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Understanding teachers' reluctance to the pedagogical use of ICT in the 1:1 classroom

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Abstract During the last decade, several *one laptop per student-initiatives* (1:1) have emerged as a solution to the recurrent disappointments with the pace of transformation of teaching methods in schools. However, an increasing number of research studies indicates, that despite major expenditure, increased access and improved technical equipment, few teachers have integrated ICT in the curriculum in a way that leads to significant changes in classroom practice. This article explores teachers' reluctance towards the pedagogical use of personal laptops in secondary schools. A case study approach is used in a follow-up study of a 3-year 1:1-implementation initiative, investigating a period of in-service training for teachers in a secondary school. The teachers' arguments for *not* using the laptops for teaching are of particular interest. Five different, but overlapping, patterns in the explanations for their reluctance have been discovered: lack of technical competence, not worth the effort, insufficient material, diminishing control and lack of time. The teachers' arguments exposed technical, pedagogical, and content concerns. This qualitative study of teachers' reluctance, as studied in situ, adds nuance and additional perspectives to previously presented explanations.

Keywords Laptop · Teaching · ICT · Classroom · In-service training · Socio-materiality

1 Introduction

The transformation of teaching, with or without ICT, has long been a major issue within educational research (Fullan 2007; Hargreaves et al. 1998; Mourshed et al. 2009). Reformers have tried for decades to develop the way teaching is performed by changing policy, organization, governance or finance (Hargreaves 2010; Selwyn 2011). During the last decade, several *one laptop per student-initiatives* (1:1) have emerged as a solution to the recurrent disappointments with the pace of transformation (Chen 2010). The 1:1-initiatives, commencing as a few small-scale projects some 20 years ago in different parts of the USA, have now become an everyday occurrence in schools all over the western

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world (Fried 2008; Holcomb 2009; Lowther et al. 2003; OECD 2010; Warschauer 2006; Zucker and Light 2009). The arguments behind the initiatives are similar, regardless of geographical location. Firstly, the fact that the ambient society is permeated with computers forces schools to adapt to the development (Hepp et al. 2004). There are also arguments that could be categorized as egalitarian; in a technology-rich and globalized society, where knowledge is a fundamental asset, pressure is put on schools to prepare *all* students for a society where ICT is a key technology (Buente and Robbin 2008). The focus on life-long learning, and what has been termed "21st century skills", is an expression of this trend (European Commission 2007). Furthermore, there are pedagogical arguments, in which 1:1-initiatives are considered as *change-agents* in efforts to transform teaching, particularly when encouraging student-centred approaches (Chen 2010; Mooij and Smeets 2001; Sharma 2011). Although the laptop is not expected to act as a catalyst on its own, it is considered to be a lever to realize the intentions of a transformation of teaching (Venetzky and Davis 2002). The 1:1-initiatives have been supported by research, demonstrating a growing collective conviction that 1:1-laptops can improve results and enhance learning (e.g. Bebell and Kay 2010; Lei and Zhao 2008; Livingstone 2011; Owen et al. 2006; Penuel 2006; Silvernail and Gritter 2007; Warschauer 2006; Warschauer and Grimes 2005).

However, an increasing number of research studies indicates, that despite major expenditure, increased access and improved technical artefacts, few teachers have integrated ICT in the curriculum in a way that leads to significant changes in classroom practice (Conlon and Simpson 2003; Cuban 2001; Dynarski et al. 2007; Kozma 2003; O'Shea and Koschmann 1997; Smeets 2005; Zhao and Frank 2003). Teachers regularly use the personal laptops for organizational purposes, for example, for sending out and/or collecting information and assignments, but they rarely use the technology in ways that challenge the persisting methods of teaching (Hennessy et al. 2005; Watson 2001). However, this cannot be considered as a consequence of diverse methods of implementation of ICT, since research shows that differences in attitudes to and the use of ICT between teachers within a school are just as substantial as the differences between different schools (Player-Koro and Lindström 2013; Shear et al. 2010). Part of the current research argues that it is more likely to be an effect of teachers' personal attitudes towards ICT (Belland 2009; Somekh 2008; Twining et al. 2013). It is also a question of pedagogical approach; the teachers who regard ICT as a learning tool have confidence in the technology and trust students to be capable of working independently, have more inclination to use laptops (Inan and Lowther 2010; Lane 2003).

