

Erik Adalberon

University of Agder

Trond Eiliv Hauge

University of Oslo

Roger Säljö

University of Gothenburg

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Pre-service teachers' experiences with a digital examination design: The inter-relation between continuity and change in an institutional context

Abstract

This article reports a study of a full-scale digital examination in a five-year master program of teacher education in Norway. The innovative design involves observing a video case based on an authentic classroom situation and analysing the case in light of educational theory and subject content knowledge. All parts of this format are to be solved on a computer with Internet access. The study is centred on the pre-service teachers' experiences of this open-ended and unfamiliar testing format. More specifically, the intention has been to analyse (a) what kinds of preparations they engaged in; (b) how they solved tasks during the examination; (c) their reflections on this mode of examination. Interviews with 11 informants have been conducted, and the content is summarized in three selected cases, and finally across the interview sample. The results indicate that innovations like this are interpreted and approached against the background of pre-service teachers' expectations, and the open format engaged the pre-service teachers to draw upon a wide range of resources both when preparing and solving the tasks. It is, however, timely to question whether the introduction of the examination format, based on faculty interest and intentions, will have the intended impact on evaluation procedures in an established learning culture.

Keywords: digital examinations, Higher education, teacher education, video,

Lærerstudenters erfaringer med et digitalisert eksaminasjonsdesign: Den gjensidige relasjonen mellom kontinuitet og forandring i en institusjonell kontekst

Sammendrag

I denne artikkelen rapporteres en studie av en fullskala digital eksamen som har blitt benyttet i et femårig masterprogram i norsk lærerutdanning. Det innovative designet er en firetimers nettbasert og digital eksamen basert på observasjon av en video case fra en autentisk klasseromssituasjon, og en analyse på bakgrunn av pedagogisk og fagdidaktisk teori. Hele eksamenen besvares via en datamaskin med nettilgang. Studien er rettet mot studentenes erfaringer med denne åpne og ukjente eksamensformen. Mer spesifikt er intensjonen å analysere a) hva slags forberedelser de gjorde, b) hvordan de løste eksamensoppgavene under selve eksamen, og c) refleksjonene de hadde etter en slik eksamensform. Intervjuer med elleve informanter ble gjennomført, og innholdet oppsummert i tre case-studier samt en tematisk studie på tvers av utvalget. Resultatene tyder på at slike innovasjoner blir tolket og bearbeidet på bakgrunn av studentenes forventninger, og at de benyttet en rekke ulike ressurser for forberedelsene til og gjennomføringen av eksamen. Det er imidlertid betimelig å stille spørsmål om innføringen av et slikt eksamensformat, basert på fakultetets interesser og intensjoner, vil ha den ønskede påvirkningen på vurderingsprosedyrer i en etablert læringskultur

Nøkkelord: eksamen, høyere utdanning, lærerutdanning, video, digital eksamen

Introduction

This article is centred on the issue of assessing professional knowledge in teacher education and will focus on a specific case in which a new approach to examinations is introduced in an established learning culture

The backdrop here, namely the education of teachers, is considered a complex process. Prototypically, general teacher education builds on learning in an academic setting and practicum periods in schools. On the one hand, students at university learn about the subjects, didactics, educational theory, evaluation and other fields that are relevant for the profession. On the other hand, they learn by being involved in practicum periods, in which the intention is that they apply and transform the knowledge acquired in the academic setting and simultaneously gain experiences of classroom teaching that will enrich their understanding of what the teaching profession is about.

The evaluation and examination of professional knowledge is an essential part of teacher education (Richmond, Salazar, & Jones, 2019; Schoenfeld, 2007;

Stürmer & Seidel, 2015). There is a long history in academia of testing traditional academic knowledge through oral and written examinations, projects and other paper-and-pencil activities (Gipps, 1999). Considering the complex nature of the profession, questions have been raised about the relevance of traditional formats used when assessing other aspects of the professional learning than the academic elements (Knight, 2002).

