PROJECT PRESENTATION

"Bored or Board?"
- A Nordic Collaborative Project on Interactive Whiteboards

Gunstein Egeberg, Ove Edvard Hatlevik, Tor Arne Wolner, Dina Dalaaker & Geir Olaf Pettersen

Gunstein Egeberg
Project manager, Norwegian Centre for ICT in Education, Norway.
gunstein.egeberg@iktsenteret.no

Ove Edvard Hatlevik
Researcher, Norwegian Centre for ICT in Education, Norway.
ove.e.hatlevik@iktsenteret.no

Tor Arne Wolner
Associate professor, Department of teacher training, Vestfold University College, Norway.
tor.a.wolner@hive.no

Dina Dalaaker
Adviser, Norwegian Centre for ICT in Education, Norway.
dina.dalaaker@iktsenteret.no

Geir Olaf Pettersen
University lecturer, Institute of teacher training and pedagogy, University of Tromsø, Norway.
geir.olaf.pettersen@uit.no

English abstract
A growing number of classrooms are currently being equipped with interactive whiteboards. Figures from Futuresource (2009) show that between 30 and 40 per cent of Norwegian classrooms are now equipped with interactive whiteboards, and it is fair to assume that this figure is rising 1. At the same time, few teachers have subject-didactic training in how to use these tools. Many questions can and ought to be addressed when a new type of teaching technology enters the classroom on such a large scale. Will the use of interactive whiteboards contribute to a change in teachers’ teaching practices? If so, in which respects? What happens to learning and motivation when teaching is performed using an interactive whiteboard?

Keywords: Interactive whiteboards (IWB), classroom practice, teacher training, teaching, technology.
Introduction

Technology in itself will not necessarily create better teaching. The quality and value depends on how the teacher uses the technology, and this is a field where we still need more knowledge and research. Analyses in the report “De gamle er eldste” show that teacher-centred teaching has the most stable and positive effect on pupils’ performance. This kind of teaching is, among other things, characterised by the use of classroom boards, individual work, assignments and classroom discussions led by the teacher. When viewed in the context of NIFU STEP’s report, the “Bored or Board” project gives clear indications that the use of interactive whiteboards as part of teacher-centred teaching could make a positive contribution to learning. An interactive whiteboard (IWB) is basically a surface onto which a computer screen is displayed, normally via a projector. The surface is touch-sensitive, either by using a pen or finger, and lets you control your computer from the board itself.

The “Bored or Board?” project is a Nordic collaborative project between Denmark, Sweden and Norway. The project started up in Denmark in 2009, one year before the other participating countries. The Danish project is a collaborative project between Absalons School in Roskilde Municipality and University College Sjælland. The starting point for the Danish project was a study conducted by the Danish Evaluation Institute (EVA 2009). This study revealed a lack of professional and didactic development of the school subjects, where the realisation was made that new technology had changed the academic content. This co-occurred with a marked change in the different teaching methods. The survey revealed a lack of knowledge about how technology could be implemented in practice (EVA 2009).

In the spring of 2010 a Norwegian project was established comprising Vestfold University College, Gulskogen School, Drammen Municipality and the Norwegian Centre for ICT in Education. Buskerud University College and Østfold University College subsequently joined the project as part of the Oslofjord Alliance (OFA). Two 7th grade classes at Gulskogen School in Drammen Municipality constitute the practical arena. Sweden joined the project at the same time as Norway, with participants from Uddevalla Municipality, Forshälla School, Herrestad School and University West. The Nordic countries share a common basic view of learning and teaching, and their school situations are also quite similar. These similarities were important conditions for starting up the project.

Background

SMART Technologies in Canada held the assumption that there existed a “Scandinavian” approach to teaching and learning, and was therefore interested in the experiences gained from the use of IWBs in the Nordic countries. At the same time the Danish research community wanted to gain more knowledge about the use of technology in education. SMART Technologies joined the project by supplying equipment to the participating schools. In return, SMART Technologies will receive the research reports but the company is not involved in the research and the project design. It is of secondary importance that products from SMART Technologies were the tools used in the project, as the testing of SMART boards was not in itself the object of this project. Rather, the focus of this project is the testing of interactive whiteboards and other digital tools in the classroom in general.
The overall project aims to produce new knowledge about how interactive whiteboards are used in the classroom, and how schools and teachers should develop their own practices. Each country contributes to the project on the basis of its own objectives and problem areas.

