NORDIC JOURNAL OF DIGITAL LITERACY

UNIVERSITETSFORLAGET

RESEARCH PUBLICATION

Vol. 13, No. 1-2018, p. 24–39
ISSN ONLINE: 1891-943X
DOI: 10.18261/ISSN.1891-943X-2018-01-03

Digital professional development: towards a collaborative learning approach for taking higher education into the digitalized age

Inger Dagrunn Langset
Professor, Department of Teacher Education, Norwegian University of Science and Technology
inger.langseth@ntnu.no

Dan Yngve Jacobsen
Associate Professor, Department of Education and Lifelong Learning, Norwegian University of Science and Technology
dan.jacobsen@ntnu.no

Halvdan Haugsbakken
Researcher, Department of Sociology and Political Science, Norwegian University of Science and Technology
halvdan.haugsbakken@ntnu.no

ABSTRACT

In Norway, digital skills are defined as an essential proficiency in the national curricular plans, and learning worldwide is in many ways changed by contemporary Web 2.0 technologies. Even so, teacher training is lagging behind when it comes to developing digital learning cultures and providing digital role models for future teachers. At the Norwegian University of Science and Technology (NTNU), we used a Massive Online Open Course (MOOC) approach to provide a digital professional development (DPD) program to faculties at the Department of Teacher Training. A main idea was to develop this program at the meso-level (horizontally) with some mutual structures and offerings, avoiding a top-down approach, which, based on experience, is likely to fail. The findings in this study present a four-step model, the collaborative learning approach (CLA), to account for the development and implementation of a blended learning MOOC (bMOOC) for professional digital competency development.

INTRODUCTION

Digital competence, which comprises digital knowledge, skills, attitude and literacy, has become a key competence in education in most developed countries. Norway is currently one of the most digitized countries within the OECD area. Digital penetration in several sectors of the society demonstrates Norway's digital maturity and readiness (OECD 2017). However, the government's strategy for digital competence development (Kunnskapsdepartementet 2017a) emphasizes the need to further strengthen the use of ICT in the entire educational system to prepare for working life. The focus on the possibilities afforded by digital technology and the emphasis on digital skills development put Norway in the digital forefront and make the country a case well worth studying.

In 2005, the Norwegian government defined digital skills as one of five key competences (Kunnskapsdepartementet 2005) and since then, all high school students have been provided with laptops. Initially, digital skills were linked to practical knowledge of various software programs (Erstad 2010). Over the years, however, a more sophisticated understanding of digital competence has developed; the upcoming generation should be able to use and produce multi-media content productively to learn, communicate, collaborate and present their work to various audiences. Furthermore, digital skills and digital literacy involve the ability to act responsibly online and to be conscious about an ethical use of the internet (Utdanningsdirektoratet 2015). Lately, there has also been a discussion as to the dangers that lurk online, for instance cyberbullies, haters, and trolls[1], and on how to enable teachers and parents to protect their children against digital risks[2] (PACER Center 2013).

Despite government policies, Norwegian teacher training institutions are lagging behind when it comes to encouraging new teachers to use ICT as tools for learning, communication and collaborative knowledge development. A report from 2013 (Tømte et al. 2013) states that teacher training in Norway does not live up to the expectation to educate digitally competent teachers, and that faculties in these institutions are mainly making use of traditional teaching methods. When used, technology is mostly limited to learning management systems (LMS) to administer learning, presentation tools to scaffold lectures, interactive tasks with instant feedback and digital portfolios to store and retrieve student work. Even if the teacher trainees belong to the digital generation, as coined by Tapscott (1998), they have limited knowledge about digital technology and social media when it comes to using these as tools to scaffold learning in didactical settings. Langseth (2012) shows similar findings and concludes that this is a fair picture of teacher training in Norway. The research suggests that teacher educators and student teachers follow the digital development in general, but that their awareness vis-à-vis digital technology and digital professional development is more poorly developed. This points to a challenge for the teacher training institutions.

In this study, we followed a group of pre- and in-service teacher educators in a vocational teacher-training program. The study took place from January 2014 to December 2016 at the Norwegian University of Science and Technology (NTNU). The teacher educators developed a blended learning MOOC (bMOOC) on digital learning and offered it to fellow

1. See for instance Commonsense Media, https://www.commonsensemedia.org/cyberbullying
2. Medietilsynet/ Nettmobbing: http://www.medietilsynet.no/barn-og-medier/nettmobbing/

teacher-training faculties as a resource to enhance their digital professional competencies. A main research goal in our study is to identify elements that will contribute to a change in digital practices after completing a digital professional development (DPD) program.

DIGITAL DEVELOPMENT IN INSTITUTIONAL SETTINGS

Over the last forty years, many institutions in higher education worldwide have initiated faculty development programs and other measures to enhance the quality of teaching and learning. Institutions usually organize the training in designated units where university teachers will come for shorter programs, usually between 7, 5 and 15 ICT credits. During the same period, learning environments in universities have changed significantly. Pedagogical understanding and discourse has developed, technology has offered unprecedented opportunities for access to education and enrichment, academic staff have engaged in reflections on their teaching, and recruiting students from new populations – ethnic, socio-economic and gender-wise – has indeed required new educational approaches (Chalmers & Gardiner 2015).

