be created quite quickly and may not persist; strong ties take time and commitment
Relational intensity	Characterises the affective and empathetic qualities of the encounter, the depth of the relationship, the degree to which people treat each other as fellow human beings rather than (say) seller and buyer

After Manzini (2015), 105–110

The approach uses four dimensions of collaborative encounters: active involvement, collaborative involvement, strength of social ties and relational intensity (see Table 14.2). Although many collaborative encounters, in learning networks and elsewhere, blur the distinctions between providers and users of a collaborative service, the account here retains these terms to help distinguish contributions when these are asymmetrical.

The first two dimensions (active and collaborative involvement) can be used to make a map of participant involvement (PI). The second two help us map interaction quality (IQ). The four dimensions can be simplified and represented in binary terms (e.g. active–passive or strong–weak), but it may be better to consider them as continuous variables. In either case, we can make two-dimensional maps of PI and QI, creating simple quadrants or more open zones. (Manzini does the former. Figures 14.2 and 14.3 do the latter.)

Figure 14.2 maps the space of *participant involvement*: who does what, with whom and how. A high degree of active involvement coupled with a low level of collaboration can be characterised as a DIY (do-it-yourself) arrangement. Self-drive car-sharing schemes are a typical example: high user input but little or no contact with other people. In the networked learning area, we could think of self-directed learning from online videos as an analogous case. Low levels of both active involvement and collaboration are typical of mainstream service delivery. Using a 'ride sharing' service like Uber or getting a quick answer to a question via an online chat-based 'helpdesk' are examples here. Higher levels of collaboration coupled with low levels of personal active involvement in the service itself are commonly found with co-managed services, as when a group of people work together on policies or high-level management issues but don't get involved in service delivery. A housing co-op which employs maintenance and cleaning staff is an example. Finally, Fig. 14.2 situates co-production as involving high levels of active involvement in production of the service itself, in collaboration with others. People who both organise and do voluntary work in a community garden are in this zone, as are people who collaborate within a self-managed learning network. It is important to point out that high levels of active or collaborative involvement are not in themselves virtu-

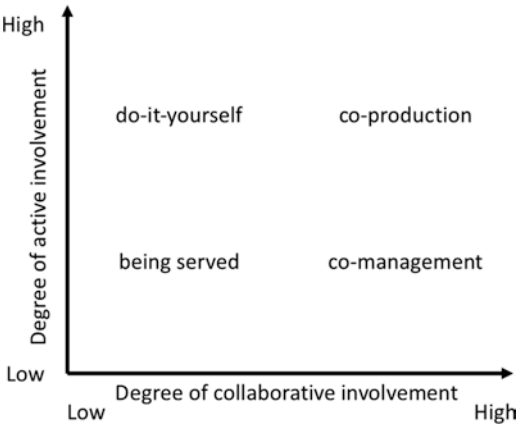

Fig. 14.2 Participant involvement (PI map). (After Manzini, 2015, 107)

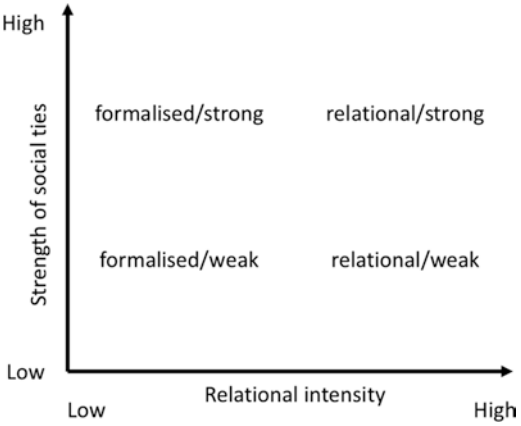

Fig. 14.3 Interaction quality (IQ map). (After Manzini, 2015, 109)

ous. It would be exhausting to live one's life entirely in that way. The key issue is to make, and help others make, considered choices about collaborative engagements.

Figure 14.3 maps a similar space but for *interaction quality*. This is a less elaborated construct in Manzini's work: the space is rendered simply in terms of the strength of social ties and the quality of the relationship (deep, warm and personal or formal and rule-defined). A reason for this may be that the dimensions of PI have the capacity to frame deliberate action in advance, whereas those of IQ reflect something more emergent: qualities that become clearer in and after the fact. Indeed, Manzini's examples say more about the warmth or depth of connection in an encounter as experienced, and rather less about characteristics of the arrangements that might be recognisable or clearly specifiable a priori. (One can make a deep and warm connection with someone even in a highly regulated, formal situation.) As with PI, none of these arrangements is *intrinsically* better. For example, being able to collaborate in weak-tie situations makes life more open and less tribal.