The ICT-impact report (Balanskat et al. 2006) categorizes three levels of barriers for the integration of ICT in schools: the teacher-level, school-level and system level. In most 1:1-initiatives, teachers have been used as an instrument to change practice (Bingimlas 2009). Hence, the teachers' arguments presented in this article are solely on a teacher level. However, it has proven difficult to change teachers' way of teaching and to stimulate the use of technology in the classroom by in-service training that only focusses on handling the technology (Watson 2001). Teacher training can even be a barrier to laptop implementation if the training lacks connection to the classroom practice or exclusively focusses on technical skills (Kopcha 2012). The examples of unsuccessful in-service training are numerous; dissatisfaction among teachers with the number of opportunities for in-service training (Moses et al. 2012), the disappointment of teachers concerning consultation in laptop training (Rutledge et al. 2007), the

dissatisfaction of teachers with lack of subject-specific content (McGrail 2007), and frustration with recurring technical problems during training (Dunleavy et al. 2007; Garthwait and Weller 2005).

The challenges to implementing 1:1 laptops are usually considered to be either pedagogical or technical (Tearle 2003). Consequently, in-service training initiatives emphasize either technical or pedagogical issues, but rarely both, and commonly highlight the technical aspects (Sipilä 2010). Hence, when new technology is added, the focus is usually on the technical aspects of the artefacts' affordances, which allow a certain action and the social aspects are toned down. Affordance is here to be understood as originally proposed by Gibson (1979), meaning that the surrounding world is not only perceived in terms of spatial relationships but also in terms of object giving possibilities for action (affordances), that is; perception drives action.

Mishra and Koehler (2007) argue that to be able to integrate technology into teaching, teachers need to comprehend the dynamic and transactional relationship between the technology, the pedagogy and the subject content, expressed as technological-, pedagogical- and content knowledge (TPACK). The TPACK-framework highlights the transactional relationships between the three different forms of knowledge and regards the intertwining between the teacher and the technology as an important aspect to be taken into consideration when discussing the integration of technology in school settings.

Similarly, despite the fact that most attempts to integrate technology into teaching are initiated by school leaders and/or policymakers, teachers are the ones who must realize the intentions. With the situation described above in mind, it becomes evident that teachers are key actors in the process of integrating technology into the classroom. Whether the technology is a laptop, as in this case, or any other digital device used in a classroom is not relevant. In the modern school, teachers do not have the opportunity to put away the "computer in a closet" (Cuban 2001, p. 52)—they are now in a situation in which they are compelled to use the digital technology. It is of importance to understand teachers' arguments for their reluctance to support the implementation of laptops for teaching purposes. Hence, an explicit focus on looking for arguments for this reluctance guided the research questions.

Research questions:

> What are teachers' arguments for being reluctant to integrate laptops in teaching?
> How can these arguments be understood?

These questions were empirically investigated during a period of in-service training, in the context of a larger 1:1-implementation initiative. The remainder of the article is organised as follows; firstly, the case is described and a background is given describing why and how the in-service training was carried out. Subsequently, the method is described. This is followed by a description of the findings, together with a discussion. The article is summed up in the conclusion.

2 The case

The field studies were carried out during a period of in-service training for teachers. The model was work-integrated learning, which meant that the teachers were supported

and guided in their regular tasks (Freudenberg et al. 2010). Three years earlier, two secondary schools in a small Swedish municipality had introduced a 1:1 project. All students and teachers received personal laptops and the schools were equipped with an open Wi-Fi infrastructure connected to the Internet. During the first years of in-service training, most of the time was spent on technical matters. Several hours were spent on learning how to use the learning management system (LMS) and how to use different types of software. Compulsory in-service training was arranged occasionally, where teachers could choose between, for example, learning how to make an animated movie or how to make digital presentations more effective.

The project was led by a steering-group consisting of two officials from the central school administration, with a special assignment for education and educational development, together with two headmasters from the participating schools and three ICT-instructors. The ICT-instructors were former teachers who had been specially trained to support the implementation-phase of the 1:1 project.

After three years of 1:1, the steering group stated that they wanted to accelerate the pace of the transformation process. They emphasized that they wanted an in-service training programme that was a combination of both technical and pedagogical content, and described their expectations of teachers as "stepping back from the teacher's desk and relying on the students' own ability to construct knowledge by interaction with the environment" (quote from an interview with one of the headmasters).

