Making Use of ICT: Glimpses from Norwegian Teacher Practices

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ABSTRACT
This paper presents the Norwegian results of a baseline study of teacher practices with ICT. Through semi-structured interviews, six Norwegian teachers explain how digital technology not only changed aspects of their planning and classroom teaching, but also assessment and feedback. The results, together with similar results from England, Denmark, Germany, and Austria, contribute to the development of ICT support for formative e-assessment in the 21st Century classroom. Furthermore, through an analysis of the baseline interviews, tweets, blogs, forum posts, and discussions with teachers at conferences, we identified nine ICT-supported assessment methods being used in Norwegian classrooms. Our conclusion is that the interviewees are active users of ICT in all aspects of professional teacher practice, using both the tools provided and finding new tools to integrate technology into their professional practice.

Keywords:
Teacher practice and ICT, ICT and assessment, assessment for learning, technology enhanced learning

INTRODUCTION
A recent editorial in this journal (Søby 2013) reviewed the status of information and communication technology (ICT) as a strategic instrument in the Norwegian educational sector. This paper reminded us that ICT has been included in the educational policy agenda for almost 30 years. After the use of digital tools was identified as a basic skill in 2006 (changed to “digital skills” in 2011), Norway became the first European country to develop a curriculum that linked the use of digital tools across all subjects. The European Survey of Schools (EUN, 2013) found that “Norway comes top in Europe with regard to ICT infrastructure and use” (Søby, 2013, p.4). The Norwegian Monitor 2013 study (Hatlevik, Egeberg, Guðmundsdóttir, Loftsgarden, & Loi, 2013), that
investigated teacher uses of ICT in various aspects of their practice, found that ICT use was higher for administrative tasks (22.1% use computers for six hours or less per week, while 29.6% use them for 13 hours or more) than for teaching (69.9% use computers six hours or less per week, while 11% use them for 13 hours or more). This study, however, did not specify the details of how teachers use ICT in their day-to-day professional practice.

This paper reports on a study in which six Norwegian teachers were interviewed on the uses of ICT in their professional practice. The study was guided by the following research question: How is ICT used in teachers’ professional practice? Professional practice encompasses “an individual’s private, interwoven, but constantly changing system of knowledge, experience and values, which at all times has an impact on the person’s teaching” (Handal and Lauvås, 1999, p. 19). Teachers were interviewed in conjunction with a European research project that is interested in how European teachers are currently using ICT in lesson planning, classroom teaching, monitoring, assessment, feedback, and communication in order to provide better support for formative e-assessment in the future 21st Century classroom.

After describing the background and method for the study, the paper describes how ICT is being used and compares the Norwegian results with results from the other participating countries, which include Germany, Austria, Denmark, and the United Kingdom. We then present a set of ICT-supported assessment methods currently being used in Norwegian schools, which provide us with insight into assessment methods being developed and integrated into teaching practice. Finally, we discuss the results in terms of this project and within the broader context of how Norwegians use ICT in their professional practice.

BACKGROUND

In order to support teacher classroom assessment methods, the EU Next Generation Teaching, Education and Learning for Life (NEXT-TELL) project focuses on providing support for such efforts. In particular, the project’s Evidence-centred Activity and Assessment Design (ECAAD) activity aims to support teachers and students with nuanced information about learning when it is needed, and in a format that is supportive of pedagogical decision-making, in order to optimise the level of stimulation, challenge, and feedback for students. Pedagogical decision-making includes lesson and assessment planning, assessment and monitoring of learning, interpretation of assessment results and giving feedback, improving one’s own teaching practice, and engaging in communication with various stakeholders, that is, various aspects of a modern view of teaching (Darling-Hammond et al., 2005). NEXT-TELL subscribes to Darling-Hammond et al.’s (2005) view that teacher practice also

1. http://www.next-tell.eu
includes participating in school development, cooperating in teams, and engaging with professional learning communities. Two other NEXT-TELL activities, Teacher Inquiry into Student Learning (TISL) and Strategic Planning with ICTs in Education (SPICE), address these issues.

Figure 1 illustrates NEXT-TELL’s ECAAD vision of supporting formative e-assessment. In this environment teachers use planners to specify learning activities and assessments, which are delivered to the students either through digital means (e.g., an automated quiz or a Google Docs essay) or as pen-and-paper drawings. The data generated by the learning activities and assessments is captured (automatically if possible, otherwise physically) and recorded for analysis either by the teacher or by an automated analysis (e.g., determining what the results of a quiz mean for student learning). The data is then visualised in some way (e.g., as traffic lights indicating achievement of a learning goal or content). Teachers use the visualised data to provide feedback or feedforward to students and to adjust their teaching.