Several attempts have been made over time to create more dynamic ways of assessing professional knowledge in teacher education. For instance, the Teacher Performance Assessment (TPA) was launched in the United States several decades ago to assess pre-service teachers' classroom performance, and it has gained widespread acceptance (see Chung, 2008, for details). In addition, assessments of performative aspects of teaching have been attempted through competency-based tests, for instance by using videos to test the students' 'professional vision' (Stürmer & Seidel, 2015, p. 54). Along with comparable approaches to assessing teacher knowledge (for instance Lee, 2005; Wiens, Hessberg, LoCasale-Crouch, & DeCoster, 2008), these examples illustrate a variety of alternative attempts to capture the complexity of the teaching profession in examinations.

In this article, our focus is centred on another recent attempt to assess professional knowledge in teacher education. A full-scale digital examination design with video cases was tested and introduced at a university in Norway in 2013 and has since become a mandatory test for the pre-service teachers. It can be described as follows:

- Solved online through a web browser with basic text editing functionality
- Solved individually with a four-hour time limit.
- Can be solved anywhere and all resources are allowed.
- Starts with a 10-minute (approximately) video case of an authentic classroom situation. The scene is taken from an upper secondary classroom, and the subject is Norwegian language. It is possible for the pre-service teachers to replay the video at any point.
- The first task is to describe important observations in writing and analyse them with relevant theory.
- The pre-service teachers are thereafter asked to focus on a topic they have observed in the film and analyse it.
- Marked with grades A–F by two independent assessors. Counts as 40% of the total grade in a 20-credit course.

The examination format was developed to suit the recently reformed five-year master program in teacher education, and the overall intentions with the design were to make the academic study more relevant for, and more closely connected to, the teaching profession (Lund & Engelién, 2015). Our interest here is concentrated on the situation in which an innovative examination format, with

new rules and affordances, is introduced to pre-service teachers. More particularly, the investigation will be centred on how the pre-service teachers perceive the new format against the background of their previous experiences with examinations.

Analytical frames and research interest

Assessment procedures are often discussed in terms of design, validity and reliability, but, as argued by Boud et al. (2018), how assessment practices turn out is often dependent on the participants and the local resources available in the specific setting in which they are deployed. Examination formats may be shaped to serve a certain purpose, but the environment in which they are embedded will determine the actual response. Regarding the digital examination we have analysed, our research interest is focused on how the pre-service teachers manage the new format, and how the affordances of the situation co-determine how they handle the tasks.

The general analytical background for this study is sociocultural (Säljö, 2001; Vygotsky, 1978), with an interest in the role of mediating tools and how pre-service teachers interact with the design and the tasks presented. From this perspective, an examination or test is conceived as a material and cultural practice rooted in what is a well-established learning culture that has emerged over a long time (Hodkinson, Biesta, & James, 2007; James & Biesta, 2007). The digital examination represents a disruption in the sense that the examinee has to handle various uncommon tasks. Instead of responding in writing to a set of questions, they have to comment on and analyse a video clip of classroom interaction. In this situation, they must decide how to describe the situation, what is distinctive about it from a professional point of view, and what conceptual tools are appropriate for analysis and problem solving. A process like this also implies writing a report that is quite different from traditional examinations, and this may appear as a new genre of writing and testing for the pre-service teachers (Ivanic et al., 2009, p. 20; Prior, 2006).

Although learning cultures are believed to be dynamic, they are also considered enduring over time (Hodkinson, Biesta, & James, 2007). Hence, the introduction of new examination formats may cause tensions in light of the pre-service teachers' various expectations, and in particular, their 'assessment expectations' (Struyven, Dochy, & Jansens, 2005, p. 329). The pre-service teachers in this study are familiar with commonly used examination formats in the Norwegian higher educational system, such as written school exams, take-home exams, oral exams and essays (Ørnes, 2015). It is thus reasonable to believe that these formats are recognised and well understood. The pre-service teachers' approaches and expectations to such examinations have emerged from previous experiences with such methods for assessing knowledge and their affordances.