Each of the countries in the Nordic project chooses its own focus areas, but all the national projects have a common research design and method of implementation. The research design falls under the tradition of applied research and alternates between different phases of observation and testing. This is based on the idea of finding not only “best practice” but also of identifying “next practice”. In the first phase of the project, classroom observations are conducted and a midway report is written on the basis of these analyses. The next phase entails a workshop where teachers collaborate on finding new prototypes for teaching methods, before entering a third phase of testing and evaluating these prototypes. Each country produces its own report, which are to be collated into a single report in the early autumn of 2011.

Drammen Municipality and Gulsøgen School are the initiators of the Norwegian participation in this project. Together they entered into a cooperative project with Interactive Norway, the Norwegian importer of SMART boards, and with SOLEIS, which develops and supplies digital teaching resources for interactive whiteboards. Drammen Municipality was one of the first to provide its schools with interactive whiteboards, and regarded participation in this collaborative project as a good way to collate valuable knowledge and experiences of how the interactive whiteboards could best be used for teaching purposes.

Classroom management was selected as the overall theme for the Norwegian project, with a particular focus on the role of the teacher, communication, assessment and didactic design. The project group investigates and focuses on a number of individual areas but also views these areas in relation to each other. “Didactic design” in this context means the choices that shape a teaching or learning situation.

Classroom management is a topical theme, which has often attracted attention in connection with the use of technology. John Hattie (2009), who collected more than 800 meta-analyses relating to pupils’ achievements, stresses the importance of classroom management. Among other things, he stresses the importance of pupils gaining insights into what the criteria for goal achievement are. Hattie also stresses the importance of allowing pupils to actively participate through assessments of each other, self-assessment, and dialogue with teachers and fellow pupils. From this perspective, it is interesting to look at teacher–pupil communication and pupil–pupil communication when teaching is being conducted with the use of interactive whiteboards.

In this study we address how the communication flow between pupil and teacher and between pupils is perceived. Are the questions open-ended or closed? In other words, do the answers require reflection and offer opportunities to communicate what is being thought about the question, or do they simply require a right or wrong answer to a closed question. Furthermore, the project focuses on assessment, which is an important tool for achieving competence aims for the curricula and one of the priority areas for Drammen Municipality. The project investigates how both pupils’ assessments of themselves and each other, as well as teachers’ assessments, take place in the learning process through student-involved teaching with interactive whiteboards. The project group also holds an assumption that when the teacher uses interactive whiteboards in the teaching situation, this will have significance for the teacher’s role. What characterises the teacher’s role when using interactive whiteboards? Do the pupils become active participants? Focusing on didactic design, we
want to investigate how teachers combine and present learning resources when they use interactive whiteboards as part of their own teaching practice. The project also looks at what possibilities and limitations interactive whiteboards present when it comes to interaction between teacher, pupil and subject matter.

Method

The object of the project consists of two groups of pupils in the 7th grade and three teachers, in the subjects of Norwegian and mathematics throughout one school year. The two groups of pupils are used as one case (Yin, 2005), and the study includes use of both qualitative and quantitative methods (Cresswell, 2003). The Norwegian project group has chosen pupils in the 7th grade, since this is the same age group that was used in the parallel Danish and Swedish projects. The school’s management selected the pupil groups and the three teachers. A focal point for the project is to find examples of and experiences with the use of interactive whiteboards. Several international studies also followed classes over shorter (Beauchamp, 2004; Glover & Miller, 2002) or longer (Lerman & Zevenbergen, 2007; Zevenbergen & Lerman, 2008) periods of time.

Ethical guidelines

Data collection is reported to the Norwegian Social Science Data Services (NSD). Tor Arne Wølner, Associate Professor at Vestfold University College, is the data manager. Consent from the parents/guardians has been obtained.

Data collection

This is a case study, which uses mixed methods (i.e. combined methods) (Creswell, 2003; Moss, Jewitt, Levacic, Armstrong, Caradini & Castle, 2007; Schuck & Kearney, 2008) of data collection and analysis. The project has multiple research questions for the study, and it is difficult to answer all of them using only one single method. The project therefore combines qualitative and quantitative methods of data collection that can elucidate and answer the research questions we have defined. The methods used include observation, video observation, interviews and questionnaires.

Observation: Several other studies employed observation (Mercer, Hennesey & Warwick, 2010; Schuck & Kearney, 2008) to gain knowledge about and information on what goes on in the classroom. In this project, observation is used in selected lessons in Norwegian and mathematics. Since it is important not to have too many observers present during these lessons, the tasks are divided among the researchers. The members of the research group have different tasks in connection with the observations; some film the lessons while others take field notes or complete observation forms.