According to Bates, web 2.0 technologies, such as blogs, YouTube, smartphones and cameras, virtual worlds, and e-portfolios enable learners to collect, create, transform, adapt and share learning materials. Furthermore, these online tools can be used for collaborative learning, group work and projects, problem solving and creative thinking to develop necessary aptitudes in the knowledge economy (Bates 2010).

So far, higher educational institutions have been slow on the uptake of the benefits afforded by new technologies. Bound by tradition and accepted practices, and organized in geographically defined units, Bates (op. cit.) suggests that the old universities are likely to fall behind the more flexible "for-profit universities" in the pursuit of new methods of teaching and learning. According to Bates, this is mainly so because faculties will try to implement new methods in the existing structures and practices that have been there, literally, for centuries.

A fairly common and well-known approach to digitalization is individual, tool-focused and campus-based courses to implement tools already purchased by the organization. Typically, training relates to a certain digital infrastructure, such as an LMS, that the institution expects faculties to use in their courses. According to Kennedy (2006) such top-down oriented approaches normally comprise of centrally or externally delivered course content that will support existing routines, curriculum plans or even a political agenda. In addition, educators are also usually left with a limited degree of autonomy. Not well received by educators, these approaches do not necessarily serve the purpose of new digital practices or support the necessary change in educational cultures.

Nonetheless, the digital delay is probably also rooted in the long tradition of academic freedom, where autonomy to design courses according to personal pedagogical beliefs and established pathways is a key feature. A long tradition of freedom of individual professional development is also a main value contributing to this (Mårtensson & Roxå 2016). These traditions leave digitalization in the hands of individual faculties and let personal interest, values and preferences point out the direction and milestones for development.

Neither institutionalized top-down approaches at the macro-level, nor individualized private initiatives at the micro-level seem to bring the institutions up to standard when it comes to new technologies and disruptive practices. The meso-level, which is to be found in between these positions, also entails problems. Research into higher education in Scandinavia (Mårtensson & Roxå op. cit.), shows that peer engagement for teaching is highly collegial and contextualized. At the meso-level, we find micro-cultures that can be described as strong or developing. Mårtenson & Roxå find that *strong* cultures are resilient to change and tend to develop from micro-cultures where individuals co-shape their habits, norms and traditions over time. Faculties in these settings consider themselves autonomous and self-controlled and share certain assumptions regarding teaching and assessment that are implicit in the culture. Strong micro-cultures also take certain ways of securing high quality teaching methods with long traditions for granted.

Developing micro-cultures, on the other hand, share an interest in innovation, creating and shaping new approaches and new ways of interacting in and outside the group. Research on higher education carried out in Norway found that the attitude to new technologies in these two types of micro-cultures may impede or encourage digitalization (Fossland 2015; Jacobsen 2017; Langseth & Haugsbakken 2016). Consequently, leaving digital professional development entirely to the meso-level is also not a sustainable strategy when it comes to developing well-informed digital practices in higher education.

A brief review of the existing research literature confirms that digital professional competence is unevenly distributed among educators. In her study on digital enthusiasts in Norwegian higher education, Fossland (op. cit.) found that educators have developed pedagogical ways of using new technologies that will meet Norwegian and European standards related to educational flexibility, social cohesion, lifelong learning and the use of learning object repositories (LOR). She also found that their teaching relates to central aspects of quality in higher education, such as pedagogical variation, collaboration, authentic learning, and relevance for working life, constructive feedback and internationalization. At a strategic level, Fossland found that most Norwegian universities have developed some form of digital strategy. Nevertheless, the focus in these strategies is typically on digital infrastructure, technical support and short "top-down" courses on how to use specific digital tools. Pedagogical uses of new technology to enhance education in a long-term perspective, were rarely mentioned in these documents.

A national, quantitative report on higher education in Norway (Kunnskapsdepartementet, 2017b) states that educators' digital competency development is a long way down on the leadership's agenda and weakly anchored in educators' course descriptions, learning objectives and obligatory tasks.

The latest national model for faculties' pedagogical competency development comprises between one and two hundred hours of formal training, focusing on planning, learning activities, teaching, assessment and reflection. Learning objectives in these areas tend to emphasize the uniqueness of higher education, omitting, to a certain extent, digital competences and reflections on learning activities in digital environments (Lid, 2014). As for digital tools, the emphasis is on mastering the technology and its pertaining applications. Despite the emerging body of pedagogical literature on digital teaching and learning in higher education, an overall discussion, e.g. on how new technologies may change education and learning processes, seems to be missing.