The point of departure for this specific analysis is an interest in the pre-service teachers' responses and reflections around the new digital exam, and in particular what role resources and various tools played in their problem solving and task reporting. The study concerns significant aspects of this process: (a) the initial phase of examination preparations; (b) the actual writing of their individual examination report during the examination; (c) their reflections after taking the examination. The research questions we seek to answer are as follows:

- What resources and tools do the pre-service teachers report drawing upon in when preparing for and completing the digital examinations?
- How do the pre-service teachers interpret and reflect over the digital design and its affordances compared to traditional examination formats in higher education?

Assessment practices in professional education

Established examination formats have obvious shortcomings in the context of professional training (Knight, Buckingham, & Littleton, 2014), and the performative and collaborative aspects of professional competences will seldom be displayed and tested in these procedures. Even when the students use professional language (Mäkitalo & Säljö, 2018), several vital aspects of vocational performance are hard to ascertain through paper-and-pencil testing (Eraut, 1994).

In recent decades, the possibilities of assessing professional competence in alternative ways have increased due to developments in digital technologies (Court & Bamber, 2009). In areas such as health education, simulations and resources such as mannequins and virtual patients have been introduced to assess students' performance and skills in a challenging and clinically relevant manner (e.g., Boulet, 2008; Hulsman, Mollema, Hoos, De Haes, & Donnison-Speijer, 2004). Other digital innovations, such as virtual labs and virtual microscopes, also offer new settings for testing professional skills (Helle & Säljö, 2012; Petersson, Lantz-Andersson, & Säljö, 2013). The interactive nature of such resources enhances the opportunities for examining knowledge and skills, as students may be exposed to a broad range of problems that they have to solve in a dynamic and challenging environment.

The development in digital technology will provide new opportunities but also present new challenges in evaluation practices (King & Boyatt, 2015; Laurillard, Oliver, Wasson, & Hoppe, 2009; Voogt, Knezek, Cox, Knezek, & ten Brummelhuis, 2013). Important challenges to address concern educational cultures and prevailing pedagogies and forms of teaching, teacher beliefs and motivations for reform. In general, the high complexity of study designs and programs also adds to the problem of consistency of Information- and

Communication-Technology (ICT) use across institutional levels (Hew & Brush, 2007; Lawless & Pellegrino, 2007; Ottenbreit-Leftwich et al., 2012; Polly, Mims, Shepherd, & Inan, 2010). Although one recent report concludes that the implementation of ICT for assessment purposes is slow in the higher education context (Raaheim et al., 2018), some attempts to innovate are worth considering.

The use of video technology has shown promise in the context of educating teachers (Plöger, Scholl, & Seifert, 2018). According to Christ et al. (2017), who conducted an international study among teacher educators, different video methods facilitate different kinds of significant outcomes. For instance, Pape and McIntyre (1993) report on an early attempt to use video cases as part of evaluative practices, and they conclude that this design offers a way for students to implement their experiences in the context of realistic examples. In the process of analysing video cases, the abilities of students to observe and analyse instructional practices come into play. These are considered core skills for professionals, and attempts to include such elements in examinations have been tested in many teacher education programs (Blomberg, Sherin, Renkl, Glogger, & Seidel, 2014; Borko, 2016; Darling-Hammond, 2016). At a general level, the use of video technology in examination situations has similarities with the main ideas behind the paper-based case methodology in the sense that both support the development of skills related to integrating and contextualising theoretical and practical knowledge (Goldman, Pea, Barron & Derry, 2006; Masats & Dooly, 2011; Santagata & Guarino, 2011). However, it seems reasonable to assume that the multimodal and dynamic environment enabled by video documentation adds to the realism and professional relevance of the attempts to examine such integrated skills.

In sum, there are several reports of how technology, and video technology in particular, has been introduced in the context of examinations in teacher education. Each example sheds light on what the technology affords, and to some extent, the impact such a change in examination practices will have for educators and students. The intention of this article is to contribute to an increased understanding of this topic by investigating a case where teacher students have experienced a digital examination design that includes video documentation for assessment purposes in professional training. Since this example is part of a regular educational program, with high stakes for all involved parties, we argue that the insights provided will be of special interest.