We use two types of observation forms. One contains predefined categories based on an operationalisation of the research questions for the study. The purpose of this is to obtain an idea of what is going on and which activities are predominant during the teaching session (Kleven & Strømsnes, 1998). The disadvantage of a form with predefined categories is that the observer may be influenced by assumptions which she has already made in the study and which she brings with her into the classroom situation, and that it may be difficult to capture interesting events, which do not fit directly into the categories defined in the observation form. The other form is therefore more open-ended and can be used specifically for when something interesting is observed or when
something unexpected happens. The activities that are recorded are time-coded, and the activities are briefly presented and described. The time data can be used to link this form to the video recordings, field notes or the more structured observation form.

**Video observation:** Video observation is used in the classroom in both the Norwegian and mathematics classes. We have chosen to let the camera focus on activities that take place on the interactive whiteboard, both when the teacher uses it in her teaching and when one or more pupil uses it for their work. For example, in the mathematics lessons there are several examples of pupils solving set questions.

**Questionnaire:** In mid-December 2010 the pupils were asked to complete an electronic questionnaire that was created using Google Spreadsheet. This form contained questions about how the pupils experienced teaching with interactive whiteboards in general and in Norwegian and mathematics in particular.

**Interview of teachers:** The project group has conducted, and will continue to conduct, informal interviews of the teachers in connection with planning meetings and observations. In mid-December 2010 a more formal group interview was conducted with the three teachers involved. One object of the interviews was to elicit the reflections they had made from their experience of using interactive whiteboards.

**Interview of pupils:** No interviews have yet been conducted of the pupils. These are planned to take place in May–June 2011 in order to obtain more detailed descriptions of the pupils’ experiences with, and thoughts about, the use of interactive whiteboards.

**Data analysis**

We have collected – and will continue to collect – data from the project in the form of observations, video recordings, interviews and questionnaires. While these offer many approaches to the analysis, they also pose a number of challenges. One approach to understanding the field could be to review and discuss the field notes and to study in more detail different patterns in the predefined observation forms. In this way, isolated examples could be identified, as well as more characteristic features of the teaching. By using field notes and observation forms, the analyses could be undertaken at the same time as the data collection, and it may therefore be difficult to gain an overall perspective of what is happening in the classroom.

The purpose of the video observation is to have the possibility to conduct analyses of the activities that go on in the classroom, either in full lessons or in shorter sequences. It is also possible to use observation forms or field notes to refer back to activities that stand out as interesting, unexpected or relevant with respect to the research questions. In connection with the analysis of data obtained from video observations, the software tool InqScribe is used. This tool makes it possible to enter codes, comments and analyses of events, tasks and isolated statements.

We have conducted a survey among the pupils and will conduct descriptive analyses of their responses to this survey. The chosen research method is the case study, with the two classes as cases. The data basis is therefore unsuitable for drawing generalised conclusions. Nevertheless, we hope
that the response from the survey will provide us with interesting information about how the pupils perceive and assess the use of interactive whiteboards.

**Assessment of the methods used in the study**

As already mentioned, this study is based on multiple research questions, something that requires the use of multiple methods. On the one hand, the fact that the study attempts to cover multiple topics associated with the use of interactive whiteboards represents a weakness, and it may be difficult to narrow the focus of the project design and plans. On the other hand, this is a project with multiple participant institutions and researchers. It is therefore to a certain extent possible for participants to narrow the focus through data samples and the selection of analytical methods. An example of such narrowing of the focus is an in-depth analysis of video recordings of the teaching of fractional arithmetic in the mathematics classes.

Using different methods presents several challenges. It is not certain that the same phenomenon can be elucidated by the use of different methods. It might just as well be the case that different phenomena or aspects are elucidated when different methods are used. It is important to be aware that none of the methods used in this project take precedence. A third factor is that the project uses an arbitrary sample, and it is therefore difficult to transfer findings from this study to other schools. Instead, we want to use the project to identify examples of the use of interactive whiteboards. Many international case studies have also been conducted on the use of interactive whiteboards (Beauchamp, 2004; Glover & Miller, 2002; Mercer et al., 2010; Schuck & Kearney, 2008; Lerman & Zevenbergen, 2007; Zevenbergen & Lerman, 2008). There appears to be a need for more experimental design linked to the usefulness of interactive whiteboards in connection with teaching. For the time being this is a research question that lies outside the scope of this project.

**Theoretical framework and knowledge base**

A considerable amount of research has been done on the use of interactive whiteboards. Because no large-scale quantitative surveys were identified when searching for research literature for this project, it is difficult to make any generalised assessments on the basis of the reports that were found to be of interest. Nevertheless, the numerous qualitative studies described in the reports are interesting and relevant; they provide knowledge on the use of interactive whiteboards in different contexts and also point to potential theoretical models.

