Face-to-face and remote teaching in a doctoral education course

Using flipped classroom, formative assessment and remote teaching to increase the teaching quality of a literature review course

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ABSTRACT

This case study examines face-to-face and remote teaching in a doctoral education course and ask if flipped classroom, formative assessment and remote teaching increase the teaching quality of a literature review course. To be able to answer the research question, design-based research (DBRC, 2003) and case study (Yin, 2009) were used as a research-pedagogical design and methodological framework. The selection of informants is based on purposeful selection (Maxwell, 2005) where one group of PhD candidates ($n = 24$) situated at the University of Bergen and one group of PhD candidates ($n = 12$) situated at Volda University College, were selected. The study indicates that the PhD candidates enhanced their understanding of literature review throughout the PhD course, they appreciated the course design, and the quality of their academic papers and their survey feedback indicated that they had a good learning outcome from the course. Despite some methodological limitations, this study shows that advanced video conferencing systems in combination with a well-prepared teaching design have several positive outcomes and can be used as a starting point for a more large-scale study. The study shows, despite former

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mixed experiences with remote teaching, that student participation via several campuses did not necessarily lead to poorer quality and poorer learning outcome for these PhD candidates in this case study. However, the case study also shows the need for more large-scale research which will give a more nuanced and thorough understanding of how we can increase the teaching quality of remote teaching as part of the training component in the PhD.

INTRODUCTION

Doctoral candidates are the "crown jewel" in Norwegian higher education; they conduct a demanding "academic marathon" in 3–4 years, they hold a high academic level, they mean a lot for research in Norway and they are important for recruitment to scientific positions both inside and outside of academia. In spite of this, only 2 out of 3 doctoral candidates complete (Kunnskapsdepartementet, 2017) their doctoral thesis, while more spend longer than planned before they dispute and fewer become researchers (Reymert, Nesje & Thune, 2017). Should we worry when there is a higher dropout at the doctoral level than in upper-secondary school and that fewer doctoral candidates will become researchers? Could this be related to doctoral supervision, the teaching quality of the thesis or is this related to other factors influencing PhD student-attrition?

Nevertheless, we are in a time of upheaval within doctoral education where a major increase in the number of doctoral candidates or "massification" has become a phenomenon in many countries; in Norway, the number of PhD candidates has increased from 4000 in 2002 to 10 000 in 2016 (150%) (Reymert et al., 2017). In light of this development, the new white paper "Quality in Higher Education" (Kunnskapsdepartementet, 2017), ICT-research in higher education (Ludvigsen, Krumsvik & Furnes, 2015; Krumsvik & Røkenes 2016) and the "silent revolution" within doctoral education the last 10 years (Krumsvik, 2016), show that there seems to be a certain potential to improve the teaching quality of the training component in the PhD.

In Norway, the pedagogy of doctoral education and doctoral supervision seem to be especially important areas to focus on in the years to come. However, the pedagogy of, for instance doctoral supervision internationally, has been described as poorly articulated and under-theorized (Halse & Malfroy, 2010, p. 80). The same could be said about the pedagogy of doctoral education in general where only 6 of 10 PhD candidates in Norway are satisfied with the teaching quality of the training component in their PhD (Reymert et al. 2017). In addition, we have very little research knowledge in Norway about how PhD candidates experience the teaching quality of remote teaching and distance-based cooperation, where PhD candidates are situated in two different locations, and where digitalization and video conference system are essential parts of a flipped classroom design. To examine the area further and achieve more knowledge, flipped classroom (Bishop & Verleger, 2013) and design-based research (DBRC, 2003, see below) focuses on if, and eventually how, we can enhance the teaching quality of a PhD course within academic writing and transferable skills (literature review-course). Thus, the research question for this article is:

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How do PhD candidates perceive their learning outcomes from a PhD course in literature review where flipped classroom, formative assessment and remote teaching are the central elements of the teaching design?

BACKGROUND

The background for this case study is that there is still relatively limited research knowledge about flipped classroom design, formative assessment and remote teaching in doctoral courses, and how these elements influence the training component of the PhD and the relationship between educational, study and teaching quality. NOKUT defines educational quality "(...) as the quality of teaching classes and other facilities for learning, and students' learning outcomes after completion of education in terms of knowledge, skills and skills general competence" (Skodvin, 2013, p. 2). However, it is important to distinguish between educational quality, study quality and teaching quality: "The term education quality is more general and more comprehensive than the study quality concept. The former includes everything from what is happening at the subject/study program level and up to the government's education policy means of promoting education quality. The study quality concept is thus narrower and refers to what is going on at the educational institution itself" (Skodvin, 2013, p. 3). Furthermore, one can say that the teaching quality goes further to the micro level, that is, the quality of teachers' teaching in the specific courses. This case study focuses on teaching quality of remote teaching when two fellowships groups are geographically located in different places. The term remote teaching means that the teaching goes on synchronously and differs from nearby designs where the teaching goes on asynchronously. In such context, it is interesting to examine how these fellowship groups experienced the content and the coherence between the different flipped classrooms, remote teaching and formative assessment elements integrated in the course design. The case study (Yin, 2009) focuses therefore on how one fellowship group ($N = 24$) of PhD candidates (and 2 course leaders) physically located at one university (University of Bergen), as well as one fellow group ($N = 12$) of PhD candidates (and 1 course teacher) physically located at another university (University College of Volda), experienced their learning outcomes in a doctoral course in literature review.

THEORETICAL FRAMEWORK

This case study relies on especially three theoretical lenses underpinning the three ground pillars of this design-based research study (DBRC, 2003): flipped classroom, formative assessment and remote teaching (distance learning).