There are several lines of research on e-assessment in NEXT-TELL, ranging from the development of assessment methods (both with teachers and from a formal model-based perspective, e.g. Kickmeier-Rust & Albert, 2013), to visualising assessment data and integration of this data in open learner models (Bull et al., 2012; Bull et al., 2013), which can be used by teachers and students for feedback, feedback, and feedforward (Hattie & Timerperly, 2007). This evidence-based approach (Mislevy, Almond, & Lukas, 2003) is particularly relevant in today’s technology-rich classrooms, in which student use of technology creates a multitude of data (e.g. artefacts and log data) that can be mined, assessed, and presented in ways that students and teachers can interpret to support learning (Bull et al., 2012).
In order to understand the existing practices of ICT use, which can then feed into the requirement process for the first version of NEXT-TELL’s methods and tools, interviews with teachers at project-participating schools and newly recruited teachers, were carried out. While the baseline study focused on professional teacher practice, the goal was not to develop theoretical models or frameworks of practice such as the TALIS model (OECD, 2009). Instead, the goal was to better understand existing practices and possible hurdles that might be encountered when moving towards the NEXT-TELL vision of the 21st Century classroom.

THE BASELINE STUDY IN NORWAY

Guided by the research question “How do teachers use ICT in their professional practice?” a baseline study was carried out with 34 teachers in 5 European countries. The teachers were interviewed about the use of ICT in education in their country, its use in their school, and in their professional practice (Ceirniak et al., 2011). The baseline interviews provided the project with valuable information about the use of ICT in the educational sector and identified current practices. The European schools participating in the study were recruited based on their interest in the project either at the time the grant application was sent to the EU (our high school in Norway was involved at this stage) or through recruitment efforts after the project was funded (our primary school was recruited in this manner).

The teacher practice baseline study in Norway was carried out in May and June 2011.

Methods

This qualitative study employed semi-structured interviews. Semi-structured interviews, which follow an interview guide, are a good way to gain insight into a topic. This style of interview gives interviewers the flexibility to change the order of questions based on the flow of the conversation (Oates, 2006). They encourage a conversation between the interviewer and the interviewee (Skjevheim, 1996) and provide the opportunity to ask follow-up questions if something is unclear or if something interesting turns up in the conversation. Interviewees are free to introduce issues that they think are relevant (Oates, 2006). Furthermore, semi-structured interviews result in rich data and give us valuable information about the use of ICT. Although the teachers interviewed do not represent all teachers in Norway, their stories help us understand how the vision of an innovative 21st Century classroom can become a 21st century practice in Norway.

By analysing the collected interview data, we identified a number of interesting ICT-supported assessment methods being used by the teachers. To supplement the interview data, we collected examples of interesting ICT-based
assessment methods being used in Norway via Twitter, blogs, and Norwegian conferences. These varied data offer insight into existing ICT-supported assessment practices in Norway.

Participants

Six Norwegian teachers from three different schools—two high schools and one primary school—were interviewed. The participating Norwegian high school has a special focus on ICT and was recruited to be a part of the project application. Early in the project school management asked natural science and language teachers to participate in an information meeting where the project was presented, and then volunteers to be interviewed were solicited. The two other teachers, one primary and one secondary, were contacted after the project began as we knew of their efforts related to ICT and assessment; we knew that their work would be informative for the project.

Table 1 gives an overview of the participants. There were natural science (STEM) and English (TESL) teachers, male and female, with varied amounts of experience. Five were secondary teachers and one was a primary school teacher. Three taught STEM and another three taught TESL. One female and five male teachers had from two to 38 years of experience. Four of the secondary school teachers taught at a digital secondary school (DSS) that participates in the NEXT-TELL project, uses new pedagogy, and aims to be paperless.

While it can be argued that these teachers are not representative of the teacher pool in Norway, the NEXT-TELL project is focused on schools with a high density of ICT use and on classrooms of the future. Knowledge about such schools and teachers still gives valuable insight into how teachers in general can take ICT for formative assessment into use. Furthermore, many of the responses to the interview questions reveal the current state-of-the-art for schools in general in Norway. This is discussed further in later sections.
Data Collection

The interview guide was comprised of questions related to general information on (1) education, (2) schools and teachers (in their own country), (3) school infrastructure, (4) their ICT experience, and (5) ICT use in their own professional practice. The interviews were recorded digitally (with consent of the interviewee and reported to NSD), and later transcribed.

RESULTS

Data Analysis

The data, which included 6.5 hours of interviews, was transcribed and analysed. The data analysis was inspired by a descriptive phenomenological analysis (Giorgi 1985; 1989), in which transcriptions are analysed by dividing the text into themes and sub-themes, which are then discriminated and transformed into meaning units, or text fragments containing information about the phenomena. These are further synthesised into a consistent, general representation. The goal of a phenomenological approach is not to approach the study by a preconceived theoretical construct or with predefined research hypotheses, but rather to investigate a phenomenon.