These expectations adapt well to the Swedish curriculum for the Compulsory School (Curriculum for the Compulsory School System 2011), in which the importance of an educational change towards methods encouraging students to be flexible thinkers and problem-solvers is emphasized. The Swedish Curriculum for the Compulsory School also includes recommendations for using a Local Pedagogical Plan (LPP), with the intention of clarifying the relationship between the national objectives and the assessment of student learning and to clarify the structure of teaching and learning for both teachers and students (The Swedish National Agency for Education 2011). It is a distinct requirement of the Curriculum that the LPP should describe how the national objectives have been reflected in the teaching as well as in the quality of the knowledge that should be assessed. Furthermore, it is emphasized that the LPP must describe how and when ICT should be integrated into teaching, and that it must be comprehensible to both students and parents. The LPP should encompass three different parts. Firstly, there must be an explicit purpose displayed within the instruction; that is, what goals should be achieved. Secondly, the LPP must clearly describe the core content of the objective and finally, the LPP must describe the requirements for achieving different grades.

Hence, to satisfy the demands from the national curriculum, as well as their own expectations on a more fast-moving transformation of teaching, the steering group decided to develop the in-service training. Together with their efforts to support teachers to implement the use of laptops in the classrooms, they wanted to accomplish a transformation of teaching towards a student-centred approach, and assumed that the process of creating LPP's and thereby integrating the use of laptops was a way to combine these two goals. The steering group wanted the teachers to have a general discussion on how to use the laptops as a tool and eventually to construct LPP's in their respective subjects. Accordingly, the teachers were divided into subject groups (e.g., mathematics teachers and language teachers in separate groups), and were asked to construct a subject-specific Local Pedagogical Plan (LPP), with which they could to

implement the use of ICT. The results presented in this article draw from an examination of a subject-group during a period of in-service training.

3 Method

The study is an ethnographic case study (Silverman 2007; Singer 2007; Yin 2009), in which the pedagogical planning of a group of teachers was thoroughly studied through observations and individual interviews. A case study is particularly appropriate for revealing the interaction of relevant contextual factors, when it is impossible to describe all of the variables involved (Yin 2009). The method was chosen since it provides tools to understand the reasoning of the members of a professional community about their practice. As the method made it possible to take part in the teachers' discussions, it also facilitated the understanding of the technology-in-practice and the meaning the users attached to the technology (Denzin 1997; Sands 2002). It also enhanced the possibilities to follow the teachers' development process, which means that it was possible, during the analysis phase, to not only describe the outcomes from the in-service training, but also to understand *why* and *how* the results occurred (Smart 1998).

The research was conducted in a secondary school during a regular school year. The research results presented below describe data from a group consisting of six secondary school math teachers who were followed during the recurring in-service training. The teachers had staff meetings for 2 h every week, and every third week, this occasion was reserved for in-service training. For practical reasons (the in-service training for this group was carried out on days that made it possible for the researcher to participate), the group that was followed for this article was a convenience sample among three different subject groups. Observations in other subject groups during the in-service training period, together with classroom observations completed during the 3-year implementation initiative preceding this study, confirmed the results from the studied group.

3.1 Observations of in-service training sessions

The teachers in the observed group were all experienced teachers, each with more than 7 years of teaching experience, and they were all regular users of digital technology. The in-service training was led by an ICT-instructor who was a former teacher and had been specially selected for this employment by the headmasters. The mission was to develop teachers' teaching methods and the instructor considered the laptop as a tool for realizing the transformation. The ICT-instructor planned and operated the meetings with the group every third week and participation was mandatory. The five 90-min occasions for in-service training were also audio-recorded and field notes were taken. Since the digital recorder during the in-service training sessions was placed in a classroom, with many teachers going in and out, only the parts containing discussions between the ICT trainer and the participating teachers was transcribed. Most of the recordings were transcribed verbatim, although in some parts of the recordings, it was not possible to distinguish every word and thus, these parts were not analytically sufficient. These parts were handled using alternate, more efficient forms of transcription. For example, summations of small talk between the participants were used. In

addition to the recordings, a few both planned, as well as unannounced, classroom visits were carried out. During these visits, field notes were taken and written out shortly after the observation sessions.