When describing the theoretical underpinnings of the flipped classroom, there is reason to claim that the majority of studies in the field refer to the theories of Piaget (1967) and Vygotsky (1978). Flipped classroom, as it appears today with its distinctive feature of digital tools (artifacts), appears to relate also to more recent socio-cultural perspectives on learning (Wertsch, 1998; Cole, 1996; Stahl, 1993; Lave & Wenger, 1991; Wenger, 1998). The socio-cultural perspective emphasizes that learning is constructed in interaction with other people and artifacts, which has a significant focus on the basic thinking in the flipped

classroom. The Connectivist Theory of Learning (Ebben & Murphy, 2014) has taken these aspects further in the digital era and especially in relation to Massive Open Online Courses (MOOC).

Looking at what separates the flipped classroom design from a similar teaching design, Lage, Platt, and Treglia (2000) defines the flipped (or inverted) classroom as follows: "Inverting the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa" (p. 32). Despite this, Bishop and Verleger finds that "Most research on the flipped classroom employs group-based interactive learning activities inside the classroom (…)" (Bishop & Verleger 2013, p. 5). In their literature review of what has been published in scientific publishing channels, Bishop and Verleger (2013) found 24 scientific studies that were related to flipped classroom teaching. Several of these studies showed that students had positive experiences with the flipped classroom design, but only 2 of the 24 studies had a full scale flipped classroom design. In these two studies, Moravec, Williams, Aguilar-Roca, and O'Dowd (2010) found that the students performed 21% better on exam questions where a flipped classroom design was used. In Day and Foley (2006), the authors found that students who used a flipped classroom design scored significantly higher on all home assignments, project submission and tests. In the first meta-analysis on the effects of flipped classroom teaching, Hew and Lo (2018) examined 28 studies where they found that flipped classroom improves student learning in health professions education. The authors suggest having quizzes at the beginning of class in a flipped classroom design, and limiting the length for all video segments combined to a total of 20 minutes (Hew & Lo, 2018, pp. 9–10). Nevertheless, since there are still few systematic, large scale studies of flipped classroom design on PhD level, one has to be careful to draw hasty conclusions, and there is a need for future research. Therefore, it is important to take into account if it is the flipped classroom design, the teacher him or herself, a combination or other factors which impact students learning outcomes when using flipped classroom designs.

In a literature review from Estes, Ingram & Liu (2014) with a focus on higher education, the authors found that:

> The literature review reinforces the sense that the flipping technique is useful when seeking to optimize class time, support the development of higher-order thinking skills, and enhance teacher-student and student peer-to-peer interactions. The success of a flipped approach hinges on the synergy between instructor and students and requires sustained motivation and contribution before, during, and after live instruction (p. 4).

From this literature review, it is reasonable to claim that there still is little research knowledge on the PhD level about flipped classroom teaching. Therefore, this case study is positioned towards this gap in the research field.

Estes et al. (2014) also found in their literature review that there are four elements that are related to flipped learning (and flipped classroom), and which are included in a Flipped Learning model. The first element consists of a *Flexible Environment*, where it is assumed that student learning takes place both virtually (for example, through the web, remote teaching and learning platforms) and in physical learning environments (for example

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classrooms) with formative assessment integrated into such flexible learning environments. The second element is *Learning Culture* where there is a clear student-centered learning focus and where differentiation is an important pillar. The third element, *Intentional Content*, emphasizes deep learning and higher order learning related to Bloom's taxonomy (Anderson & Kraftwohl 2001). The fourth and final element in the Flipped Learning model is *Professional Educators*, where the teacher is the teaching designer, supervisor, provides feedback, runs small e-lectures, quality assurance video resources, etc. (Flipped Learning Network, 2014). This F-L-I-P ™ model is what separates flipped learning (or flipped classroom) from the nearby teaching design, and these four pillars are used in this case study to "scaffold" the teaching design.

Formative assessment is a theoretical lens in this flipped classroom design and is emphasized in Norwegian policies regarding higher education. Several Norwegian policy documents including the Qualification Framework for Higher Education (Kunnskapsdepartementet, 2014) and the new White Paper about higher education (Kunnskapsdepartementet, 2017) state that formative assessment should be a transparent and integrated part of every course designs (also on the PhD level). Therefore, the theoretical framework for the case study in this PhD course was also based on Hattie and Timperley's (2007) formative assessment model as shown in figure 1:
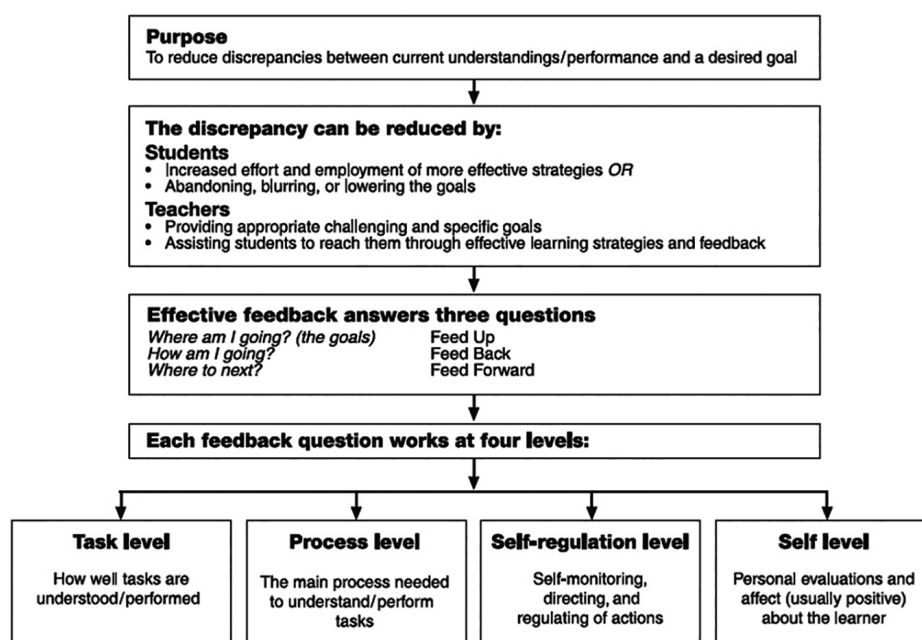