The digital examination design

The backdrop here is a digital examination design, which is part of an integrated course of studies of education (pedagogy), pedagogical content knowledge (subject didactics) and school practice. In this program, the pre-service teachers must pass four other course examinations that are part of the integrated study

program during their fourth and fifth years of education. These are given in formats the pre-service teachers know well, such as essays, reports, take-home examinations and assessments of practical training in their placement schools. All these formal situations are intended to combine an assessment of the integrated use of theoretical knowledge of the different study disciplines with the experiences the pre-service teachers have had during their practical work in school.

The digital examination design is based on a video case from classroom teaching. It is framed by an open-ended task description, and the instructions read as follows (own translation from Norwegian):

The first part of the exercise begins with an observation, where you, based on relevant theory and with the use of relevant concepts, explain important observations in the video case. The next step is to formulate an issue that can shed light on how you as a teacher can work with one of the topics you have observed in the case, in your didactic subjects 2¹. Discuss the issue in light of educational and subject didactic theory. You can also bring in practicum experiences where they are relevant in supporting your argument. Refer to the case where it seems natural in the discussion.

This format is built on a set of general and formal writing requirements (e.g., restrictions regarding the re-use of earlier examination work and peer assignments and instructions about how to make use of literature references and how to include citations). The pre-service teachers are allowed to utilise available literature, whether online or in books, and texts they bring with them as long as they follow accepted reference rules. In addition, the digital examination design allows the pre-service teachers to sit anywhere they like and to collaborate with others.

In advance of the examination, they had access to an exemple video for training purposes and were invited to a seminar in video analysis.

Method

The unit of analysis in this study is the individual informant and his or her reported experiences of the examination design before, during and after the examination. To provide insight into these experiences, one-on-one semi-structured interviews were chosen as a favoured method for investigation. Compared to other potential methods like observation, a semi-structured interview gives insight into the informant's experiences of certain events and topics. The group of pre-service teachers was approached at the beginning of their fourth year and given information about the study before being asked to participate. There were 142 pre-

¹ The number pertains to the pre-service teacher's second subject specialization

service teachers in the whole programme, distributed over several subject specialisations: science (35), mathematics (6), Norwegian (L1) (23), social science (34), English (13), history (20), religion (4), Spanish (2) and German (2). Initially, a group of 16 informants volunteered to participate, but five withdrew before the interviews were about to start. Eleven informants were deemed to be adequate to ensure that the results are not biased, except for typical 'volunteer subject' issues (Rosenthal & Rosnow, 2009). Our consideration is that non-volunteers would be difficult to reach in other research designs as well, and that a sample of 11 informants would accurately reflect the group of pre-service teachers. The informants we ended up with were nine female pre-service teachers and two male, between 22 and 28 years of age.

The interviews were conducted approximately six months after the digital examination in 2015. Due to institutional arrangements, our investigation could not have started earlier. The timing may not be optimal considering that the details of events may have been forgotten. However, most informants remembered vital events and were able to reflect on the whole process even at this point.

The interviews

After consenting to participate, the 11 informants were interviewed individually over three days. Semi-structured interviews (Kvale, 2008) were conducted using a pre-defined interview guide based on the research interest and adding follow-ups relevant to the topics of the study and the pre-service teachers' responses. The questions were organised in three thematic sections: (a) preparation for the digital examination; (b) experiences with the digital examination tools and the situation; (c) evaluation of the examination at a general level. The interviews varied in length between 32 and 98 minutes depending on how many details each of the participants included, to what degree they elaborated their answers and whether they had any reflections on the issues.

Coding and analysis

The data comprised 11 transcriptions from the interviews and were organised using QSRs N-Vivo 10. The coding was mainly based on topics that appeared in the responses. A data-driven coding like this entails that the codes were derived from the data rather than from pre-existing concepts (Gibbs, 2007). The software N-Vivo includes a function for labelling parts of the transcribed interviews as 'nodes' (Bazeley, 2011). This allowed us to establish various nodes during the initial analysis based on the content of the interviews. These nodes were later organised and categorised pertaining to our three main interests described above, resulting in a final set of codes.