3.2 Interviews

The teachers were individually interviewed both before and after the training. The interviews were semi-structured and audio-recorded. The interview questions were open-ended and covered the following areas: 1:1–implementation—general experiences so far, classroom situation (teachers' role, student learning), lesson planning/design, perception of knowledge, and opinions concerning the in-service training. Notes were taken and rewritten on the day of the interviews. The day after every interview, the notes were sent to the interviewees and they were given the opportunity to comment, add, or cross out sections in the text. This was used as a means to validate the results from the interviews. The respondents approved to the content in the written notes, with the exception of a few superficial changes, such as the length of teaching experience and their combination of subjects.

3.3 Pattern coding

In the analysis of the interview data and observations, a pattern coding process was used (Saldana 2013; Strauss 1990). The recordings were transcribed and analysed by using a qualitative software package primarily designed for transcription and qualitative analysis of audio and video data (Transana).

Subsequently, the transcripts were studied in detail to identify joint patterns. Key words or sentences from interviews, observations, and recordings were marked and put together into categories. For example, all statements or observations concerning the teachers' assumption about *lack of time* were marked with a specific colour and assembled in one category. Successively, the statements were analysed in order to disclose underlying reasons for the teachers' reluctance. The analytic process was iterative, with a progressive refinement of the categories, as well as an understanding of the underlying presumptions. Eventually, five different categories were formed. The boundaries between the categories are indistinct, due to resemblances and overlapping between the categories. LeCompte (2000) suggests thinking of analysis of audio-recorded data as assembling a jigsaw puzzle. Since the audio recordings did not have an intrinsic organizational structure, this metaphor is applicable to the process of analysis of the material in this article.

The final data set consisted of 5 h of audio data from the in-service training, 6 h of interviews with teachers and field notes from observations.

3.4 Limitations

Evidence of construct validity in this article is provided through the use of mixed methods (Podsakoff et al. 2003). The observations and interviews painted an unequivocal picture of laptop use. As it is a case study, performed in an actual educational setting over an extended period of time, there were no control groups or elements of experimental setup.

The results are mainly dependent on observations and interviews with a limited group of teachers. Hence, the relevance in this case study should be understood as an illustrative example rather than definitive findings. Since human beings perform qualitative methods of data collection, such as interviewing and participant observation, it is of great importance that the risk of bias is considered. As a consequence, a researcher must be aware of how both the tacit and the formative theories prepossess the results (LeCompte 2000). There is always a possible bias as the interviewer's opinions or prejudices may affect the outcome of the interview. The discussion concerning self-reported data and common method bias is well-known (Conway and Lance 2010). However, the usual assumption that common-method bias inflates relationships between variables measured by self-report is questionable. For example, Spector (2006) reported that correlations among self-reported variables are near zero.

4 Findings

In the following section, the categories emanating from the teachers' arguments for not using the laptop are presented and discussed. The chosen focus is to report on the arguments for their reluctance. The observations and interviews disclosed five different, but overlapping, categories: lack of technical competence, not worth the effort, insufficient material, diminishing control and lack of time.

4.1 Lack of technical competence

Although the overall ICT-skill among the teachers in this case was considered by the steering group to be sufficient, the teachers still expressed uncertainty. "To be quite honest—I'm not really sure how to handle the laptop" (quote from audio-recording during observation). The lack of competence was of two different kinds; firstly, there was a lack of competence concerning how to handle the different types of digital teaching material and secondly, there was a lack of competence if technical problems should occur while using the laptops in the classrooms. The first kind was evident when the teachers expressed a feeling of not being skilled enough to use the material available on the Internet; "There is always a plug-in or a plug-out not installed, which makes the stuff impossible to use" (quote from interview with teacher). The teachers also expressed a feeling of stress due to implicit or explicit demands for always being technically up-to-date, and articulated that it was impossible to keep pace with the fast-moving accumulation of resources on the Internet. This second feeling of lack of competence was revealed when students proved to be more competent than the teachers in handling technical problems, and the teachers were not quite comfortable with this situation; "There is always a student ("*nerd*") in every class who think they can fix any technical problem" (quote from interview with teacher). These examples constitute a type of problem that is embedded in the rapid technological development. For example, technical problems, a new interface or updated software highlights the teachers' the concerns of not being up-to-date.