Figure 1 Formative assessment model (Hattie and Timperley, 2007, p. 5).

This formative assessment model mentioned above, was integrated into the flipped classroom design (based on design-based research design, DBRC, 2003), and we used the model below as theoretical "lenses" in different phases of the PhD course (shown in Figure 2).
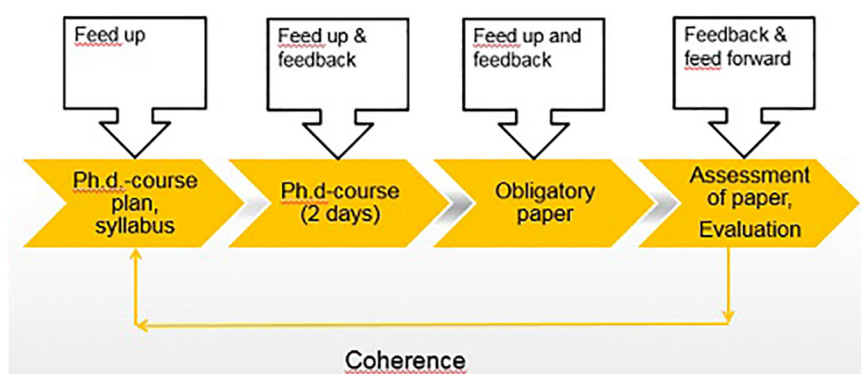
Figure 2 The formative assessment model applied in the case study

The concepts *feed up, feed back* and *feed forward* and the coherence between these, were important parts of bridging the theoretical foundations with the practical teaching design;

1. *Feed up* relates to the PhD course plan and the descriptions of learning outcomes in this course plan. Further, these descriptions of learning outcomes "steer" the reading list/ syllabus (and the video clips applied) so this stands in a dialectical relationship.
2. *Feed up* & *feedback*-processes take place throughout the two course days, and relate to the content of the course and are communicated both orally and through mediating artefacts *in situ* (Student Response Systems).
3. *Feed up* and *feedback* relate to the academic paper which is (A) attached to the course aim, and (B) related to the PhD students' needs.
4. *Feedback* and *feed forward*-processes in the final part are attached to (A) the feedback each PhD students receives concerning the paper generally (1–2 pages) from the course leaders, and (B) the feed forward the PhD student receives which is communicated directly in the text from the instructors in their academic papers (throughout the 10 page-long paper).

The third theoretical lens relates to *remote teaching* and *distance learning* as an important part of the teaching and research design, and was meant to fulfill one of the main aims of the PhD course: far-reaching cooperation between two academic institutions. A central issue in this PhD course was to explore whether it was possible to provide good teaching quality when we, through such far-reaching cooperation, mix a face-to-face group of PhD candidates in an auditorium at University of Bergen (with two lecturers in place) with remote teaching where PhD candidates are situated in Volda University College (with 1 lecturer in place) 330 km away.

The philosopher Emmanuel Lévinas (Aarnes, 1998) claims that face-to-face meetings have strong ethical aspects grounded in human nature, which calls for empathy, human touch and understanding. The sociologist Zygmunt Bauman (2007) has followed up the ethics of Lévinas, where also the face-to-face meeting is the starting point. Bauman is particularly concerned about social structures that make "face meetings" disappear and be

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replaced by virtual communication through social media (in addition to being anonymous). The awareness of such aspects are important to consider in pedagogical aspects of remote teaching. At the same time, we might say that listening to music through the radio or TV can give great moments even if this is "remote listening" and not a face-to-face meeting with the artists. Is it possible to achieve some of the same results in remote teaching? The case study will examine some of this based on the assumption that remote teaching positions itself as a synchronously virtual face-to-face meeting mediated through advanced video conference technology.

In the last five years, we find that different Massive Open Online Courses (MOOCs) have entered this area of remote teaching and distance learning (Ebben & Murphy, 2014). In Norway, we recently got our own policy document (NOU) about MOOC: *MOOC to Norway – New Digital Learning Methods in Higher Education* (Offentlige utredninger, 2014). It is not within the scope of this article to examine this area, but rather focus on the studies examining online learning environments that have a socio-cultural learning paradigm as underpinning (Dillenbourg, Baker, Blaye, & O'Malley, 1995; Koschmann, 2001). The socioculturalist Roger Säljö underlines that when we change the communicative ecology of our daily practices, we influence the way in which we interact (Säljö, 2010). Andersson (2010) finds some tendencies of this in her doctoral thesis where the students experienced the change of such learning practices as a major challenge (Andersson, 2010, p. 5). Several studies show that this requires both a digital didactic and a digital competence (Krumsvik & Almås, 2009; Grov, Almås & Krumsvik, 2013). Especially challenging is how we can scaffold learners in digital relational competence and create a teaching design that supports both student groups – one face-to-face and one through remote teaching. Therefore, flexible education, remote teaching and video conferencing can give certain opportunities, but as Guri-Rosenblit states, there is still a large gap "between some sweeping expectations as to the potential of the new technologies and their actual implementation" (Guri-Rosenblit, 2009, p. 12). Lawson, Comber, Gage, & Cullum-Hanshaw, (2010) find that video conferencing is still at an early stage and argue that the field of video conferencing in education is under-researched area. According to Selwyn (2011), there is still a need to examine how students experiences remote teaching which is the main focus in this study.