Case descriptions were chosen as a method to illustrate central points in our analysis, and to make a somewhat more 'thick description' (Denzin, 2011) of how the pre-service teachers reacted to and experienced the situation. We ended up with three cases as a way to demonstrate a variation in experiences and responses,

and at the same time to illustrate some patterns in their descriptions. Our selection process was based on which informants had both unique and common responses among the 11 informants. For instance, both Sam and Rita reported to be self-confident but had different approaches to the situation. The remaining eight informants were used to validate the case information and highlight general patterns across the sample as a whole.

The validity of the study

We consider validity to be a matter of trustworthiness, rigour and quality (Golafshani, 2003) in all phases of the interview process (Kvale, 2007, p. 123). Furthermore, the interviews were completed in late 2015, and the examination design has been developed slightly since then. After four years, we would argue that the results are still relevant since the issues raised are transferable from the context at the time to contemporary issues about examinations. Research design and findings should be evaluated on internal consistency, both at the level of the participants and existing studies in the field.

Ethics

In our work on this research project, we have followed the ethical guidelines set by Norwegian research authorities (Den Nasjonale forskningsetiske komité, 2006). More specifically, all participants were informed both in writing and orally about the project, what their participation would involve, and that they could withdraw at any time. The anonymity of the informants was ensured by using aliases, and no information that might reveal their identity was or will be exposed. All direct citations are translated from Norwegian, and great care has been taken to preserve the original meaning.

Results: Examination preparations and approaches to solving the task

In this section, three cases are provided to illustrate the characteristic approaches to examination preparation and task solving that this design generated. Following this, the central tendencies across the sample are presented.

Three case descriptions

The following case descriptions illustrate how three pre-service teachers prepared for and responded to the digital examination. The cases describe some of the driving motives and resources utilised in the preparation and writing of the report.

Rita – utilising new opportunities

In advance of the digital examination, Rita and some of her peers gathered and divided course-relevant books and articles to study, dividing the work into equal portions. They wrote and shared notes to maximise the overview of relevant

themes. Rita organised the notes in a digital format and categorised the content, which allowed her to browse through the notes and pick up relevant themes when composing her report.

Prior to the examination, Rita tested the home network to ensure that the platform worked properly. She wrote her report while sitting in her kitchen. When the examination started, she watched the video case several times and made notes of her observations. Afterwards she wrote up her immediate impressions and later revised the descriptions in a second round. She compared her interpretations with the previously written notes before she decided on a theme that would be reasonable to elaborate according to the instructions. Her chosen topic was aligned to her academic subject specialisation.

Despite the time constraints, Rita claimed that she had “managed to complete the task in four hours”². She was satisfied with her achievement and reported that she would likely prepare in the same way next time, if possible. However, she was not particularly fond of writing under time pressure, and she believed her performance could have been better if she had had more time. Concerning the digital examination design, she believed it was slightly more relevant to the teaching profession than many other formats she had experienced: “To have an observant view on instruction, and make a connection to theory, I believe, enables me to show a little more of the connection to [teacher] practice”.

At the same time, she did not see any reason to include her own experiences from her teaching practice as part of her exam report, as she did not have an insight on the subject presented in the video. In her view, the differences between the subjects were so significant that the teaching experiences would be incomparable.

Sam – following familiar patterns

Sam found the digital examination to be quite similar to the take-home examination format he knew well, as he had permission to sit anywhere and use all available materials. He decided to follow a strategy he commonly used for take-home examinations. Like most of the other pre-service teachers in the course, Sam attended the seminar in which observations and analyses of video cases were discussed, but, as he said, “I would not say we have worked a lot with how one observes a video”. Of course, he had observed other lectures during his practicum, but as he remarked, a video case “is another type of observation than I’ve been doing as a teacher”. In his view, the observation in the classroom is bound to the context, whereas video-documented observation is centred on an entirely new and unknown situation.