The teachers were challenged by a technology that provoked and changed the prevailing circumstances, in which they usually are the experts. Research show that it is also a question of the teachers' epistemological foundations; teachers interested in

collaborative learning, and teachers who are more familiar with the technology, are generally more inclined to embrace ICT in their teaching (Watson and Tinsley 1995). Hence, the teachers' pedagogical, content *and* technological competence is decisive and was taken into account when analysing the reluctance. The analysis showed the importance of not only considering technical and user-related aspects of the technologies, but also on how to critically analyse the pedagogical use in various contexts. We observed the same teachers being paralysed when confronted with a technical problem easily solving the problem in a different situation. The laptops derived meaning through social agency, and vice-versa, the social agency was dependent on the material aspects for its meaning making, thus making both perspectives indispensable when judging if the teachers' technical competence was sufficient. Social agency is here to be understood as the individual's capacity to make an independent choice of action (Moreno et al. 2001).

4.2 Not worth the effort

Some teachers stated during the in-service training sessions that it was "not worth the effort" (quote from audio recording during observation) to use the laptops. Behind this statement lay the teachers' estimation of how much the design of the task would be enhanced and the quality of the task would be improved by using ICT, in relation to the amount of effort put into searching for material and preparing it for classroom use. The usual assumption was that the possible pedagogical benefits from using the laptop did not measure up to the perceived costs. According to the teachers, the costs, in this case, were both the time spent as well as the risk of students using the laptops for unsanctioned activities, such as web surfing or playing games (Tallvid et al. 2014). If they did not perceive the pedagogical enhancement to be large enough, they did not consider it worth the effort to use the laptop.

Technology affords different kinds of uses, and the teachers and the ICT-instructor comprehended the possible affordances in different ways. During the in-service training, the ICT-instructor tried to motivate the teachers by manoeuvring the discussions towards different ways of implementing technology into the task-design process. By asking questions about how and when the teachers actually used ICT, she expected them to reflect on their own practice and their own use of laptops. "Well, that's the goal, right? We want the students to pass in mathematics. Right? Naturally, it is related to how you write your Local Pedagogical Plans… It is obvious that…. And how you use the laptop. How you are using your laptops today and how it is possible to develop?" (quote from an audio-recording during observation). The ICT-instructor used arguments with reference either to competencies, organization or to the social circumstances surrounding the use of the technology. Less frequently, she used arguments about how the material aspect of the technology took part in the practice. The teachers kept coming back to the technical obstacles of using the laptops and made clear that the actual pedagogical gain was limited. Neither of them considered the technical and social aspects as intertwined.

The "not worth the effort"-arguments reveal a perspective on ICT that can be considered as instrumental. That is, a perspective that regards the laptop as a tool that is solely used for enhancing the learning process. The teachers react on the explicit request for implementing the laptop and do not consider other possible values of the

technology. If they perceive it as not being worth the effort, they will abstain from using the laptops in the classroom.

4.3 Insufficient teaching material

The teachers had considered and tested the use of the Internet several times, but in the end, they almost always decided to abstain from using it in teaching. The resistance often concerned the difficulties in finding appropriate material, and if they eventually found something that was possibly useful, they did not consider the material to be of a sufficient standard. As stated by one of the teachers: "There is such a lot of crap on the net. I don't think it is good math. I have done "Creative mathematics" earlier and I think that contributes a lot more" (quote from audio-recording during observation). The teachers stated that they seldom departed from the pedagogical structure provided by the textbook. If they used the book strictly, they did not risk putting anything at stake and they could be sure that all parts of the curriculum were covered. Leaving the textbook and starting to use the Internet challenged this way of teaching. The challenge seemed to be that the Internet-connected laptop did not provide the well-framed, unquestioned, sequential organisation of educational tasks that a book did. Hence, it made it harder to be sure that all parts of the curriculum were covered.

The teachers wanted the task design in the LPP's to focus on pedagogical challenges rather than on the use of the technology, regardless if it was needed or not. They expressed a need for technology, although not necessarily laptops, as a complement and as a resource for different learning needs, but not as a total package to replace successful teaching methods. They wanted the technology to offer possibilities to support them to manage the flow of information, decisions, and the reconstruction of activities in the classroom.