It can also be mentioned that today, it is quite common within flexible education to apply educational desktop video conferencing which normally means that students are geographically separated from each other and the teacher, and can participate in an common online classroom. Desktop video conferencing tools like Blackboard Collaborate and Adobe Connect are quite common tools for this purpose, as well as more less powerful yet freely available tools like Skype, Google Hangouts and Facetime. All these allow synchronous communication and interactive learning environment tools. However, our former experiences with such tools have revealed several "hurdles" attached to students' different broadband capacity in their homes or workplaces, which gave a number of problems with picture quality, sound problems, technological delays and students' "dropping out" of the live/synchronous online lectures. This resulted often in challenging teaching environments – both for teachers and students. Based on these experiences, we wanted to move a step further from educational desktop video conferencing and examine how a more advanced video conferencing system (Cisco© Video Conferencing System) could function in such

remote teaching settings. This video conferencing system was already implemented in at one of the campuses as part of their daily practices (Volda University College). At the other campus (University of Bergen) we implemented this video conferencing system only for this PhD course and the case study.

METHODS

To be able to answer the research question, design-based research (DBRC, 2003) and case study (Yin, 2009) were used as a research-pedagogical design and methodological framework.

DBR is "a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories"[1] (Wang and Hannafin 2005, p. 6). Inspired by design-based research and design experiments (Collins, 1992; Brown, 1992; DBRC, 2003), this case study's (Yin, 2009) selection of informants is based on "purposeful selection" (Maxwell, 2005) where one group of PhD candidates (n = 24) situated at University of Bergen and one group of PhD candidates (n = 12) situated at Volda University College, were selected for the case study. We applied both document analysis (Merriam, 1998) where the learning objectives in the course plan that the intervention was associated with were analyzed (literature review course). In addition, the document analysis also included the evaluation of the PhD candidates' academic papers in the last part of the course. Further, three surveys (developed by the course leaders and researchers) were applied as well as informal conversations with PhD candidates at Volda University College.

McCune (2017) and Thomson (2015) underline that informal conversations about teaching provide rich opportunities for pedagogic development, "yet these informal exchanges are rarely considered in the current discourses relating to continuing professional development for teachers in higher education" (McCune, 2017, p. 10). Our claim is that informal conversations yield qualitative data that may both supplement and enhance the understanding of the PhD course gained through the formal evaluation. Informal conversations enabled us to follow up responses and deepen our understanding of the emergent finding during the different stages of the course and the research project (cf. Figure 3). Such informal conversations took care of the case study's typical "how" and "why" questions and allowed for further validation of the other data sources.

The activity

Preparation

The focus was specifically on how the PhD fellows experienced the preparatory phase of the course, the two course days, and the post-work phase with the course based on a flipped classroom design (Bishop & Verleger, 2013) through the ten-week course period (see Figure 3).

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1. The five basic characteristics of Design Based Research are: "(a) pragmatic; (b) grounded; (c) interactive, iterative, and flexible; (d) integrative; and (e) contextual (Wang & Hannafin 2005, p. 7).
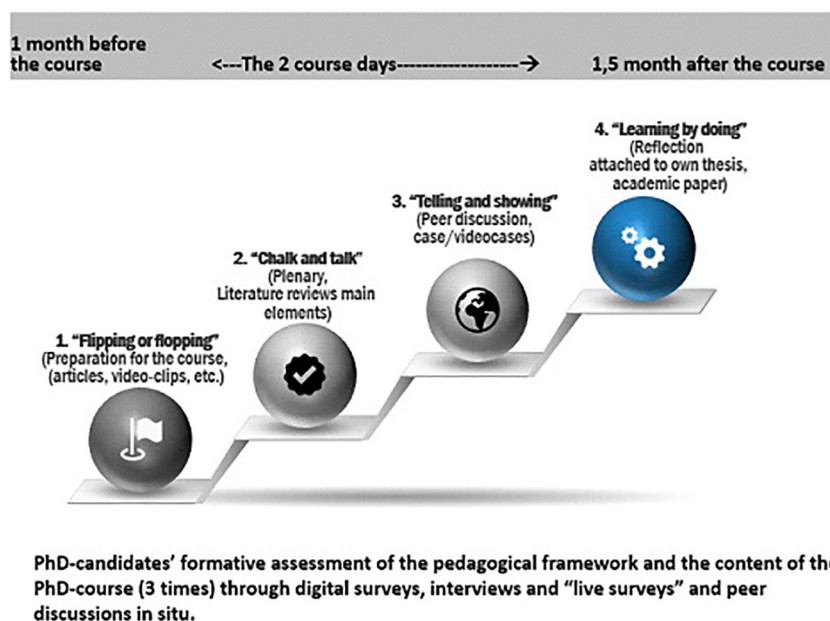
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Figure 3 The pedagogical design of the PhD course

As we can see in Figure 3, the PhD students were exposed to a flipped classroom teaching design throughout the course and different pedagogical methods and digital tools as an attempt to enhance their understanding and to give, and receive formative assessment before, under and after the course. The coherence between video clips and reading list before the course and the content in – and after – the course, was therefore essential.