The purpose of this study was to determine empirically how teachers used ICT in their practices. In order to enhance the credibility of the data, the dialog with teachers focused on determining practice and experience rather than on theoretical knowledge.

The transcribed interviews were read carefully, one by one, in order to identify meaning units related to the predefined themes of interest to the project: classroom teaching, monitoring, (formative) assessment, feedback and communication with students and parents, and homework. These were further divided into sub-themes: how, what, tools and applications used, needs, and good practice.

Some of the themes related to many meaning units, while others related to few. The themes identified for each respondent were clustered into a number of general themes that appeared to be common to all respondent descriptions. Then a general structure, which reflected the collective experiences of the teachers, was formulated. A draft description of each theme, based on the meaning units, was written and a summary of each theme was compiled using reductions and linguistic transformations of the meaning units in order to reveal the meaning of the phenomena in a condensed form, whilst staying as close as possible to the essence of each description. In order to ensure that our understanding of the general themes reflected respondent understanding, the participants were asked to comment on the identified, general themes.

A condensed version of each theme is presented below.
Lesson Planning
ICT teaching methods should promote high-quality, relevant education (Berg et al., 2012; Engen & Øgrim, 2009; European Schoolnet, 2013; Haug, 2011; Hernes, 2010). Therefore, planning for its use in the classroom is important. The four teachers from DSS explained that they planned both individually and as a group (within the same subject area), and that a student representative was a part of the planning group. All of the teachers used the national curriculum’s specified competence goals as the basis for planning. They planned teaching activities, learning processes, and assessments. In addition to using obligatory tools such as the Virtual Learning Environment (VLE) It’s Learning (www.itslearning.com), the teachers used tools such as Google Docs, Wikis, and open Internet resources for planning. One teacher, for example, displayed Google Docs on a Smart Board, while planning in order to facilitate collaboration.

The six teachers differed with regard to the level of detail in their planning. Two TESL teachers documented their plans mainly on the yearly level (planning when to teach which topic and defining their learning goals) and then spontaneously adapted their teaching to the class’s needs. The other four teachers documented their plans on a more fine-grained level. They often planned for individual topics or even specific lessons.

Classroom Teaching
All interviewed teachers used ICT to some extent when teaching. Differences described between the use in grammar school and secondary school can be attributed in part due to accessibility and infrastructure. Not surprisingly the teachers emphasised that it is not the use of technology itself that is important, but how the tools are used to achieve the objectives of the curriculum.

All the teachers use It’s Learning (www.itslearning.no), the learning management system used in many Norwegian schools. In addition, the secondary school teachers use SkoleArena (www.skolearena.no), a digital information service for students and parents about teaching, attendance, student contact information, grades, etc., and NDLA (National Digital Learning resources for secondary education) to access digital learning materials. SkoleArena and It’s Learning are used interchangeably for communication with students. In addition, Digital drills/Glossary tests, Dictionaries, Wikis, Microsoft OneNote, GeoGebra, Kikora, GoogleDocs, Google Spreadsheet/forms and various Internet sites for teaching and learning resources for home and school (e.g., BBC Learning) are in use.

Monitoring
Monitoring was very difficult for many of the teachers to describe, and many of the teachers do not like to use the term “monitoring”. The primary school teacher explained that monitoring students is about observing whether the
student entering the classroom knows what to do. On the one hand this is something teachers should do to maintain an overview of student learning, skills, and knowledge levels. On the other hand, one asks if the collected information gives an accurate picture of the student competencies.

Teachers at both primary and secondary schools recognise that monitoring is a continuous process throughout school. They explained that monitoring is mainly done by studying the student body language, self-esteem, conversations, discussions, ways of demonstrating their knowledge and skills, reflections on feedback, tests, oral activity, written activity, practical exercises, fieldwork, performances, presentations, general level of achievement, interactions with peers, and self-assessment.

When it comes to use of technology, teachers mention several aspects of ICT that make monitoring easier now than it was previously:

- It’s Learning gives an overview of how students work and participate in groups.
- The plagiarism tool in It’s Learning can determine what percentage of submitted texts is copied from the Internet.
- Student work is checked regularly on It’s Learning, which enables a continuous dialogue with the students.
- Wiki History is used to observe which students contribute and how they do so.
- Kikora is used to observe how students solve calculations.

Formative Assessment

The secondary school teachers are especially interested in formative and continuous assessment. There has been a special focus in Norway on formative assessment (Utdanningsdirektoratet, 2011) in the last couple of years. Indeed, one of the schools considers this to be an area of special interest. The primary school also planned to begin a project focusing on assessment in the semester following the interview.