The teachers were willing to try new ways of mathematical training, but they were not as convinced as the ICT-instructor that the best way to fulfil the pedagogical plans was by using the laptops. It is possible to understand the teachers' reactions as taking the option to *not* use the affordances provided by the technology. They could always "choose to do otherwise" (Orlikowski 2000, p. 412) with the technology at hand, or as expressed by Leonardi: "Human agency is realized by both using the capabilities provided by technology and resisting the limitations those capabilities impose" (2011, p. 148). Different agendas between the ICT-instructor and the teachers were revealed. The ICT-instructor had an explicit goal (as expressed in the project-plan) to develop work forms and methods by using ICT, and the teachers were more interested in pedagogical issues, with or without the laptop, as a means to reach the goals. However, the ICT-instructor was persistent, and claimed that it might not even be correct to strictly adhere to the pedagogical planning provided by the textbook; "because you cannot be sure that the book is following the new curriculum" (quote from audio-recording during observation). This disunity might be emanating from conflicting views of how the design process is supposed to work. Teachers asked for tools that they could implement in the classroom, while the ICT-instructors provided material for the teachers to include in their task design. The current system was challenged by the introduction of the new technology, which in turn demanded change in the social aspects of the system. The social aspects include the growing interest for sharing teaching material. "It is easier to ask your neighbour in the staff room, than

trying to find something on the net" (quote from teacher interview). The teachers preferred teaching material that was constructed by a colleague that was part of the same teachers' work team or on the same school, to material randomly found on the Internet.

4.4 Diminishing control

The teachers stated that there were two similar problems concerning control when using the laptops in class. The first problem was when students lost attention during lectures. "It is almost impossible to let the students have the laptop lids open and, at the same time, ask them to focus on the whiteboard. "There seems to be a kind of magnetism in the laptop" (quote from interview with teacher). The temptation for students to use the laptop for unsanctioned activities, such as gaming and chatting, during periods of self-paced work was an often-discussed issue among the teachers. The teachers illustrated this point with the necessity of a never-ending supervision of some of the boys: "If you leave them for 5 min—they will drop the assignment and start to play games" (quote from interview with teacher). Though, this was not considered as a major problem, the teachers thought it was similar to other types of misbehaviour and should be treated in like manner.

The second problem, when using the laptops, was the teachers' feeling of not being in full control over the development of the tasks. An explanation, derived from interviews, was that the information on the Internet is not as sequential as in a textbook, but can be found linked together in terms of associations. "You never know what link they choose to follow and suddenly they are far away from the original task" (quote from interview with teacher). Thus, it makes it possible for students to move freely and expand the tasks in ways that are not anticipated by the teacher (Tallvid et al. 2012). This results in a diminishing sense of control and makes it harder for the teacher to make a plan that lasts for more than a solitary lesson, because the students often found variations that were well within the curriculum, but not foreseen by the teacher.

It is a well-known and discussed issue that the personal laptops give students opportunities to use the laptop in off-task activities (e.g. Fried 2008; Hembrook and Gay 2003; Wood et al. 2012). The issue concerning off-task activities, and whether this expression reveals a focus on the negative implications of these types of activities, is discussed by Mifsud and Mörch (2010). They state that it discloses a presumption of seeing all learning activities as teacher-defined and that all learning must be restricted to the classroom. This statement corresponds with the assumptions in this study; students' performance should be based on relevance, not on the time spent on the primary task. Since the Internet-connected laptop offers infinite possibilities for finding information, it is impossible for the teachers to supervise and control all activities in a 1:1-classroom. The laptop becomes a new entity in the classroom and is often dissociated from the learning environment. Hence, the teachers' apprehensions are not only a technical issue that can be solved by technical restrictions and filters, but also a social matter enabled by a transformation of attitudes. When new technology is introduced, it brings new challenges to the classroom environment and the persistent focus on technical issues fuels the teachers' feeling of lack of control. Consequently, the teachers' former hegemony is challenged and their feeling of lack of control becomes explicable.

4.5 Lack of time

The teachers stated that their time for planning was insufficient and during the observations and interviews, it was noticeable how a perceived lack of time affected their attitude towards the use of laptops. One of the teachers explained: "Right, but then you have to spend a lot of time finding material. And when you find something, you can agree to use it for a while. Then, after a short period, you have to change and there is no continuity. In addition, there are no possibilities for feedback or follow-up. So you always have to test and test and test new things and there is no continuity that makes it possible to see if there are any differences" (audio-recorded during observation).