One month before the two course days, the PhD candidates received the first (out of a total of six) video clip (app. 5 minutes long) about literature review on a Facebook page[2] especially made for the course. In the following weeks, the PhD candidates were exposed to new video clips regularly and they used their own smartphones, tablets or computers to watch these video clips. Since the technology density in Norway is very good, access is normally not a threshold for these PhD candidates (Statistics Norway, 2016; MediaNorway, 2017). However, they could get computer access through the library facilities and in other areas of their universities if they do not have their own computers.

The PhD candidates gave us feedback concerning their own experiences of these six video clips before the two course days. This feedback was communicated to us anonymously through the survey software and technological artefact SurveyMonkey[3].

Directions

The main part of this course was the two course days, which consisted of a pedagogical framework (see Figure 3) and remote teaching for one PhD group (N=12) and a face-to-face teaching for one PhD group (n=24) synchronously (see Figure 4). The two teachers at University of Bergen had prepared the teaching design together with the additional teacher

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2.   See here: https://www.facebook.com/Phd-kurs-503921176474052/
3.   See here: https://www.surveymonkey.net/

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at Volda University College. Therefore, the PhD candidates in Volda received the same course resources, handouts and information as the PhD candidates in Bergen.

Figure 4 The infrastructure of the far-reaching cooperation.

We explained the framework for all the PhD candidates synchronously by using the following metaphors: "Flipping or Flopping" (The idea behind the flipped classroom and remote teaching design), "Chalk and Talk" (teacher-centered instruction about research, frameworks and theoretical introduction), "Telling and Showing" (student-centered sequences with telling and showing the "handcraft" of literature review) and "Learning by Doing" (student-centered video cases, peer discussion, SRS). In addition, the PhD candidates were encouraged to have "mini conversations" in break times (6 x 15 minutes), during lunchtime (1 hour x 2) and during social activities in the evening (1–2 hours) about "ups and downs" with their literature review process.

The first part of the plenary lectures ("Flipping or Flopping") introduced the flipped classroom design (Bishop & Verleger, 2013) and explained to the PhD candidates the idea behind the course design. In the second part ("Chalk and Talk") of the plenary lectures, we focused on frameworks, theories and research concerning literature reviews, what distinguish them from each other and Norwegian policies and regulations about literature review on a PhD level. We also focused on formative assessment (Hattie & Timperley, 2007) and how this was applied in the teaching design. In the third part of the lectures ("Telling and Showing"), we focused specifically on the "handcraft" of literature review and especially attached to the doctoral thesis with active use of especially one framework by Boote and Beile (2005).

The fourth part, "Learning by Doing" was essential for using video cases, peer discussion and Student Response Systems (TurningPoint and Flinga) to let the student communicate their reflections and thought around video case questions.

The video clips in the Flipped classroom were meant to be six "mini lectures"[4] (app. 5 min.) giving the PhD students an introduction to literature review as a methodological "handcraft". The video clips were created by two of the lecturers and had a clear coherence with the reading list, the learning outcomes for the course and to the upcoming course days and academic paper. We encouraged the PhD candidates to watch the video clips and asked the PhD candidates at the start-up of the course: "Have you watched the six video clips before the course ("Flipped learning")?" (*N*=31). Eighty percent of the PhD candidates answered that they had watched these video clips and we also asked them: "Have you read the recommended literature for the course?" (*N*=31) where only 24% had read the recommended course literature (see Figure 5).
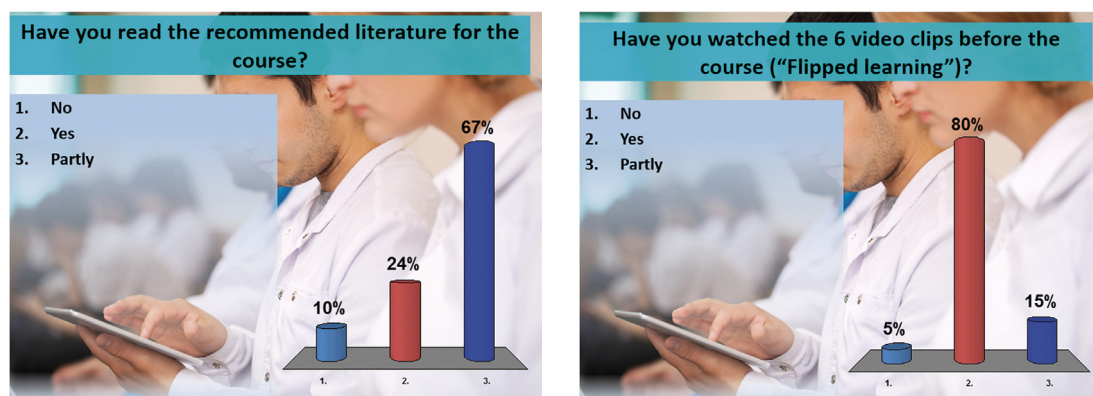

Figure 5 PhD candidates' responses on the video and reading preparation for the course

During the two course days, the PhD candidates responded anonymously *in situ* to 4 video case questions by using Student Response System ("clickers"). The results from the PhD candidates[5] appeared after 30–40 seconds on the big screen in the front of the auditorium

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4. See here: https://vimeo.com/208388452
5. However, the PhD candidates from Volda University College took this sequence based on pen and paper, and where the lecturer in Volda summarized their views in a plenary discussion and communicated the main tendency to Bergen.