Lerman and Zevenbergen (2007) draw attention to the risk that the use of interactive whiteboards may impair the quality of teaching. These researchers point out that the use of IWBS requires the teacher to change her teaching practice if the whiteboards are to add new possibilities to the teaching. Lerman and Zevenbergen argue that IWBS may influence teaching practice by increasing the pace, and that this increases the risk of impairing the depth or quality of teaching. The teacher’s posing of questions during the lessons is used as an example. When a question is posed, the pupils need time to reflect before answering. If the pace becomes too fast, many pupils will not find an answer before the teacher moves on. It also turns out that the teacher often spends less time on following up questions from the pupils, so that while the number of questions increases, the quality of the teaching is impaired. Another factor discussed by Lerman and Zevenbergen is how the teacher organises the pupils when the IWB is being used. Here it is implied that teachers often prefer to have the group of pupils gathered around while the IWB is being used, that it is used to draw the pupils’ attention towards what the teacher is teaching. For their part, the pupils say that the
whiteboards have a positive impact on teaching when the pupils themselves are given the opportunity to actively participate. They also point out that the IWBs could have a positive impact if they were used in a sensible manner and if teachers developed their own practices. IWBs cannot replace a good teacher; what is decisive is not only what the teacher does, but also how she does it (Lopez 2010).

Hooper and Rieber (1995) describe five phases for implementing technology where a teacher is involved. These five phases are: 1) familiarisation, 2) utilisation, 3) integration, 4) reorientation, and 5) evolution. In the first two phases the teacher is introduced to new technology and familiarises herself with it. The technology can be equipment or software but can also have to do with ideas and concepts. After familiarising herself with the technology, the teacher begins to use it, initially on a personal level or in limited situations. The third phase involves integrating the technology into the teacher's pedagogical practice; in other words, she uses the new tools in her present teaching practice. In their paper from 1995, Hooper and Rieber explain that teachers rarely reach phase three, integration. In 2011 this has changed in the majority of contexts; teachers today have integrated different technologies into their practices to a greater extent. This also applies to the use of IWBs (Lopez 2010). The question is whether teachers take it a step further and reorientate their teaching and develop their own practices. When it comes to interactive whiteboards, teachers will have to go through the same steps in order to be able to use the whiteboards in a good way. The school administration ought to facilitate progression through these phases and to have a strategy for how this should be done.

An understanding of how schools and teachers adopt new technologies is important when studying the use of interactive whiteboards in schools. One interesting perspective would be to investigate how a school as an organisation evolves its use of new tools. Evolution can be divided into phases: infusion, integration and transformation (Gibson 1996, cited in Northcote, Mildenhall, Marshall and Swan, 2010). As the school and teachers gradually evolve their use of IWBs, the focus will shift from one that is teacher-centred to one that is pupil-centred. A number of research projects have studied the relationship between teachings in classrooms as opposed to working in groups. There is a risk that introducing IWBs could lead to more teacher-centred teaching whereby the whole class is addressed together (Wood and Ashfield, 2008) and the teaching becomes monolingual in nature rather than allowing the pupils to be active in the learning processes through dialogue.

Holmes (2009) conducted a study of how in recent years student teachers have used different functions when planning lessons with the use of IWBs. Holmes found that these functions could be categorised thus: colour, hide and reveal, links to multiple representations, sort or slide, visual images, animations or applets and allowance for student annotations.

Preliminary findings

The findings in this presentation are based on the first half-year of the project and the data that is available so far. Our assumptions and findings must therefore be viewed in this light.

Didactic design

The teachers’ planning of lessons is documented through the teachers’ planning documentation. By adopting Holmes’ (2009) characteristics of learning activities it is possible to see which elements the teacher used when preparing her lessons. To give an example from the analyses, we refer here to a teaching plan where the topic of the lesson is fractions and common denominators.
The teaching plan is based on software that accompanies the whiteboard. The entire presentation consists of 13 slides. A lot of colour is used. The teacher also uses several diagrams to represent fractions, such as pizza slices and rectangles, to demonstrate \[
\frac{2}{4} = \frac{4}{8}
\]. In the first slides the figures 1/4 and 2/4 are used to represent fractions. Because it can be misleading to use different figures, the ideal solution is to stick to one standard figure. The teacher commented after a class that she finally had managed to change the fraction to the correct written format. Images are used both to explain and to serve purely as decorative illustrations. Space was also left for writing down calculations while going through the material.

In the workbooks we use as an example here, the characteristic “hide and reveal” and links to other interactive pages were not used, nor was it arranged so that the pupils could move around and sort elements such as virtual concretising materials. These functions are used to a certain extent in other teaching sessions.