"Studiebarometeret" (the study gage), a survey done by the National Board for Quality in Education (NOKUT 2016), reveals that most Norwegian students see digital media as important tools to promote cooperation and flexible learning. However, they are not so unanimous when it comes to how these media can increase motivation, determination and creativity. In these areas, most students do not experience digital media as important contributors to learning quality. An intriguing conclusion from the study is that these findings point to a strong potential for better use.

The new "St. melding nr. 16" (2016–2017) *Culture for quality in higher education* outlines several educational key concepts, e.g. assessment for learning and deep and transformative learning, stating that it is up to the institutions to find ways to meet these challenges. One of the measures from the government to make this happen is to offer personal incentives.

In brief, there seems to be an understanding of the need for change, both strategically and pedagogically, to prepare students in higher education for the digitalized age. However, institutions and individual teachers are offered a great portion of autonomy in how to deal with digital professional development.

In this study, we explore a middle-situated digital competency development initiative based on continuous collaboration among faculties and internal developers. Since knowledge acquisition apparently does not develop from externally defined designs at the macro-level, we move away from these top-down initiated courses to a middle-situated initiative based on continuous collaboration and research informed inputs. The assumption is that developing high digital competence in micro-cultures at the meso-level is a result of learning processes among professionals. Healey and colleagues (Healey et al. 2013) also support this hypothesis when they point out how change is based in networks with shared visions, goals, facilitation and individual reflections. In Norway, Postholm (2016) also finds that such collaborative settings have a positive effect on teachers' learning.

THE SMART LEARNING INITIATIVE

"Smart learning" (SL) was one of four projects funded by the top management of the NTNU and designed to improve the quality of education in the institution. The initiative, targeting teachers' and students' digital competence development, was a collaboration between the Department of Sociology and Political Science and the Department of Teacher Training. The project team involved five members, with different roles and complementary backgrounds, ranging from teachers and researchers to technical staff. Smart Learning's main product was a national MOOC on digital competence development running from 2014–16.

A by-product, the Smart Learning for Teacher Education (SL-TE) bMOOC started out as an explorative, collaborative learning network among a group of teacher trainers with an interest in educational technologies and disruptive learning practices. They decided to make a MOOC and, upon completion, they offered the MOOC to the entire teacher-training department. The vision was to develop and enhance online cooperation and networking among these educators and their students. The local management recognized the initiative, but never strategically anchored it in a local plan for digitalization.

Considering the relatively restricted number of participants, the term MOOC may seem inaccurate. However, the bMOOC with its digital architecture and the online accessible content, is scalable and flexible enough to meet the definition of the concept.

The program was meant to work as a form of continuing education for faculties. A main intention was to encourage faculties to use new technologies and social media, thus turning them into role models for other teacher educators and future teachers. A classic study by Lortie (1975/2002) showed quite early on that teachers do what their own teachers used to do and not what they are taught to do during their own pre-service training. Modelling good digital practices in teacher training is therefore of critical importance.

In an international review of 42 articles on student teachers' digital development, Røkenes & Krumsvik (2014) describe eight characteristics of successful digital competence development in teacher education. These are collaboration, metacognition, multimodality, modeling, authentic learning, student-active learning, assessment, and bridging the theory and practice gap. Interestingly, these are all recognizable and well established pedagogical concepts. We therefore claim that, rather than the pedagogical concepts embedded in the new technologies, it is the lack of knowledge related to the applications, hands-on skills and attitude that keeps educators in higher education away from using new technologies. The necessary question that arises is how to bridge new technology and educational concepts to develop actual digital competences that may enhance students' learning and social belonging while limiting drop-out rates.

In our recent research (Langseth & Haugsbakken 2016; Jacobsen 2017), we found that stakeholders may benefit from MOOC technologies to develop their digital competences, and that MOOC technologies may contribute to instigating sustainable educational change. The actual bMOOC approach was designed to offer the necessary scalability and flexibility to attract all faculties and inspire new digital practices across the entire teacher training department.

RESEARCH QUESTIONS

This case study follows the trajectory of an action research initiative where some of the activities were planned and implemented along the way. Apart from an overall idea to test out how DPD could be implemented from the meso-level, a stringent research protocol was not established in advance of the study. A main goal for the study was rather to identify components along this pathway that could contribute to the development of productive digital practices in a learning community.

Our research questions are as follows:

1. What components contributed to digital professional development (DPD) among the educators we follow in this study?
2. How can we describe a productive digital professional developmental process at the meso-level in a higher education institution, such as a teacher-training unit?

METHODOLOGICAL APPROACH

This case study was a part of the Smart Learning for Teacher Education project. The study developed through four phases. The first phase, lasting from January to April 2014, was the preparatory stage where teacher educators, after a general e-mail invitation, volunteered to partic-

ipate in a community of digitally interested colleagues. These faculties met on a regular basis, reading books, articles, testing tools and discussing approaches to digital learning. The focus was mostly on social networking and sharing to gain insight into digital learning. Data collection in this first phase consisted of participatory observation and field notes from the meetings.