Manzini's work on mapping collaborative encounters is an expert designer's contribution to the toolkit of people who manage professional learning networks – whether on their own behalf or for the benefit of others. He did not intend it as such, but what transpires in learning networks is a significant instance of collaborative encounters more generally.

Synergies in Professional Work and Networked Learning

A key purpose for professional learning is to help professionals become better at providing services: learning to act more effectively, more efficiently, and in keeping with evolving professional standards. It is not unusual for professional learning to be done in a collective way – for example, through participation in seminars, advanced courses and conferences. There is now an extensive history of *networked* professional learning, stretching back from the late 1980s to the early 1990s. One can also point to large-scale R&D projects in networked professional learning, such as JITOL and SHARP, which experimented with tools and methods for sharing professional knowledge (including know-how) within geographically distributed communities of practice (Goodyear, 2014). Network Improvement Communities (NICs) are a more recent manifestation (Penuel & Gallagher, 2017). As with more conventional, face-to-face, forms of collective professional development, these professional learning networks have found ways of navigating the contours of co-operation and competition. Participants may share 'pre-competitive' knowledge in order to advance the field as a whole, but keep to themselves the knowledge that sustains individual competitive advantage. In short, professional learning networks are characterised by a managed and/or negotiated openness. Such dynamics underlie some of the movements in the PI and QI spaces shown in Figs. 14.2 and 14.3.

Earlier in the chapter, I also developed a version of Manzini's argument that the levels of collaborative social innovation needed to transform current economic and social arrangements into something more sustainable require new distributions of design activity. If we apply that argument to networked professional learning, a plausible trajectory is as follows:

1. We can imagine an exponential growth in the provision of professional services to self-directed community groups and networks: networks as clients.
2. Such professional contributions are still likely to take the form of co-designed and co-produced services. Indeed, they are likely to be both more open and more directly engaged or embedded in the social innovation activities of the network.
3. So professional activity in and with client networks will also have a community-strengthening or relationship-strengthening character and function.
4. And will help provide and improve both sense-making systems and platforms for action. Professional involvement in the activities of a client network will entail both inquiry (sense-making) and action in the world.

This educative or learning (sense-making) dimension to professional work turns out to be very pervasive. Professionals turn to their networks to learn things that will help them improve their own practice and to engage with peers in activities that combine collaborative inquiry, discussion, reflection and action in the world. The people – networked learning practitioners – who help such networks function have a more obvious pedagogical remit, but they too have and take opportunities to learn how to improve what they do: among other things, through their own learning networks. And those who carry out forms of research that are intended to improve the functioning of learning networks occasionally generate useful ideas – to be tested in practice – but they are also themselves active networked learners, picking up new concepts, methods and tools from others. Of course, one could push these similarities more strongly, and say that there is just one big complicated learning network. Without wanting to imply any sense of hierarchy or dependency, I think it is more helpful to say that there are still some clear roles and obligations – much still depends on who pays the salary and what outcomes are expected – so that we don't lose sight of the distinctive positioning of researchers, designers, teachers, professionals and their clients. But what we must not let that obscure is that *everyone* involved in networked learning is learning and helping others learn and that this learning activity has at least two foci: the learning task at hand and improving the efficacy of the network(s) in which that is happening. Nor does the extensive, widely distributed nature of the learning activity (sense-making, acting in the world) undermine the value of specialised or expert knowledge, or proficiency, in activities such as research and design.

Concluding Comments

In this chapter, I have argued that professional work often has a designerly quality. It frequently involves inquiry, reframing and action. Design inquiry combines a search for what is true, what is real and what is ideal. Design action involves composing and connecting: bringing people, tasks and things into a unified whole. I have also positioned design as an expert professional activity (offering a professional service) and as a vernacular activity (everyone designs).

The designerly work of professionals and the service work of (expert/professional) designers often involves:

- Co-designed services (and therefore co-inquiry and co-action)
- Collaborative services
- Relational services

Design research operates at two levels: an object level (level 1) – characterized by inquiry into 'the current problem' – and a meta-level (level 2), where the purpose is to improve design work in the future. Networked (professional) learning also operates at two levels: collaboration with others to learn how to tackle the current task and collaboration with others to improve one's capabilities for tackling future

tasks. Combining these perspectives, we can sketch a future for networked professional learning with social innovation at its heart and the co-design of collaborative services as its unifying practice.

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