On the day of the examination, Sam worked alone, “sitting at home by a coffee table while a cat was running around in the apartment”. When writing his observations, he paid extra attention to the teacher’s behaviour and actions that he believed to be relevant for understanding teaching. He admitted to consciously

² Quotation marks signifies that this is a direct quote from the interview – Translated from Norwegian

focusing on certain elements in the video that would point in the directions he wanted. He said his choices were influenced by a previously written course assignment. He had browsed through a copy of this assignment during the examination looking for inspiration. He also used available books and articles. Furthermore, he chose not to include many of his own experiences as a teacher in the report. They were too “subjective”, he felt, and furthermore, he argued that his interpretations of teaching would be misplaced in this subject-related and high-stakes task.

Sam was not particularly content with his performance on the digital examination, and the result did not live up to his expectations. He pointed out that he had misinterpreted the nature of the task, and his writing plan did not work properly due to the short time available. In retrospect, he concluded that he should have prepared differently and adopted a regular school examination type of preparation.

Marie – exploring the affordances

Like Rita, Marie and some of the other pre-service teachers formed a study group to write and share summaries of the course literature. She found this to be a useful and timesaving method for getting an overview of the learning content, compared to reading the literature in full. Because of the limited time, she decided to take a chance with an unconventional preparation method. The open-ended format inspired her to explore the affordances of the format and choose a theme in advance that could relate to the upcoming video case. She decided to work out texts ahead, focussing on a theme of a general nature, namely, communication. She thought it would be easy to adapt the texts to the anticipated classroom situation coming up in the video case. She wrote several pages in a digital document that could be used to “cut and paste, and editing, during the examination”. Marie felt they had received too little guidance from the lecturers regarding video observation and analysis. The lecturers “almost expected the students to know such things beforehand”, she said.

Marie reported sitting together with a handful of her friends at the university when viewing the video. After they had watched the video twice, they spent 20 minutes exchanging ideas about what they had observed and what they could include in the assignment. Then, they separated for individual report writing.

Overall, Marie appreciated the use of a video case as the starting point for the tasks. For her, it made them more realistic. Moreover, she perceived the discussion with her friends as very “rewarding”. Regarding her strategy of writing pieces of text in advance, she believed it worked so well that she would have done the same thing again. However, she realised that there were some drawbacks with her choice, such as a “weaker connection between text and case”, and she believed it might be more reasonable to write a larger portion of the assignment then and there.

Summary of the cases

In two of the cases, the pre-service teachers went into discussion groups before the examination, where they shared their readings and understanding of the course content as well as digitised notes. One of the groups also met to watch the classroom video together and shared their observations for 20 minutes as the starting point for their reporting. In the third case, an individual approach was chosen for preparation. Two of the pre-service teachers were sitting at home when they wrote their reports, while the last one used the university facilities. One student, Marie, chose to prepare pieces of text on a general theme of communication beforehand. Another also used pre-prepared digitised notes with summaries of the course literature. Each of the initiatives they report both before and during the digital examination seems to be entirely based on their individual inclinations or on experiences drawn from their existing learning culture.

Furthermore, they used different models with which they were familiar when preparing for the digital examination. The cases reflect how the pre-service teachers tried to adapt to the new examination genre. All three were reluctant to utilise their experiences of practical teaching when completing the task. They seemed to have implicit expectations of what should be written in an academic examination, and this presumption did not include such personal accounts of teaching. They also reported experiencing time pressure, which made it additionally difficult for them to reflect on their practicum experiences in the context. It would thus seem that the digital examination format, with all its various novelties, did not match their assessment expectations.

Patterns across all the pre-service teachers

Some common response patterns can be observed across all the interviewed pre-service teachers. Answers from the rest—named Dina, Kristin, Sara, Nora, Tara, Ingrid, Kim, and Anne—are used to complete the picture.

(Table 1: Response patterns across the interviewed pre-service teachers.)