In the second phase, from April to August 2014, the focus was on producing the MOOC content. All contributors had access to the online MOOC platform Canvas, and produced texts, videos and assignments and uploaded them to the platform. Each participant was responsible for one module, but everybody shared a mutual responsibility to give feedback and find digital tools that could serve a pedagogical purpose in the different modules. In addition, the participants also developed a theoretical framework to help MOOC participants make sense of the tools in a wider context. In this second phase, the main data come from both informal conversations and qualitative interviews with the MOOC developers.

The third phase, from August 2014 to December 2014, may be described as the implementation phase. The MOOC was offered to all faculties at the Department of Teacher Training, with 40 faculties signing up initially. It started with an open workshop on campus in August, with a new module introduced every three weeks throughout the semester. After the last module, there was a new workshop on campus where the participating faculties reported on how their newly acquired skills had come into use in their everyday professional work. In this phase we collected both participant observational data as well as two sets of interview data; one from some of the participants and one from some of the MOOC authors.

After closing the MOOC, there was a fourth phase concerned with changing the educational culture. This phase can be dated from January 2015 to December 2016. A main ingredient was faculties trying out new skills and testing new approaches to teaching, learning and assessment. In this phase, the project leader also further urged drop-outs to complete the MOOC in order to reduce attrition and enlarge the community of digitally skilled faculties. In this phase the MOOC developers also supported vocational teacher training faculties who tried out new assessment methods in their courses. Main methods in this phase of the data collection were participant observation, qualitative interviews and surveys. An overview of the four phases and pertaining methods is rendered in Table 1 below.

Table 1. Overview of data collection

Phase	Period	Methods	Number of informants
Phase 1	Jan–April 2014	Participatory Observation Qualitative interviews*	N/A 5
Phase 2	April–Aug 2014	Participatory Observation Qualitative interviews*	N/A 5
Phase 3	Aug–Dec 2014	Participatory observation Qualitative Interviews* Qualitative interviews** LMS-data	N/A 5 3
Phase 4	Jan 2015–Dec 2016	Participatory observation Survey Qualitative Interviews**	N/A 38 5

* These interviews involved the teacher educators who participated in phases 1, 2 and 3.
** These interviews were conducted in fall 2016 with the vocational teacher educators who joined the MOOC course in phases 3 and 4.

In addition, we also harvested numerical data from the learning analytics tools in the Canvas platform. Not primarily designed for research purposes, its statistical capacities are undersized, but, due to a relatively small group of enlistees (N = 40), this could be done. Both manual counting and re-entering of the data were used to draw information from Canvas. The data describe participant behavior along such parameters as regularity of page views, participations, relative activity and number of assignments submitted.

The overall methodological approach may be described as action research (Creswell 2012) where research methods are mixed (Creswell 2011) to answer the research questions and develop new insights. An obvious reason for describing this as action research is the design that evolves along the way, depending on accumulated experience and knowledge. In addition to being a research project, this was also an effort to develop a MOOC that would address some of the issues connected to teacher trainees' and teacher training faculties' job related digital challenges.

FINDINGS

Phase one, preparatory phase: The project was introduced as an open invitation to 78 faculties in the teacher training unit to participate in a peer group focusing on new technologies. Seven of the invitees turned up for the first meeting and formed a group of digital interest, agreeing to spend time together to develop their digital competence. There were no predefined learning objectives or assessment criteria, but they found a common interest in better understanding the potential of new technology in educational contexts and exploring the use of technology to enhance learning practices.

The group organized meetings on campus every two weeks and created a 24/7 community on Facebook. The group shared, curated and discussed pedagogical ideas, educational experiences, research, new technologies, new digital concepts etc. at flexible times.

The group mentors organized the meetings, curated literature, challenged beliefs and pointed to new technologies and possibilities. The group also read Howard Rheingold's book "Net Smart: How to thrive online" (Rheingold & Weeks 2012), and discussed concepts and tested out links and digital tools in the book.

At the organizational level, the local management was informed about the activity; they granted some money to buy books and some food and beverages for the late afternoon meetings.

According to the interview data, this was a motivating experience for the participants and they pointed out the community as a main success factor. One of the informants tells us that he likes

> "to work with OK people who are creative—innovative. I get new ideas myself, and it leaves room for self-development. The collaborative feeling adds to the motivation [….] I was inspired by the MOOC experience."

The group was also a main learning experience for the participants. Another informant tells us how he has

> "always been interested in technology, and now there is a new wave of technologies coming over us. … and how do I use this in my teaching? I spent some five hours a week learning new stuff and I learned a lot."

Overall, the group that was formed in phase one of the project became an important community of learning where the participants both challenged and inspired each other's beliefs and aptitudes related to digital learning.