In Norway grades are introduced in the 8th grade, when the students are 13 years old. Prior to this, all assessment is formative. The teacher working in the primary school explains how assessment is a part of understanding a student’s knowledge level in order to help him or her achieve the expected knowledge level in order to be prepared for lower secondary school.

In secondary school grading and assessment are described as difficult for the teachers. Secondary school students receive a grade for each subject area they
have had during the semester, and a grade for specific national exams (students are randomly assigned to exams, and not all the students in one class take the same exams; for example, five students in one class might take a written math exam, while four might take an oral physics exam). Although the grade given for each subject area is summative (over the semester), formative assessment helps inform the summative assessment.

One advantage to giving grades during a semester is that it enables teachers to give a slightly better grade (e.g., 4+ instead of 4 on an English essay) in order to motivate the students. Not all teachers, however, like giving grades during the semester. A secondary school teacher explained that he already practised no grading during the semester, and finds this to work very well. He explained that focusing on formative assessment rather than on grades makes it easier for him to give a grade at the end of the semester without having to argue with students about how to sum up different grades they received during the semester. In DSS the teachers were planning not to use grades on semester tests or essays or assignments, only giving final grades for each subject at the end of the semester. However, the school was not able to follow through on this plan due to opposition from students. The school intends to prepare better for the student arguments in the next school year. In addition to teacher assessment, many teachers use or would like to use more self-assessment. Peer assessment seems to be less popular, and some teachers find it difficult to choose peer assessment methods, because this is a sensitive subject for students.

How teachers assess is individual. Some assess six times in the semester while others assess all the time. The national teaching plan gives the learning goals for the subject areas, but the teachers work together at each school within a subject matter team to make assessment criteria. The assessment criteria—and how formative assessment is performed—varies by subject area. Formative assessment in language and science is described by the teachers as difficult compared to math assessment. In mathematics, where progress is dependent on mastery of each topic (often in a certain order), formative assessment is related to helping the student understand a topic so they can move onto the next topic. General science (as opposed to a specialty such as physics or biology) is explained as less linear; students can master one topic (e.g., gravity) and not another (e.g., chemical reactions) as there is no interdependence between topics. As teachers find there to be little time for formative assessment, a new topic is often introduced before a student has achieved a reasonable level of understanding of an earlier topic. Thus, formative assessment in science is described as difficult. In foreign languages, teachers find it very difficult to formulate assessment criteria, as there are so many aspects involved.

Another finding from the interviews is the lack of a uniform practice and guidelines for assessment at these schools, which results in local, individual assessment practices. For example, one teacher mentioned that it might not be entirely appropriate to make assessment criteria for everything, and finds
that this inhibits learning. Some teachers, on the other hand, believe assessment criteria to be helpful.

Teachers use a plethora of assessment methods including multiple choice tests, presentations, practical exercises, mentometer tests, text assignments, dialogs, and discussions. The teachers use a number of ICT tools:

- **Kikora** gives immediate feedback as the student calculates and the teacher gets the information. The tool is not yet in use at the schools we talked to, but some teachers have tested it and find it very promising.

- **SkoleArena** gives the teacher the ability to log grades and communicate feedback. Most teachers are satisfied with it, but some teachers find it difficult to keep an overview of the communication.

- **It’s Learning** offers multiple opportunities to communicate with the students, deliver assignments via sound and text, share links, and complete tests. Most teachers are satisfied with this tool, but others find it difficult to keep an overview of its use. It is difficult to combine It’s Learning with other tools.

- **Khan Academy** provides a collection of teaching methods and a database of tasks in different mathematical topics. The student can earn badges, and the student and teacher can view visualized progressions.

- **Google Spreadsheets** makes it easy to create forms for assessment history, which can then be shared with students.

- **Wikis** are not easy to use, but they allow students to make comments on peer work and collaborate.

- **MarkIn** provides a comprehensive set of tools enabling the teacher to mark and annotate text.

**Feedback and Communication with Students**

Whether a TESL or STEM teacher, and regardless of the length of their work history, all interviewed teachers stress that feedback to students is time consuming and requires extensive work. Still, it is enormously important (Hattie & Timerperly 2007; Hernes, 2010; Krumsvik, 2011; Krumsvik et al., 2013). The S1 teachers usually give feedback and/or grades after an assessment via SkoleArena, a tool that enables teachers to see if and when their students have logged in. Teachers cannot, however, tell if the students have read their feedback.

All of the teachers stressed that feedback influences learning outcomes and mentioned that it is striking how students can reach another level by getting
good feedback. Most of the teachers give both oral and written feedback on student work, but the main message expressed by the teachers is that talking directly to the student is the best method.