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(shown as statistics, bar charts). These results created a moment of contingency defined as moments "in which the direction of the instruction will depend on student responses" (Leahy, Lyon, Thompson & Wiliam, 2005, p. 6). We then encouraged the PhD candidates to comment on the results and this stimulated a fruitful discussion.

To avoid only quantitative statistics and "surface discussions" in these video cases, some of the video cases included another digital SRS-element. After the PhD candidates had responded with Student Response System ("clickers"), they also had to communicate their reflections and feelings with text through a different Student Response System (Flinga). Here, they could anonymously communicate qualitatively why they answered the way they did with the SRS ("clickers") video case question. While the PhD candidates used their smartphones, tablets or computers to communicate their reflections and feelings (max. 4 min.) all of these answered appeared "in situ" and live on the big screen at the front of the auditorium (as text boxes dropping down from above). In this way, all the PhD candidates could see everyone's short narratives around the video case questions, and Flinga mediated and made explicit their inner thoughts. This created a new moment of contingency and the lecturer went through each and one of the textboxes, and read these for the whole audience and invited everyone to comment on the different answers. At the end of this part, the lecturer encouraged the PhD candidates to follow up with informal communication and "mini-conversations" about these responses during break times, lunchtimes and social activities in the evening.

By communicating and visualizing all of the answers generated by the PhD candidates' video case questions, the lecturers attempted the following: (1) to build on the six video clips and bridge some of the gaps between theory and practice; (2) to establish a collective culture for communication and "sharing and caring" in the auditoriums; (3) to raise the awareness around the challenges the PhD candidates experience around academic writing (literature review); and (4) to focus on the importance for PhD candidates to learn about literature review for their doctoral thesis as well as a transferable skill outside of academia.

Debriefing

The course leaders created two feedback-surveys before and after the course as well as Student Response System responses throughout the two course days. We also had informal conversations with the PhD candidates via e-mail, during break and lunchtimes, and when they wrote their academic papers. The main objective with these different arenas for debriefing was both to get feedback on our course design before and after the course as well as a "there and then" feedback (Hattie & Timperley, 2007) *in situ* during the two course days.

On this backdrop, we tried to apply the same principles from the formative assessment part throughout the course as a ground pillar of the debriefing as well. Seen in entirety, the most important debriefing happened in the last part of the course where the PhD candidates got feedback and feed forward (Hattie & Timperley, 2007) on their academic paper. However, the whole course design gave the PhD candidates the opportunity to become more aware of the importance of giving and receiving feedback in learning processes. Altogether, the formative assessment and the flipped classroom design seemed to have given a more fertile ground for professional communication between PhD candidates and course

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leaders. The advanced video conferencing system was quite a technological leap from other video conferencing desktop systems, and gave the remote teaching a new dimension because of very high screen resolution, top sound system, lack of technological issues and delays, user-friendly interface, and in general high quality of the equipment.

Appraisal

The PhD candidates were exposed to flipped classroom teaching design throughout this course and we used a number of digital tools (see appendix) to give and receive formative assessment before, under and after the course. We tried to establish a coherence between video clips and reading list before the course and the content in – and after – the course. The combination of technology-enhanced learning, peer discussion, video cases, high quality of video conferencing system and our theoretical underpinnings, increased the formative assessment possibilities and altered the teaching quality of the course.

The six video clips made for this course were created using Screencast-O-Matic,[6] Windows Movie Maker[7] and the camera on a smartphone. The Student Response Systems applied in this activity are based on an "easy-to-use" free trial version of Flinga[8] and the licensed hardware/software TurningPoint[9]. It is also possible to use a free trial version of SRS software (Flinga and Socrative[10]), and so this could be a low cost activity. Applying Student Response System *in situ* gave 100% response rate so that every participant's "voice" was recognized, and this altered some of the "asymmetric power relationship" which we find in traditional lectures where the lecturer steers the monologue or dialogue, and often acts as a "sage on the stage" (Van Dusen 2000).

Finally, as part of the design-based research and case study methodology attached to the course design, we asked the PhD candidates to assess the course. This part shows that 29 out of 31 fellows experienced to a very high degree or to a high degree that the course included the objective of introducing literature review as an academic genre. Moreover, 22 out of 31 fellows experienced to a high degree or to a high extent that the course included the goal of learning to do a literature review as part of a doctoral dissertation. In addition, 21 out of 31 fellows expressed to a large extent or to a large degree that the recommended literature for the course supported their learning outcomes from the course. Furthermore, 26 out of 31 fellows found that the six video clips (designed specifically for the course, flipped classroom) supported their own learning outcomes from the course to a very high degree or to a high degree. Additionally, 23 out of 31 fellows expressed to a very high degree or to a high degree that the lectures ("Chalk & Talk") supported their own learning outcomes from the course. At the same time, 26 out of 31 fellows found that they had a very high or high learning outcome from this course. Finally, 24 out of 31 fellows expressed that the advanced video conferencing system used during this distance-capturing course was a good tool for collaboration.

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6. See here: https://screencast-o-matic.com/
7. See here: https://www.microsoft.com/en-us/windows/
8. See here: https://demo.flinga.fi/s/DAB7PDH
9. See here: https://www.turningtechnologies.com/response-options
10. See here: https://www.socrative.com/

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However, from a critical point of view, we wanted to examine these positive survey results more thoroughly from the PhD candidates who were situated at Volda University College and experienced the remote teaching part. We wanted to use the opportunities for learning represented by interaction and informal conversations with the PhD candidates before, during, and after the PhD course (McCune, 2017; Thomson, 2015). Our empirical material enabled us to investigate how the learning outcomes were experienced across the two campuses in the project. University of Bergen (UoB) played the leading role in the project, both by hosting the PhD course and as their staff gave most of the lectures during the two-day course. In comparison, Volda University College (VUC) were more on the receiving side, with one short plenary lecture as their major theoretical contribution to the course content. The sub-research question for this part was therefore: How did this asymmetry influence the candidates' learning outcomes?