Phase two, the production phase: After three months the participants had crystalized various areas of interest related to digitalized teaching and learning. Personal (online) learning networks (PLN), attention and multitasking, digital assessment practices, student response systems (SRS) in flipped classrooms and the use of Smartboards became main headings. Pertaining to their principal interest, the participants took responsibility for one main topic each. Inspired by the main Smart Learning MOOC project mentioned above, these topics were then organized as modules. The faculties then developed the content of their respective modules, but collaborated when learning how to use the Canvas platform. They also gave feedback on each other's work as it progressed. The work resulted in seven modules with explicit learning objectives, assessment criteria, as well as texts, articles, videos, and tasks to be completed on the way.

The Smart Learning project paid to get the MOOC online on Canvas, and the faculties who produced the modules were compensated with a fixed sum provided that they contributed when the course was offered to other educators in the department.

According to the interview data, working on the MOOC further deepened the working relationship between the participants and changed how they developed and shared knowledge. One participant states:

> "We discussed the concept of MOOCs and we collaborated. The MOOC is an area for dialogue that can instigate innovation. If knowledge is supposed to be scientific, it must be shareable, open. […] We did not only talk about technology, we actually wanted to get to know the technology by focusing on the production of learning objects."

From the data, it seems that the spirit of collaboration that was developed in the first phase remained in the production phase, when the educators volunteered to take responsibility for different modules. The network that was developed in the early community of learning was still strong and productive.

Phase three, the implementation phase: The next step was to offer the digital learning MOOC to fellow colleagues. The 78 faculties in the teacher-training unit received an e-mail inviting them to a two-hour seminar after work. In the seminar, we presented the MOOC as a low stake, collegial initiative suited for everybody. Initially, there were forty registrations. The group that in fact started the module was a middle manager, her group of seven vocational faculties, some in-service mentors and the Smart Learning project team.

As mentors, we spent time both online and on campus, curating ideas, knocking on doors and guiding educators technologically when needed. The middle manager also allocated time for the seven educators to reflect upon their use of technology in the vocational courses. By the end of the semester, we arranged an informal knowledge sharing conference, focusing on the digital experiences from using the MOOC content in their

courses. The management attended both the initial seminary and the final conference in December.

As the course platform data show, none of the participants completed the seven modules or submitted many of the proffered assignments during the first semester. From the number of page views, we see that the first two modules were relatively frequently visited, but that the number of page views declined dramatically when module three opened. The participants' relative activity during the 18 weeks shows a similar decline, and if we look at the assignments, we notice that very few of these were submitted on time. This tendency grew as the 18 weeks progressed; there was less and less activity in the MOOC platform. To sum up the course platform data, it is fair to say that despite the fact that we invited a selected group, the majority of those who enlisted never completed the course as it was designed. This severe instance of attrition during the first semester is described in more detail in previous research (Jacobsen 2017).

Even so, several of the attendees seemed to benefit from the initiative during the first semester, using the course material to develop their own teaching. The attendees seemed to choose approaches and tools that they expected their own students to benefit from. In doing so, they also disconnected from the timeline of the course and redefined the proffered material from an xMOOC to a cMOOC, as defined by Bates[3]. In short, xMOOCs are designer controlled offerings usually comprising a specific platform, video lectures, assignments and some form of final assessment. cMOOCs emphasize networking and participant contributions where participants are in charge of their own learning process. The MOOC and the online learning material, hence, becomes a source they connect to in order to harvest good ideas and improve their own teaching.

The MOOC also had an impact on how these vocational faculties thought about using technology in their courses. One of the participants tells us in the interviews that:

> "During the MOOC, we worked together in the department. We had meetings where we discussed the use of technology in our courses, and we decided that technology should be a central feature in all our courses."

This was also an impression that the members of the Smart Learning project team shared. One of the team members puts it like this:

> "The vocational participants were enthusiastic; they wanted something, especially the vocational teachers. They are very close to working life, where digital tools are in use."

Another member of the team describes the course as an eye-opener in that it became clearer how new tools could be used, such as making videos when recording the screen. In our previous research, we have described how video recordings became the backbone of one of the participants' mentoring of her own students when she recorded her feedback and made it available as video clips (Jacobsen, 2017).

3. In short, the terms xMOOC and cMOOC respectively refer designer controlled and participant controlled designs. For further explanations, see Bates (2016) Chapter 5.3: Variations in MOOC designs.

Even so, attrition was a reality and some of the MOOC content was never opened by many of the participants. One of the developers expressed his disappointment in these words:

> "I put a lot of work into making proper lessons, varied assignments and even videos, and must admit I felt disappointed when most of the participants never got to my module and only a few looked at the material that I offered."

The message that the teacher training faculties sent in the interviews was that they needed time to absorb, develop and pilot new ideas in their courses, and that there were several other demands restraining their time, e.g. research, assessment and family. Another disappointment to the developers was that none of the participants wanted study points, and therefore there was no candidates for the exam that was one of the options in the course.