Another noteworthy finding was how teachers who do not use grades find a remarkable change in the student focus on learning; they explained that when the focus on grades is not there, students seem to be more interested in the subject itself. All students make progress, especially those who are not particularly interested in studying. This may be because they can focus on what they have done, and how to improve based on feedback, rather than on a “good or bad” grade. This finding is supported by previous research (Wiliam, 2011).

When talking about feedback and its relation to formative assessment, the teachers mentioned “feedforward”, a term that is found in the Norwegian assessment regulations (Utdanningsdirektoratet, 2011). Feedback is a comment on what has been done, whereas feedforward (Dowrick, 1976) is comment on what should be done in order to improve or move forward. The idea of feedforward is something the teachers mention as part of the effort to get students to learn and perform better. The aspect that seems to be the most important for the teachers being interviewed is dialog with students. This conversation with students is described as what makes the main difference, and they stress that the dialogue helps students more than giving a grade or providing several lines of textual feedback.

The teachers explained that ICT, as it is now, is not the best choice for enabling dialog, because dialog is an informal interpersonal situation. To use technology for feedback or feedforward may be more efficient, but is at the same time very time-consuming. The teachers explained that writing feedback and feedforward messages takes a lot of time, and too much written feedback may be counterproductive to the students who lack motivation. On the other hand, technology could be effective for giving and receiving feedback, because it provides the possibility to save and reuse written text and comments, which could save time for other teachers.

The teachers mentioned several tools they use for feedback and feedforward, including:

- MarkIn – text correction and comments
- SkoleArena – grading and written feedback
- It’s Learning – information, grading, and comments
- WordDocs – written feedback
How Does Norway Compare to Other Countries?

There was a clear division between the teachers in Austria and Germany, who use very little ICT, those in Denmark, who use ICT to some extent and see great potential, and those in England and Norway, who use a lot of ICT in all areas of their practice and envisage even more ways in which ICT could support their practices.

When comparing the results related to planning, we saw that the Norwegian teachers collaborated on planning not only teaching, but also activities, learning processes, and assessment. Student representatives were included in the planning groups. The only other country where the teachers mentioned that they planned for assessment was in England, and in particular German teachers stressed that they did not plan assessments at all. The Norwegian and British teachers also used a wide range of ICT tools to support their planning, including Google Docs, Wikis, and their Virtual Learning Environment (e.g., It’s Learning in Norway): tools that support collaboration and sharing. Furthermore, the teachers in Norway mentioned the use of Twitter and delogbruk.no (Share and Use), which illustrates that they are collaborating beyond their schools’ walls.

Teachers in all countries use ICT in classroom teaching, again, with varying intensity. In Germany the teachers reported using ICT to “create an atmosphere” (e.g., use a YouTube or other video). Some used pre-made units in Moodle (an open source LMS), while a very few have access to Interactive Whiteboards. In Austria they also used pre-made material (e.g., YouTube), Drill & Practice programs, subject-specific software, and some Moodle. There was little data available for Denmark on this question. Teachers in England and Norway are motivated to use ICT in their classrooms, employing VLEs (such as It’s Learning in Norway), Microsoft Office Suite, Interactive Whiteboards, Web 2.0 tools (Picasa, Flickr, YouTube, Wikis, blogs, podcasts, etc.), and subject-matter specialty programs. One teacher in England explained how she used PowerPoint plus mobile phones to poll students. In addition, as discussed earlier, the Norwegian teachers use the national sites NDLA, SkoleArea, Kikora, and special digital drill programs and dictionaries.

There was little use of ICT for monitoring students. In Germany and Austria, teachers did not use ICT for monitoring and had no idea on how ICT could help them with monitoring. In England, teachers expressed an interest in using ICT for monitoring, but did not understand how to accomplish this (although they did mention that e-Portfolios would be of use). In Norway, ICT is currently used to follow student contributions (Wiki History), observe math skills (Kikora), participate in groups, and check for plagiarism (It’s Learning).

2. Due to time constraints with the Danish teachers, some parts of the interview were dropped.
There is huge variation when using ICT for assessment. Austrian and German teachers reported that it would be very unusual. British teachers reported that there is some use of ICT for summative assessment. There is also increasing interest in using ICT for formative assessment; the teachers gave examples of audio comments on Word documents, teacher comments via VLE, and peer comments via discussion forums. Norwegian teachers provided a variety of examples, including the summative testing through national tests (English and Math are digital). The Norwegian VLE It’s Learning offers a test/quiz function, and teachers also used assessment tools such as Google Docs, Wikis, Kikora, Skolearena (to log grades and communicate), Khan Academy (to create badges that indicate progress), and MarkedIn (to re-use annotations to texts and thus save time). In both Norway and England there has been a national focus on formative assessment, and this was reflected in the interviews, Teachers in Austria and Germany, by contrast, did not use formative assessment very often.