Response	Description	Illustrating quotes
<i>1. Positive attitude toward the digital examination concept.</i>	The pre-service teachers appreciated the video case as a concept, and they spoke of it in positive terms, such as <i>intriguing, exciting, amusing</i> and <i>good</i> .	Kristin: <i>I remember I thought to myself that it was a clever mode of examining because it was more... you get a little more inside of the classroom, with that film.</i> Nora: <i>I think it was good because there were a lot of different themes we could focus on – I focused on concepts, (...) and it was the use of PowerPoint that one could tie to ICT.</i>
<i>2. Use of previous examination experiences.</i>	All reported that they approached the digital examination by comparing it to their previous experiences with familiar formats. Although they perceived the	Dina: (...) <i>when you are sitting at a school-exam, you have... no chance of anything, you just have to know it (...) you just need to have control on where</i>

	upcoming digital examination as a different format, they tended to rely on their traditional preparation strategies.	<i>you can find things, but you also need to have general control on what it's all about.</i>
<i>3. Academic writing skills at stake.</i>	Several of the pre-service teachers mentioned that writing skills were important for their performance on the digital examination. They reported having different experiences of using writing as a tool to formulate their knowledge. In comparison with other formats, they said that the task included an unfamiliar type of writing.	Ingrid: <i>Maybe it would have been better for those who are good in Norwegian, for example, who are used to writing assignments, but I'm using a long time to express myself.</i>
<i>4. Lack of experience with observing and analysing teaching.</i>	The pre-service teachers reported having little specific prior knowledge of observation and analysis that they could draw upon in the situation. The task of observing and analysing the video case was thus perceived as quite different from what they were used to, and some of them were worried about the exact requirements of the task.	Tara: <i>We have never practised how one is supposed to interpret and write something like this.</i>
<i>5. Text writing in advance</i>	Many of the interviewed pre-service teachers reported that they wrote some text in advance that they intended to use in their examination reports.	Anne: <i>I simply wrote three texts about themes we might get, and that I could adjust to the video case.</i>
<i>6. Student collaboration as a resource.</i>	A majority of the pre-service teachers reported using their peers as resources both before and during the digital examination.	Nora: <i>We watched the video, and then everyone went together out from the study halls, or like, five or six, and then discussed what we saw. And then I went in again, and after that, we didn't talk anymore.</i>
<i>7. Using examples from practice.</i>	Few of the pre-service teachers found their own practice experiences to be explicitly relevant to the content of their examination report.	Kim: <i>If I was to change between case and [own] practice and... I don't know. It wasn't natural in my report then. I believe I only wrote about it at one point.</i>
<i>8. The need for in-depth feedback.</i>	The pre-service teachers received a short, written feedback text after the examination, and although most of them reported it to be a fair judgment, some found little use for it.	Dina: <i>The feedback wasn't helpful at all.</i> Kim: <i>I was satisfied with that. I just read it, like... briefly.</i>

Discussion

Developing skills for the observing and analysing of teaching and learning situations is crucial for teachers as professionals (Blomberg et al., 2014; Borko, 2016; Darling-Hammond, 2016). This has been a key idea behind the development of the digital examination explored in this study. Our investigation of this design implemented in full scale has revealed that the use of video case, based on a selected episode of classroom practices, can function as a mediating

means for the pre-service teachers' reflections on teaching and learning. This finding is not surprising considering earlier research on video use in teacher education, where the mediating role of videos has been found to be central (Christ et al., 2017; Fadde & Sullivan, 2013; Goldman et al., 2006; Grossman, 2005; Krumsvik & Smith, 2009; Tripp & Rich, 2012; Wiens et al., 2013).

The general impression from the interviews conducted here is twofold. First, it can be claimed that the informants were engaged and motivated by the new examination format, particularly by the video scene connected to classroom teaching, the possibilities for student discussions and individual writing using personal themes. The pre-service teachers reported to utilise a varied set of knowledge resources and digital tools in their preparations and when producing their reports during the examination. For instance, they spoke of how they prepared digital notes and texts to use in their report writing. In addition, some recalled having organised study groups and shared notes related to the expected exam themes. Some details may have been forgotten during the six months that had elapsed since they completed the examination, but no particular negative reactions to the extended format have been revealed in this study.