Phase four, **maintenance and dissemination of DPD**: After completing the MOOC course, there was a fourth phase concerned with changing the educational culture. This phase can be dated from January 2015 to December 2016 and comprises faculties trying out new skills, testing new digital tools with their students and disseminating their experiences and new insights to their colleagues. In this phase we further urged drop-outs to complete the MOOC content to reduce attrition and educate digitally skilled faculties. Access to the MOOC on Canvas was kept open until December 2016.

On the practical side, a main approach was to stay in touch with the group of vocational teacher training faculties. The project group continued as curators and mentors in the network that was established in the project. Group members socialized, attended meetings held at the section for vocational teacher training, gave technical and pedagogical support and kept the MOOC offerings and the internal Facebook group going. The vocational teacher-training group continued to work on the MOOC material and, in the fall of 2016, the project team also collaborated with the vocational faculties to embed a MOOC in an Erasmus+ proposal that was later granted funding.

A change worth mentioning is the digitalization of the exam in one of the courses in the vocational teacher program that took place in the spring of 2016. The students were asked to use videos to document their research and development projects. They presented the videos covering their research at a conference held at the university, and subsequently handed in their multimodal texts for assessment. In general, this student group had little or no experience with the use of digital learning technologies, but data from the qualitative interviews suggest that the teacher trainees perceived their learning outcomes very positively.

> "It's the most fun thing that I have done throughout my entire studies. I really believe that I can use it later in my classroom practice."

> "It is an interesting way of working. It's challenging for us, who don't have particularly much digital competence. It has been a steep learning curve. When I improve my level of knowledge, I can start using video in my classroom practice at the school where I work."

As suggested by the data, classroom practices may indeed change for these teacher trainees. A standard career for high school vocational teachers like these is to be trained in a voca-

tional profession, e.g. as nurses, mechanics or carpenters. After working as teachers for a few years, they will also undertake the pedagogical training required to formally qualify. This is where the majority find themselves when we meet them in the teacher-training program, ready to go back to school with a changed outlook on digital learning.

As a part of the research on phase four, and to explore further the learning experiences from the video production, we also did a survey with 38 students in the vocational program. The students were asked to evaluate certain beliefs according to a Likert scale. We can summarize the findings as follows: Almost 60 per cent of the students see a great educational benefit when using new technology. More than 80 per cent agree that the use of video technology can be well suited in their classroom practice. On the other hand, mastering the practical skills involved in making videos is challenging. In fact, 42 per cent of the students disagree that it was easy to make videos and 68 per cent agree that it is more labor and time consuming to make videos than to complete written assignments. The data also shows that it is more motivating to work with videos than with written texts. More than 50 per cent of the students also agree that they prefer text and video assignments rather than written coursework only. In sum, the vocational teacher trainees are positive towards using videos in the classroom, but they acknowledge that working with videos is both work and time consuming. The findings mainly support the statements from the qualitative interviews.

DISCUSSION

As to the first research question, asking for components that contributed to DPD, we find that the horizontal approach in this study is important and productive. Local initiative, participation, as well as the feeling of autonomy that the participants experienced, are important factors that support this argument. In the framework of the bMOOC concept, the participants were free to explore new applications at their own pace and to decide on which new technologies to implement and how to use them in their courses.

Second, *management* support was also of vital importance. The top management in the department promoted the initiative and supported the faculties budget wise with a small amount of money. This had a positive effect on motivation in general and legitimized the participating faculties' work and effort. Our study also suggests that the management at the meso-level should be involved. We found that the middle manager allocated both time for the educators to collaborate and space to instigate formal changes in their courses. As a result, participants were motivated to stay engaged over a longer period. The vocational faculties were the group that most eagerly went on to implement new technologies and disruptive practices with their students as an effect of the SL-TE initiative.

As a third factor, the project supplied a *personal learning network* (PLN), where the participants could find ideas and operationalize new concepts related to new technologies and digital learning. Faculties are regularly told to "go digital" and are often introduced to digital tools. The challenge, however, is to change this massive material into meaningful digital learning environments. ICT is embedded in what can be described as the fast world, which, according to Levy (2006), is fast paced, information intensive and technologically savvy. Our study suggests that most educators will need a PLN that can curate news in this enor-

mous field, spanning new technologies, digital tools, blogs, tweets and ICT research. We found that developing micro-cultures at the meso-level could fill these roles when digital enthusiasts participate in the group. In our study, the digital enthusiasts were motivated colleagues who collaborated with other faculties as coaches, mentors and curators. As a fourth factor, these enthusiasts were probably an important force pushing the project forward.

A fifth factor is the availability of a knowledge bank of contextualized ideas related to humans and new technologies. The MOOC itself and its linked material served as such, or, in Siemens's (2005) terminology, as *nodes* that the participants could connect to for new ideas and practices. The faculties, to some extent, changed the rules of the game and turned the meticulously planned xMOOC into a cMOOC, where they dropped in and strategically picked the material that suited their needs and educational ideas (Jacobsen 2017). As mentioned, they also did not sign up for the optional exam. Even so, some of the vocational teachers tried out both video tutoring and digital exams with their students. In this way, the MOOC content and the video production tools that we offered became personal learning resources when they explored new digital practices.