All countries give summative feedback in written and oral form. Some teachers mentioned using graphics such as traffic lights (Germany and England) for feedback. The teachers in England report little use of ICT other than the feedback provided in self-directed instructional materials such as web-based quizzes and tests. Interestingly, there has been a recent push to provide more regular feedback to students and their parents via online reporting. The Norwegian teachers stood out in their responses as they mentioned feedback as a “dialogue” between teacher and student. They also mentioned “feedforward” as a dialogue through written messages to and from students through the VLE or through an oral exchange. Both the teachers in England and in Norway were very interested in finding out how ICT could help with feedback and, in Norway, with feedforward. Furthermore, in Norway the teachers experienced that formative assessment was still closely tied to summative models of grading and assessment criteria and that more needs to be done to develop formative assessment practices that are more qualitative, student-centred, and which enable the rich detail of student learning to be visualised and used effectively.

While there are large differences in the use of ICT in the practice of teaching, there are some commonalities that came out in the interviews. In particular all teachers mentioned the workload and time aspects of adopting new technology. Several mentioned that they did not have the skills required to use the tools. Teachers and students had varying levels of computer access: some schools still used computer labs, while students at other schools all had their own computers. All schools had Internet access.
ICT-SUPPORTED ASSESSMENT AND FEEDBACK METHODS IN NORWAY: NINE EXAMPLES

The interviewed teachers mentioned a number of interesting ways in which they were using ICT for assessment and feedback, we set out to see what other Norwegian teachers are doing with ICT and assessment and feedback. We collected examples from our interviewed teachers and school management, from teacher conferences on ICT and learning, and from social media such as Twitter, blogs, and forums. Norwegian teachers are extensive users of technology (Hatlevik et al., 2013), not only in the classroom, but also for sharing their knowledge and experiences with other teachers all over the country. One of the best-known teacher communities is the forum Delogbruk³ (Share and Use), which focuses on ICT and has over 10,000 users. Teachers are also active users of Twitter and other social media, and there are several teachers’ writing blogs (e.g., Delogbruk.com, 2013a). Common Twitter hashtags include #lærerhverdag (teachers everyday), #skolechat (school chat), #vurdering (assessment), #skole (school), and #læring (learning). During the writing of this article we tweeted to ask if any teachers were still using WallWisher (a tool that will be explained later). Within ten minutes, two teachers had confirmed that they used this tool and a third said that she was intrigued and would try it as well.

The nine assessment or feedback methods that were collected and shared in the project are presented below.

Process Writing and Continuous Assessment in Google Docs

The main idea of Process Writing is that students receive feedback from their peers and the teacher on their texts during the writing process. The students use Google Docs to produce a text and invite peers and the teacher to comment on the document during the writing process. When the document is completed, the student submits a final text for summative assessment. The Norwegian teacher who uses this approach has had a positive experience with this assessment method. When the teacher asked the students to evaluate various aspects of their English class, with respect to their own learning and personal development, many students gave Google Docs a high score. Prior to this evaluation the teacher was unaware that the students thought that continuous assessment promoted learning as much as they did. The students made a clear and very conscious distinction between continuous assessment and getting a comment and a mark on a finished text.

iPod Assessment in Practical Studies

The main idea of iPod assessment is that the teacher is able to assess the students’ practical skills from a video of their practice. The students use their iPods (and now smartphones) to film each other carrying out a task and send

3. delogbruk.no
the video to the teacher. The teacher can watch the video and provide comments or praise. S/he is also able to use the video as a teaching tool to show examples of how to do or not to do things. The Norwegian teacher who uses this approach had positive experiences with this assessment method.

**Video Assessment and Feedback**

The main idea of video assessment is to provide students with accurate, detailed feedback on their assignments. Students hand in their assignments digitally or on paper. The teacher then corrects the assignments on the computer (scanning assignments handed in on paper) using a screen catcher tool. For example, a teacher could use this tool to illustrate how to calculate a math problem. The teacher also explains what s/he is doing, and the video (the oral explanation together with the screen catch) is then sent to the student. The Norwegian teacher who uses this approach has had a positive experience with this assessment method (Johanson, 2012).

**Immediate Polls/Quiz Assessment**

The goal of polls/quiz assessment is to give the student an immediate response to questions—and for the teacher to immediately identify misconceptions. Norwegian teachers who use this approach have had a positive experience with this assessment method.

**Mobile Phone Feedback**

Mobile phone feedback is designed to give positive feedback to the student on any aspect of their school life (e.g., participation in gym class, behaviour in the classroom, results on a test). The feedback is delivered via text message. The Norwegian principal who explained this approach reported positive experience with this method (Kalbakk, 2011).