Task design and teaching include a large number of complex variables—all of which are dynamic, contextually bound, independent and sometimes described as "wicked problems" (Mishra and Koehler 2007). Adding technology to this process, with its affordances and constraints, makes it even more complicated. When the teachers were discussing the planning of a LPP including use of laptops, there were a range of different circumstances to consider that were different to ordinary lesson planning without the laptop. Firstly, after deciding the lesson content, the teachers had to find the material, preferably on the Internet, and then evaluate and use task design made by others. Sometimes the material was ready to use directly, but usually it had to be modified. The second decision, that is not part of the ordinary task design, concerns the process of assessment. The laptop gives a range of possibilities for using alternative assessment procedures instead of tests and written assignments and the teachers had to compare and evaluate the different options in order to get the most out of the task design. The teacher also had to decide whether the laptop was going to be used in the process of publishing, sending material and giving feed back to the students. Finally, the teachers had to decide in what ways the students should use the laptops: for web searching, for communication, for presentation, for documentation and/or as portfolios. These examples of decisions became constraining since they were added on ordinary task design, and hence, caused a feeling of lack of time.

At first glance, these examples can be perceived as contradictory, since one of the common arguments behind the use of personal laptops in the classroom is that the laptops are supposed to reduce workload and facilitate planning and contacts with students—and they are not supposed to be "time-thieves". Despite the fact that information is ubiquitous and always easy to reach with a personal laptop connected to the Internet, and despite the fact that the laptops have built-in possibilities for creating spread sheets, and diagrams and can perform expeditious calculating, teachers claim that time constraints are a major issue and an important explanation of their reluctance to use them in the classroom. So, how can the introduction of laptop use cause a feeling of lack of time?

An explanation given by Engelsen (2006) is that technology causes *focus congestion*. This is a way to describe the tension between new goals and the activities that are central to the organisation. The teachers expressed a discontent with "all the new demands popping up all the time" (quote from teacher interview). Engelsen states that formulating a successful implementation of technology requires the withdrawal of "old" methods and content. Usually it is not possible to maintain the old methods, and add on the technology to existing procedures, since it causes stress and insecurity. Sørensen (2007) argues that time can be considered as an aspect of materiality. If you

have a material approach to time, it becomes possible to comprehend time as "a way of reaching beyond the notion of time that runs "naturally" as a background condition or stable context (or space) for practice" (Sørensen 2007, p. 3). Sorensen's idea, as well as the teachers' opinions, confirms the notion of the technology and the social being inseparable. The laptops challenge the prevailing tradition of teachers being "the sage on the stage" (King 1993) without being forced to adapt and cooperate with others, and can thus causes a feeling of lack of time.

The interviews with the ICT-instructor revealed an attitude of disbelief towards the "lack of time"-argument. She did not agree that it was a question about time, but rather induced complaints about "conservative teachers unwilling to change" (quote from interview). The ICT-instructor repeatedly criticized the teaching for being too traditional and old fashioned and had little understanding for why the teachers did not want to use the laptops as a tool for altering the way they perform in the classroom.

The "lack of time"-argument was the most common, but also the most divergent argument. It is ambiguous because it does not always contain arguments that are really measurable in hours and minutes. Behind the statement, there were a range of concerns that were expressed as "lack of time", but when analysing the answers, the arguments often seem to be a question of either divergent priorities, discontent with the school management, a too heavy workload or a general reluctance to change, but rarely a lack of hours and minutes.

5 Conclusions and discussion

This article described and analysed why some teachers seem to be reluctant to the implementation of personal laptops into their classrooms for teaching purposes, despite technical and pedagogical support. Two questions were asked. The first question concerned the teachers' arguments for being reluctant to integrate laptops into their teaching. The result showed five different, but overlapping, rationalisations to their reluctance. These findings correspond well with similar earlier research (e.g. Tondeur et al. 2009; Wong 2008). The analysis of the arguments revealed technical, pedagogical, and content concerns.

The "lack of technical competence-argument" indicates that the teachers need ongoing technical training. Despite years of experience with laptops in the classrooms, and despite extensive training and coaching, the teachers were hesitant and perceived themselves as lacking in technical competence. However, we need to explore whether this is only a matter of competence or if it is something else. As we can assume that all teachers never will be up-to-date with the rapid technological development it proves to be more a question of understanding technology broadly, being able to adapt to the constant changes and to recognise when and how technology can enhance learning.