The program that we developed in this study had four phases over two years: the preparation phase, the production phase, the implementation phase and the maintenance and dissemination phase. These four phases make up the *collaborative learning approach* (CLA) model at the meso-level. This model answers our second question: how to describe a productive digital professional developmental process at the meso-level.

The number of attendees varied in each phase. A common factor was peer initiative and learning. Even when the participants enrolled in the bMOOC, this was a resource they explored as a cMOOC, rather than a program they submitted to. In the fourth phase, ideas were also spread to the vocational teacher trainees, many of whom later expressed an inclination to test out the ideas in their own high school classrooms.

In the model, participants of equal standing, with their own ideas and agendas, come together to form a digital learning community, to build resources, to share these assets with other colleagues at the meso-level and to act as role models who disseminate new ideas to their students.

A limitation of the study, however, relates to the fact that out of the forty faculties who initially enlisted for the initiative, the main body of participants who stayed on and gained an obvious benefit from the initiative was a group of vocational faculties. As mentioned earlier, the fact that their middle manager allocated time for collaboration and space for formal changes, was evidently an important contribution. A second reason for this tenacity could be that they perceive themselves as belonging to one group, with a common identity. Participating in the MOOC initiative together with the others would let them sustain this identity and sense of belonging.

A third reason why the vocational faculties were the most determined participants could be that vocational experience outside schools had brought their attention to the digital demands in their respective professional domains. They knew that digital competence is important and useful in order to do the job that is expected. Hence, they are also willing to put in the extra effort that is needed to meet the standards. If this is the case, a main lesson to be learned is more actively to draw the attention of the more traditional faculties to the digital demands their teacher trainees experience, or will meet as future teachers.

CONCLUSION

In her analyses, Kennedy (2006) describes varieties of professional development along the following path: *transmission*, which is used to transfer knowledge to implement new routines or plans, through *transition*, which is used to support an agenda or a policy to *transformative*, which is used to develop new practices and cater for innovation. There is an expanding space for educator autonomy from the first to the last category.

The CLA model belongs to the last category. It provides educator autonomy, ideas for new practices and innovation. Rather than starting from institutional strategies and policy documents, it is also flexible and adaptive enough to handle educational challenges according to local needs and circumstances. An important feature is also that it allows for coordinated development and networking. Faculties at the same level can develop along the same path. In this sense, it also creates a developing micro-culture as discussed earlier, rather than a community of individuals, resilient to change, holding on to old solutions that are mostly obsolete.

In the CLA, developed in this project, the main motivating force was a collective process driven by the participants at the meso-level and their local mentors. Educators were free to explore and decide on what technologies to use and how to use these to enhance teaching and learning in the local setting. Contrary to top-down initiatives, this also supports the pedagogical variation and tailor-made solutions which are necessary in large heterogeneous organizations. Following the model, the teacher educators portrayed in this study became digital role models for their students, who returned to numerous schools with fresh ideas regarding digital learning.

Creating a community of learners at the meso-level was obviously useful in this study. The study was of a single case and, according to Kennedy (1979), findings in such studies can be transferred to other settings depending on contextual factors and the extent to which these are recognizable in new settings. It is up to the stakeholders and users in the new setting to decide if the similarities are there and sufficient to try out the solution. This is a kind of case validity that is also often discussed in medical or legal cases with similar symptoms or circumstances. A solution that solved one case might, if the the cases are similar enough, also be helpful in new cases (op. cit.). This also means that the CLA model developed in this study could be a valuable stepping stone in other cases of professional digital development where the local challenges are similar.

REFERENCES

Bates, T. (2010). New challenges for universities: Why they must change. In *U-D. Ehlers & D. Schneckenberg (Eds.), Changing cultures in higher education: Moving ahead to future learning* (pp. 15–25). Heidelberg: Springer.

Bates, T. (2016). Teaching in a Digital Age: Guidelines for designing teaching and learning. *Teaching in a Digital Age: Guidelines for Designing Teaching and Learning*, *31*(2), 70–76. https://doi.org/10.1017/CBO9781107415324.004

Chalmers, D., & Gardiner, D. (2015). The measurement and impact of university teacher development programs. *Educar*, *51*(a), 53–80. https://doi.org/10.5565/rev/educar.655

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. *Educational Research* (Vol. 4). https://doi.org/10.1017/CBO9781107415324.004

Creswell, J. W. and V. L. P. C. (2011). (2011). *Designing and conducting mixed methods research. Sage Publications, Inc.* Sage Publications, Inc.

Erstad, O. (2010). *Digital kompetanse i skolen – en innføring. (Digital competency in schools – an introduction)*. Universitetsforlaget.

Fossland, T. (2015). *Digitale læringsformer i høyere utdanning. Universitetsforlaget (Digital formats of learning in higher education)*. Universitetsforlaget.