**WallWisher Assessment**

The main idea of WallWisher assessment is to be able to ask quick questions and obtain a real time overview of small issues with which students are struggling. The teacher posts a question on a post-it note on the WallWisher (see Figure 2) and gives the link to the students. The students use the link to go to the WallWisher, via their computer or their phone, and answer the questions. The teacher sees the collection of answers and is able to identify misconceptions, wrong answers, etc. This allows the teacher to adjust his or her teaching to help students better understand the subject. The Norwegian teachers who presented this approach at the teacher conference Dei Gode Døma reported that they had very positive experience with this assessment method. Teachers sharing best practices on Twitter have also reported positive experiences using this tool (Fæste, 2013; Heidinag, 2013; Husøy, 2013).
Figure 2: Example of WallWisher\(^4\) (in English)

**Process Writing and Continuous Assessment Using Wikis**

Wikis allow students to receive feedback from their peers and teacher on their texts during the writing process (this is similar to the use of Google Docs). The Wiki’s activity log makes it possible for the teacher to see each student’s activity and contributions. The Norwegian teacher who uses this approach has had positive experience with this assessment method, although it produces a lot of information and he will have to find a method to sort through all the information.

**DISCUSSION**

Our results, while restricted to a very small number of ICT-interested teachers in Norway (with all but one teaching in high schools\(^5\)), highlight some positive aspects of ICT. Teachers in Norway use ICT for many things stretching from planning to assessment, and they are the most active and advanced ICT users interviewed for this project. While it could be argued that this sample is not representative, many of the ICT tools mentioned in the interviews are in

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\(^4\) [http://loesvanboxtel.wordpress.com/2012/06/16/wallwisher/](http://loesvanboxtel.wordpress.com/2012/06/16/wallwisher/)

\(^5\) Interestingly our primary school teacher participated with her Grade 6 classes in a field trial of the advanced virtual world Second Life focused on English language learning with students in Austria.
use all over Norway. As most (or all) schools in Norway are required to use an administration LMS such as It’s Learning, one could argue that all Norwegian teachers have some experience with ICT. The same argument applies to summative testing at the national level. All schools participate in the national tests and, with the national tests in English and Math being digital, teachers have to manage their students’ practice tests, full tests, and results.

Our results support the Monitor 2012 (Hatlevik et al., 2013) observation that there is a higher priority on pedagogical competence for ICT in the various subjects and use of subject-specific programs. None of our teachers mentioned ICT or digital skills training for students; instead, all mention of ICT revolved around how it was used to support learning in their discipline.

Today most Norwegian teachers use a variety technology tools in their practice (Hatlevik et al., 2013), but some teachers are able to use advanced features of programs beyond the abilities of ‘normal’ users. These teachers may use technology that is not intended for pedagogical use, stretching the pedagogical advantages of technology and integrate it into a pedagogical setting. Power users “seek information, learn what they want to know, when they want to learn it, to the level of depth that satisfies their immediate quest for knowledge—on a just-in-time, as-needed basis.” If we apply this understanding of power users to teacher practices, we have a definition of power teachers:

Power teachers seek information, learn what they want to know, when they want to learn it, to the level of depth that satisfies their immediate quest for knowledge in order to use and find pedagogical advantages in technology, also not intended for pedagogy, and put it into a pedagogical setting, beyond the abilities of a “normal” teacher.

The teachers presented in this paper are power teachers. What resources do these power teachers have available? Could we look at such power teachers in order to say something about other teachers, and what should be in place in order to understand how to improve the future of ICT use in Norwegian schools?

Ottestad (2010) writes that there has been a shift from an innovative twenty-first-century vision to a relative lack of twenty-first-century practices in Norway. He argues that one reason for this is that teachers are told to use ICT without being provided help or guidance on how to do so. Teachers may lack the resources or structural constrictions needed to put their visions into action (Ottestad, 2010). In a previous Scandinavian study, Finnish teachers seemed to be more autonomous in relation to didactic choices than Danish and Norwegian teachers. In their use of ICT, however, the Finnish teachers were more conservative than Danish and Norwegian teachers, with some

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very interesting exceptions. Collaborating with guardians/parents was relatively more frequent in Finland than in Denmark and Norway. Ottestad also indicates that Finnish teachers might be more advanced in their use of ICT when it relates to specific pedagogical practices where the impact on learning scaffolding and subject understanding is high, such as promoting an inquiry-based pedagogy (Ottestad, 2010).