The main result in the evaluation was that the PhD candidates' overall reported learning outcomes were close to identical (UiB 5.09 out of 6.00 – VUC 4.89 out of 6.00) across the two campuses. For the purposes of this article, the use of digital tools and the experiences of using the video conferencing systems is of particular importance. The candidates reported that the six video clips played an important role in preparing them for the lectures and the course reading list (UiB 5.14 out of 6.00 – VUC 5.11 out of 6.00). Informal conversations indicated that the candidates experienced the clips as an effective way of preparing for the two-day course and as a valuable supplement to the reading list. A more substantial finding emerged from conversations with participants from VUC, "the receiving side". Several of these emphasized the use of SRS as an important element of the course design, and they valued the interactive and dialogical modes of teaching. The material indicated that the use of Student Response Systems created a safe environment for discussions, "Since I am a bit shy, the Flinga pushed me to tell my opinion:)". The anonymous answers from Flinga were projected on a big screen. The use of Flinga gave everyone a voice in the discussions of core elements from the course, it challenged the participants' own reflections and encouraged active participation, thereby reducing the dangers of falling into the role of a spectator. One of the candidates even suggested that the use of SRS contributed to her experience of well-being in the educational setting. She stated that the pedagogical thinking and digital tools created an experience "where we, sitting in that room could experience that we were interesting as participants and that we mattered".

The material indicated that the quality of the video conferencing system was important for the candidates' overall learning outcome. Firstly, the candidates from both campuses rated the use of video conferencing system as a tool for cooperation across campuses very positively (UiB 5.10 out of 6.00 – VUV 5.22 out of 6). PhD candidates from the remote campus were slightly more positive. Secondly, the candidates from Volda reported that the video conferencing system used in this project was much better than similar tools like Skype or Adobe Connect (5.83 out of 7.00), "I felt fully integrated as a legitimate participator sitting in Volda". Informal conversations added to this picture and underlined the importance of big screens and good quality of sound, "The fact that the screen was big and there were few technical problems made Bergen more present". The VUC candidates underlined the importance of having a local course teacher as a facilitator and a moderate size local group where they could also "interact and discuss in an old-fashioned analogous

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way". The local discussions seemed to be particularly important for the candidates at the remote campus.

The VUC candidates were asked to compare their participation on the PhD course via the video conferencing system with their experiences of physically attending other PhD courses. Surprisingly, the candidates reported that attending this course was slightly better or the same as physically attending other courses (4.13 out of 7.00). The informal conversations added nuances to this finding. One of the candidates said, "It's good for the environment and our economy, and it makes other and perhaps better learning resources available". Several of the VUC candidates appreciated that courses made available via video conferencing systems provided them easy and inexpensive access to high quality PhD courses. They valued the opportunity to participate in the course offered at University of Bergen while remaining in the routines of their daily lives. An additional advantage is that cooperation across campuses is a good way to use the competence of the lecturers.

SUMMARY AND IMPLICATIONS

This PhD course in academic writing enabled PhD candidates to learn about academic writing (literature review) where flipped classroom, formative assessment and remote teaching were central parts of the teaching design. Based on this, we wanted to examine the research question: *How do PhD candidates perceive their learning outcomes from a PhD course in literature review where flipped classroom, formative assessment and remote teaching are the central parts of the teaching design?* To be able to answer this research question we applied both document analysis, surveys and informal conversations.

The PhD candidates were exposed to flipped classroom and remote teaching design throughout the course and used a number of digital tools to give and receive formative assessment before, under and after the course. The coherence between video clips and reading list before the course and the content in and after the course, was essential. Therefore, all use of Student Response System (SRS), video cases and peer discussion was applied to underpin this coherence and related to the aim of the course: to learn the "handcraft" of carrying out a literature review in their own doctoral thesis. Through the evaluation part of this PhD course, we examined the relationship between the *formulation arena* and the *realization arena* (Lindensjö & Lundgren, 2000): are the good teaching design intentions enshrined in practice?

Firstly, we have to underline that there are several limitations in this study related to scope and sample size as well as the explorative design of the study. With the awareness of such limitations, we will below present our findings from the study. Based on the document analysis (especially the academic papers), surveys and informal conversations we found that the PhD candidates through their participation in this PhD course:

- Enhanced their learning outcomes throughout the course;
- They seemed to increase their understanding of the importance of communicating their reflections before, in and after the course orally and through technological mediating artefacts, to achieve formative assessment processes in such a flipped classroom and remote teaching design;

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- They seemed to recognize the importance of coherence between different course elements when flipped classroom design is applied;
- They identified and applied the three principles of Hattie and Timperley's (2007) formative assessment model as ground pillars in the course;
- 70% of the PhD candidates handed in and produced high quality academic papers related to their own thesis and that could be applied as a part of their doctoral thesis.

Concerning one of our main theoretical lenses, we find that our flipped classroom teaching design is not a fully flipped design, but a partial flip, single-group design (Bishop & Verleger, 2013). However, at the same time, we will underline that the combination of video clips, assessment assignments and the academic paper created a quite big workload before and after the course days. Therefore, this design positions itself as something more than activities within a classroom setting and relates clearly to all four pillars F-L-I-P ™ (Estes et al., 2014).