The pedagogical issue concerned the feeling of diminishing control, which implies that the technology is challenging the teachers' hegemony in the classroom. The Internet connected laptop use makes the classroom activities unpredictable and thus forces the teacher to incessantly revaluate the tasks. The teachers' arguments encapsulate an impression of an ICT implementation that is still immature. The technology is not integrated as an everyday tool for learning, but it is more of an artefact added on the existing practice to enhance specific learning situations. As a consequence, the

technology challenges the prevailing norms and hence put pressure on the teachers to handle the challenges themselves, since they cannot be disentangled through top down-enjoinments.

The content arguments addressed the issues of teaching material and of finding appropriate material. These arguments revealed a need for the development of Internet-based teaching material. The teachers did not feel that it was worth the effort to try to find material that, when found, might not even be sufficient or suitable.

Finally, the "lack of time"-argument is an expression that captures a range of issues. For example, it can concern teachers' workload, focus congestion, and/or being a sign of deviating prioritisations.

The second question dealt with how the arguments can be understood. The observations revealed that the teachers were not the only performers of the processes; the technologies also took part in and contributed to form the school practice. Hence, there are arguments for taking social as well as material aspects of technology into account when analysing the integration of technology. It is time to shift away from a merely social *or* merely material perspective when studying a 1:1 laptop implementation process. A both social *and* material perspective (socio-material) disputes the distinctions between humans and non-humans, and it also challenges the differences between the organisational and individual levels. Technologies are not separate entities isolated from their practical use. The boundaries between the social and material aspects are composed in the moment, and they change as practice changes. This means that there is no practicable way of, or no point in, trying to understand on what level or from whom the initiative to transform teaching is taken.

As we cannot look at the material and social aspects separately, we must focus on agencies (Orlikowski and Scott 2008, p. 456); that is, we must study and understand how teachers describe and explain their practical use of technology. LPP's have to be carried out by teachers and the use of laptops must be adapted to their experiences and to the local institutional circumstances. By treating laptops as something added-on and extraneous, the focus is lost on how technology is always interlinked to the social entity (Dunleavy et al. 2007). The use of laptops in the classroom is both a social as well as a material matter and it comprises affordances for teaching, as well as for other actions. The laptops are not just there, waiting to be used; the use is formed by the teachers' and the students' daily practice. A professional development with an ambition to be enduring and to accomplish a thorough change has to be responsive to the everyday social context of the teachers, as well as grounded on the material aspects of the technology.

A similar standpoint is taken by Orlikowski (2000) who focusses on both the technical as well as the social perspectives of technology. She comprehends the implementation of technology as a mutual interaction between human agents and technology, and therefore as both technically and socially constructed. Both perspectives are compatible, but the latter puts focus on agency, that is, what teachers actually do, and how they use technology to structure their on-going practice. Johri (2011, p. 215) argues in an analogous way; "socio-materiality applies to all form of learning practices, as they are almost universally mediated by materiality". Hence, the use of technology is suggested to be understood as socio-material, where teachers and laptops are inseparable. Or as stated by LeBaron (2002, p. 433); "Technology does not exist independent of its use". According to Fenwick (2010), there is a shift away from only

analysing phenomena that are assumed to be ether social or material. Instead, there is an increasing interest in the concept that the material is embedded in the social world. Life around us is permeated with technology, and consequently, so are schools and classrooms.

To sum up the second question; by revealing the teachers' arguments for being reluctant to adopt ICT for teaching purposes, the results have illustrated the need to discuss technology in classrooms as both a social as well as a material matter. The teachers were regular users of technology and they were comfortable using technology for organisational purposes. This use, however, proved to be difficult to translate into teaching, which implies that mere knowledge of technology does not foster its successful integration into the classroom. The implementation of the use of laptops is a product of human actions and decisions, and as well as the affordances and constraints of the technical devices. Reluctance is not a trenchant term that can be applied to a technology or its affordances, and cannot be viewed linearly as the outcome of a mismatch of technology and users. Teachers cannot be categorised into those who are reluctant and those who are accommodating; it may be possible to be simultaneously resistant and compatible with technology. Blaming teachers for being conservative and unwilling to change, and drawing precipitant conclusions that little has changed in technology-rich classrooms can thus be disputed.

Hence, a continued and extended exploration of the recurring disappointments with the pace of transformation and reasons behind their reluctance will be pursued in future work.

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