Krumsvik (2011) finds that concepts of digital competence have affected Norwegian education in general, and teacher education in particular. Teachers have to become more digitally competent in order to engage in the new pedagogical discourse required by Norwegian policy. This changes the value of digital epistemology in their daily practice. On the other hand, Ottestad (2010) claims that the inclusion of the use of ICT as a basic skill stresses on teachers who were faced with the frustrating dilemma of using ICT in their practice without being trained on how to do so (Erstad and Quale, 2009). The Finnish case arguably shows that autonomy and local ownership of definitions concerning important interpretations of curricula, together with an emphasis on professional development can provide better structures for pedagogical innovation with ICT (Ottestad 2010). The increasing use of technology in schools does not necessarily equal better teaching or better learning. The digital divide in education is not limited to access to technology and the Internet, it is also related to teacher and student mastery of this technology (Hatlevik et al., 2013). Ottestad (2010) claims that the Norwegian implementation of ICT in the curriculum yields positive results in terms of the proportion of teachers starting to use ICT in their practice. Our investigation of how some power teachers use ICT can help us to understand how teachers in general can improve the future of ICT use in Norwegian schools.

Perhaps the most promising finding from our perspective is that the results showed the Norwegian teachers taking part in the study being more advanced than teachers from other countries, both in their understanding of formative assessment and in their use of ICT to support assessment practices. This should not be a surprise since a 2009 assessment regulation set a new national standard for assessment focusing on formative assessment. Since that time there have been national, regional, and local initiatives to enhance formative assessment in Norway. We easily collected nine examples of ICT-supported assessment practices that show how teachers, even outside our study, use technology to get a better overview of student learning, bring students further in their learning, and manage the massive workload required by formative assessment. Furthermore, it seems like school management in Norway support the notion that “Assessment with the help of ICT is used to help students’ academic performance” (Hatlevik et al., 2013, Table 3.4). There is another side to ICT: it can lead to disruption and noise in the classroom (Hatlevik et al., 2013) wherefore it is important to have a strategy for dealing with this.
From our study we have evidence that Norwegian teachers share and learn from each other on how to use ICT for teaching and assessment. What is also interesting here is that the examples we find illustrate more use of Web 2.0 applications (e.g., Google Docs, video, wikis) and not traditional packages such as Microsoft Office or LMSs. Perhaps we need to rethink which digital skills teachers need to hone and how we support their development. We are lucky in Norway to have a national centre for ICT and education, which disseminates research, carries out studies of the use of ICT in Norway, and organises various conferences on ICT and education. The annual National conference on ICT use in education and learning (NKUL) conference convenes thousands of teachers to present their own work and hear from researchers about new uses for ICT in education. Norwegian teachers are active on Twitter, blogs, and forums, sharing information and ideas with one another. We need to ensure that this professional development is available for all teachers and not just those who are most curious and innovative.

CONCLUSIONS

The motivation for this study was to investigate how ICT is currently integrated into teacher practices in order to identify the baseline of ICT use upon which the NEXT-TELL project could build. Our study has significance both for understanding how some Norwegian teachers are using ICT in their daily professional practice and for providing input into the NEXT-TELL project. Through semi-structured interviews, six Norwegian teachers explained how digital technology not only changed aspects of their planning and classroom teaching, but assessment and feedback as well. In DSS, the high school that emphasises the use of technology in the classroom, we found power teachers with a special interest in technology using tools not designed for teaching or learning in innovative ways for pedagogical purposes. Furthermore, we found Norwegian teachers actively sharing with and learning from each other by tweeting and blogging. We found wonderful examples of assessment supported by Web 2.0 technologies. Unlike teachers in the other participating countries, the Norwegian teachers at DSS were able and willing to put the first version of some of the NEXT-TELL methods and tools into use (Cierniak et al., 2012; Bull et al., 2012) and have provided invaluable feedback to the project on issues of usability and problems with integrating ICT into practice.

However, Søby (2013) reminds us that all is not well in ICT education in Norway. He cites a number of reports and studies (e.g., Hatlevik, Tømte, Skaug, & Ottestad, 2011; Egeberg et al., 2012; Aasen, Rye, & Ottesen, 2012; EUN, 2013) that report that even in Norway, the development of digital skills has been too slow, and we now see a widening gap between Norwegian schools “in terms of varying allocation of time to ICT in schools, in the digital competence of students and teachers, in teacher training, in absent or insufficient digital learning resources, in the support provided by school owners and in inequalities in the availability of equipment and infrastructure” (Søby, 2013,
We need to find ways to ensure that these promising glimpses of innovation and practice in Norway that we found in our baseline study are able to bloom in all schools in Norway. In this sense we should further investigate how and why the power teachers innovative. What circumstances have enabled them to succeed? This is a formidable challenge, but with the advent of cloud technologies that remove some of the burden of equipment, data storage, and upkeep from schools, and Web 2.0 applications that are being used in the personal lives of our teachers and students and then being applied to the practice of teaching, perhaps we will see a new era of innovation.

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