Healey, M., Bradford, M., Roberts, C., & Knight, Y. (2013). Collaborative discipline-based curriculum change: Applying Change Academy processes at department level. *International Journal for Academic Development*, *18*(1), 31–44. https://doi.org/10.1080/1360144X.2011.628394

Jacobsen, D. Y. (2017). Dropping Out or Dropping In? A Connectivist Approach to Understanding Participants' Strategies in an e-Learning MOOC Pilot. *Technology, Knowledge and Learning*, 1–21. https://doi.org/10.1007/s10758-017-9298-z

Kennedy, A. (2006). Models of Continuing Professional Development: a framework for analysis. *Journal of In-Service Education*.

Kennedy, M. M. (1979). Single Case Studies. *Evaluation*, *3*(November), 661–678.

Kunnskapsdepartementet. (2017a). Framtid, fornyelse og digitalisering.

Kunnskapsdepartementet. (2017b). Tilstandsrapport for høyere utdanning 2017. *Report*. Retrieved from http://alturl.com/n6jvp

Langseth, I. (2012). Teknologi i et lærerstyrt undervisningsdesign for fremmedspråk. *Norsk Pedagogisk Tidsskrift*, *2*, 86–99.

Langseth, I., & Haugsbakken, H. (2016). Introducing Blended Learning MOOC – A Study of One bMOOC in Norwegian Teacher Education. In *Brinda T., Mavengere N., Haukijärvi I., Lewin C., Passey D. (eds) Stakeholders and Information Technology in Education. SaITE 2016. IFIP Advances in Information and Communication Technology, vol 493. Springer, Cham* (pp. 59–71). https://doi.org/10.1007/978-3-319-54687-2_6

Levy, D. M. (2006). *Mindful Tech. How to bring balance to our digital lives. Austin, Texas: Yale University Press.* Yale University Press.

Lid, S. E. (2014). Hva kreves av pedagogisk basiskompetanse for undervisning i UH-sektoren? (Basic educational competencies for teaching in higher education – what are the requirements?). *NOKUT*, 1–6.

Lortie, D. C. (1975). *Schoolteacher – A Sociological Study.* (2 Ed. 2002). University of Chicago Press.

Mårtensson, K., & Roxå, T. (2016). Peer engagement for teaching and learning: competence, autonomy and social solidarity in academic microcultures. *Uniped; Tidsskrift for Universitets- Og Høgskolepedagogikk*, *39*(2), 131–143. https://doi.org/10.18261

NOKUT. (2016). Studiebarometeret (National Survey on Learning Quality in Higher Educational Institutions). Retrieved from http://www.nokut.no/Documents/Studiebarometeret/2017/Studiebarometeret 2016_hovedtendenser.pdf

OECD. (2017). Digital Government Review of Norway Boosting the digital transformation in the public sector. Retrieved from https://nettsteder.regjeringen.no/bedrestyringogledelse/files/2017/04/OECD-Digital-Gov-Review-Norway-Brochure-FINAL-Web-sharing.pdf

PACER Center. 8161 Normandale Boulevard, Minneapolis, M. 55437. (2013). (2013). Cyberbullying: What Parents Can Do to Protect Their Children, 8. Retrieved from http://search.proquest.com/docview/1773224856?accountid=10673%5Cn, http://openurl.ac.uk/athens:_edu?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:book&genre=unknown&sid=ProQ:ERIC&atitle=&title=Cyberbullying%3A+What+Parents+Can+Do+to+Protect+Their+Chi

Postholm, M. B. (2016). Collaboration between teacher educators and schools to enhance development. *European Journal of Teacher Education*, *39*(4), 452–470. https://doi.org/10.1080/02619768.2016.1225717

Rheingold, H., & Weeks, A. (2012). *Net smart: How to thrive online. Mit Press.* Cambridge, Massachusetts, London, England: The MIT Press.

Røkenes, F. M., & Krumsvik, R. J. (2014). Development of Student Teachers' Digital Competence in Teacher Education – A Literature Review. *Nordic Journal of Digital Literacy*, (4), 250–280. Retrieved from https://www.idunn.no/dk/2014/04/development_of_student_teachers_digital_competence_in_teac

Siemens, G. (2005). Connectivism: a learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning.*, *2 3–10*(1), 3–10.

Tapscott, D. (1998). Growing Up Digital: The Rise of the Net Generation. *Library*. https://doi.org/10.1177/019263659908360714

Tømte, C., & Kårstein, Asbjørn; Olsen, D. S. (2013). *IKT i lærerutdanningen*.

Utdanningsdirektoratet. (2015). Rammeverk for grunnleggende ferdigheter Rammeverket skal brukes av læreplangrupper som er oppnevnt av Utdanningsdirektoratet for å bistå i arbeidet med å utvikle og revidere læreplaner for fag i Læreplanverket for Kunnskapsløftet . Fastsatt av Innhold 1 I, *30*(30), 1–19.