The study also shows that the PhD candidates experience a good learning outcome from the course through this ten-week period.

Nevertheless, even with the above-mentioned methodological limitations and reservations it is timely to ask what this (perceived) progress for these PhD candidates is due to? Is it the actual teaching design in itself that gives this progress (with flipped classroom, formative assessment and remote teaching)? Alternatively, is it the high quality of the video conferencing system, or the use of an additional teacher (at remote campus) or a growing digital relational competence among both teachers and students? On the other hand, is it the combination of these?

With these reservations, it is reasonable to claim that the teaching design gave some new conditions for knowledge construction (Piaget, 1967) and students' proximal development zone (Vygotsky, 1978). These new conditions also arose as a result of the digital artifacts' being contextualized, which James Wertsch (1998, p. 24) underlines as very important and that "(…) tools have no meaning outside the culture that gives them meaning and purpose". The *technological implications* of our study are therefore essential as it shows that digital relational competence is important, a variety of digital tools seem to be necessary in such courses, and the quality of the video conferencing system seems to be of high importance. The *pedagogical implications* of our study show that a solid teaching design seems to be essential to succeed in such flipped classrooms and remote teaching designs. This can in future improve the coherence between the teaching, study, and educational quality in the training component of the PhD. The *empirical implications* of this study show positive tendencies, but the small scale of this case study calls for what Lawson et al. (2010) and Selwyn (2011) claim, that there is a need for more research in this area in order to examine how students experience remote teaching (distance learning) across different student groups, teaching designs, etc. The *theoretical implications* of the study show that the socio-cultural perspective functions quite well as *theoretical lenses* in this kind of design-based research which involves many digital artifacts, peer discussions and formative assessments. The *ethical implications* of the study are related to the awareness that in remote teaching there are several ethical concerns regarding design-based research and where teaching and research go "hand in hand". This is important to apply for (ethics), prepare for (design) and discuss

(with the students). It is also an often-asymmetric relationship where especially the remote teaching can be vulnerable regarding ethical issues of equal participation, student-including, and so on.

As a whole, this case study shows that advanced video conferencing systems in combination with a well-prepared teaching design have several interesting outcomes and can be used as a starting point for a more large-scale studies. The study shows, despite former negative experiences, that students' participation via several campuses does not necessarily lead to poorer quality and poorer learning outcome for these PhD candidates in this case study. However, in the further research there seems to be a need for sorting out practical aspects of PhD candidates' positive response (avoid traveling, save the environment, etc.) from the aspects directly related to learning through remote teaching. This will give a more nuanced and thorough understanding of how we can increase the teaching quality of the training component in the PhD.

Acknowledgements

APPENDIX

Digital tools	Practical purpose	Pedagogical purpose
Word	Edit course plan, make the course program, make assignments, etc.	Digital format is a requirement from the faculty and easy to distribute.
Acrobat Reader	Convert the course plan to pdf-file	Course plan always distributed in pdf-format
Survey Exact	Make the registration form for the course	Necessary to get an overview of the registered students
Outlook	Submit invitation to the course	The most common way to submit course invitations and follow up information
WM Capture	Make screen videos for the course	Necessary in Flipped classrooms design when making video clips for the course
Windows Movie Maker	Edit video clips for the course	Necessary for adapting the video clips to the course plans aims and the PhD's needs.
Survey Monkey	Survey before the course and the evaluation after the course	Get feedback on what the PhD students want us to focus on in the course as well as getting feedback on their learning outcome after the course

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Digital tools	Practical purpose	Pedagogical purpose
Screencast-O-Matic	Screen-capturing software for creating Flipped classroom videos	Necessary in Flipped classrooms design when making video clips for the course
Facebook (https://www.facebook.com/Phd-kurs-503921176474052/)	Facebook page for the course	At this web page the video clips (Flipped Classroom) were distributed before the course
PowerPoint	Presentation program applied before, under and after the course	To use the multimodal possibilities in the PP to visualize and expand the pedagogical methods
Digital videocamera (iPhone)	Recording of the lecturers before the course (Flipped classroom)	Easy way to make video clips adapted to the PhD students' needs in the course
Mitt UiB (Canvas)	Learning Management System for the whole course	At this learning platform the course plan, syllabus and other resources for the course are allocated
Student Reponse System, TurningPoint	Used during the two course days	An important tool to activate and visualize all the PhD students' "voices", to get formative assessment and to establish more interactivity and peer discussion based on video cases
Student Reponse System, Flinga	Used during the two course days	To build further on the TurningPoint-results to dig deeper into the PhD students' reflection, critique and inner thoughts about important questions discussed.
Excel	To convert and handle the Flinga-data	To summarize all the PhD students views, reflections and meanings for their own sake and as a feedback for the lecturers
NVIVO	Demonstration of qualitative software for analyzing qualitative data	For letting the PhD students get an insight into the possibilities this program gives concerning literature review
Atlas.ti,	Demonstration of qualitative software for analyzing qualitative data	For letting the PhD students get an insight into the possibilities this program gives concerning literature review
Alceste	Demonstration of qualitative software for analyzing qualitative data	For letting the PhD students get an insight into the possibilities this program gives concerning literature review
Databases (ERIC, PubMed, Psychinfo, etc.)	For demonstration of search techniques	This is the mort important databases for the actual PhD student group and it is important to show them these and how to use them
Cisco Video Conference System	Advanced video conferencing system for far reaching cooperation	This is important for the PhD students located on the other campus than University of Bergen – Volda University College

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