On the other hand, it is also possible to see that the new affordances of the examination format provoked uncertainty among the pre-service teachers about issues like the genre of writing and the anticipated assessment. As the pre-service teachers reported, they approached these challenges by drawing upon knowledge of previous examination experiences. Our three cases illustrate the variety in their reasoning and use of resources, and this tendency was also seen among the other pre-service teachers. Some said they used a take-home examination format as a model, while others used academic and subject-oriented examination or school examination models when completing their reports. In addition, some of the pre-service teachers were motivated to explore whole new ways of writing (e.g. by combining pre-prepared texts, systematic descriptions of video events, ideas from peers and an inquiry-based approach in analysing their chosen theme). The result would be a range of approaches in which each found a preferred solution to solving the tasks.

One reason for this diversity in approaches may be the reported need for more guidance before the exam. Although the pre-service teachers were offered to attend a seminar in video analysis and received written feedback after the exam, the overall support from the educators was not perceived to be sufficient for solving all aspects properly. The task of observation and analysis was particularly challenging, and many believed their skills in this area were too rudimentary. Most found it difficult to include their own experiences from their practicum in the report and had problems connecting these two fields of knowledge. In addition, most found the written feedback provided afterward to be less helpful for their understanding.

Thus, this qualitative study indicates that the introduced exam design at times communicates contradictory messages regarding the knowledge to be assessed

and how to solve the task in practice. At a general level, the pre-service teachers in this study expressed that they appreciated the new design, but at the same time, they seemed to be torn between already established models and genres of writing with which they are familiar. It would seem that they were unsure about the assessment criteria and about how this format would be judged. The pre-service teachers' responses to the examination format may be explained as part of a conflicting institutional message about exam models (i.e. how exam history is embedded in institutional practices mediating contradictions and tensions when innovations are introduced). The responses may also be explained as part of a genre conflict for the individual pre-service teacher based on his or her earlier examination experiences (cf. Ivanic et al., 2009; Prior, 2006).

An additional point of interest is the potential use of collaboration. Discussions during a high-stakes situation are not common in higher education and were not something the pre-service teachers had encountered earlier. Previous investigations of this exam format suggest that this collaborating activity was motivated by insecurity about the examination (Lund & Engelién, 2015), but this study offers additional insight into how some pre-service teachers also found such discussions of the video to be of help for their analysis and understanding.

Implications

Even though there are several limitations to this study, such as the number of respondents, it offers insight into how a full-scale digital examination with various affordances can be implemented in a large institutional setting and an established learning culture. The most significant changes from traditional formats were the video case and the management system for individual student reports incorporated in a digital platform. Combined with the open-ended task and its specifications, these tools seem to play a crucial, mediating role for the pre-service teachers in processing their reports. Regarding the examination's objective of stimulating the pre-service teachers to demonstrate their ability to integrate knowledge about teaching and learning, the study highlights several critical parts of the design: (a) the pre-service teachers chose to bypass their individual examination experiences and adapt to new models/genres of testing; (b) how and to what extent learning cultures at the institutional level support a problem-oriented approach to examinations. The task of integrating theoretical and practical knowledge remains one of the greatest challenges in teacher education (cf. Blomberg et al., 2014; Darling-Hammond, 2014; Grossmann, 2005), and the example provided here illustrates the complexity of the issue. A potential lesson learned from the findings in this study is that innovations and their intended influence on the existing learning culture should be carefully planned and evaluated.

About the authors

Erik Adalberon works as a Reserach Librarian at University of Agder and is writing a PhD dissertation in pedagogy. His research interest is in examinations in teacher education.

Institution Affiliation: University Library at University of Agder, P.O 422, 4604 Kristiansand

Email: erik.adalberon@uia.no

Trond Eiliv Hauge is Professor Emeritus at the University of Oslo, Department of Teacher Education and School Research. His research includes learning and new technologies, teacher education, and school improvement.

Email: t.e.hauge@ils.uio.no

Roger Säljö is professor of educational psychology at the University of Gothenburg. He specializes in research on learning and development in the context of digital tools.

Email: roger.saljo@ped.gu.se

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