Holmes (2009) characterises effective use of colours as one of the most commonly employed features in connection with IWBs. This tallies with our own observations. The teachers also left space on the slides for writing, note taking or illustrations as they went through the material. When interviewed, the teachers said that one of the advantages of the IWB was that it enabled them to prepare things in advance and thereby save time in the classroom because they no longer had to write everything down but could instead focus on what was important. It is here that one of the possibilities – as we see it – from using IWBs lie. Even though the teachers prepare most of the teaching material in advance, they have more opportunities to draw the pupils into the process with this method than in more conventional presentations using projectors, where everything is already written in advance.

What dialogue takes place between the pupils when they work together in front of the whiteboard? It seems as if the assignments that are given on the whiteboard are decisive for what dialogue – and how much – takes place between the pupils when they work together in front of a whiteboard. The gruble.net website has a multiplication test which the pupils may choose to complete under timed or untimed conditions. During one lesson, the teacher instructs the pupils to complete the multiplication test three times, and to complete the “6 to 10 multiplication trainer” at least once, under timed or untimed conditions. After a while, a pupil in one of the groups says: “I hate time pressure”. It can seem as if time pressure leads to less dialogue between the pupils when they work on assignments.

In one “drag and drop” assignment, the pupil cannot find the answer option he believes to be the correct one. The assignment requires solving 1/3+1/2, which the pupil calculates to be 1/6. This answer option is not among the options given. The pupil first asks the group and then the teacher for help. In the course of the discussion it emerges that the pupil is focusing solely on the common denominator and fails to take into account that the numerator also changes when one multiplies a fraction. If this had been done in a conventional exercise book, the pupil would perhaps simply have written down his answer and then carried on without having to reflect on his own method and understanding.
Communication

We have also looked at what communication between the class and the teacher is like in the classroom when using the IWB. “The problem before was that when you were writing, you had your back turned to the pupils. That is no longer the case” (Teacher 1). The teachers find that they communicate better with the class because they spend less time with their back turned.

As mentioned, an issue we looked at was whether the teachers posed open-ended or closed questions to the pupils. A preliminary review of transcriptions from the lessons seems to show that most of the questions that are asked in the classroom are closed in nature. Lerman and Zevenbergen (2007) maintain that there is a tendency to do this when using interactive whiteboards. On the other hand, the teachers say they are more conscious about which questions they pose during lessons and that they are more interested in stimulating reflection. The reason for the lack of correspondence between wanting to pose more open-ended questions and actually doing so during lessons may be due to the level of teacher maturity. It is common to go through several phases when developing didactic design.

Because the teachers use more time on preparatory work and getting things ready, they say there is more time for communicating with the pupils via the whiteboard. On the basis of the data material in this study, it does seem as if this assumption is correct but that communication is still characterised by lower-order questions. As one of the teachers interviewed said, this may be due to the fact that the teaching and working method for digital whiteboards still feels novel. This is also something we noticed in our observations. From being novice users of IWBs, we see a trend where teachers learn the ropes, where they reflect on and attempt to change the way in which they communicate with their pupils at the same time as they try to use the interactive whiteboard in a different way than the conventional blackboard or whiteboard.

The teachers who were interviewed said that they found the pupils to be more motivated and that they found it easier to pose questions with the IWB in the classroom. This is confirmed by the pupils in the survey (74%). Furthermore, the teachers said that certain pupils were more active during lessons than previously. The whiteboard may therefore give more motivation, but the pupils must nonetheless work on the subjects. It is not certain that the motivation is linked to a will to work on Norwegian and mathematics, but the whiteboard may motivate pupils to pay attention during lessons.

One teacher believed that it also seems as if the pupils did not find it embarrassing to make errors when they were working with the interactive whiteboard: “They don’t appear to feel ashamed or self-conscious. It used to be a bit like that. The next in turn kind of comes along and corrects the answer” (Teacher 2). This is an interesting observation; it seems as if it is less stigmatising to approach the board and give an answer when using the IWB.

Assessment

The teachers who are participating in the project focus on assessment, not least because this is something on which the schools focus very strongly. From the interviews we find that the teachers regard the IWB as an interesting tool for assessment work. Among other things, the teachers mentioned the use of answer keys, and that this was something they wanted to make more use of. The teaching plans often contain activities that are designed in such a way that the pupils receive the results afterwards, with feedback on which assignments were correctly answered. The teacher...
uses the results and feedback to go through the assignments with the pupils and explain those that were incorrectly answered. The project will follow up with more analysis on assessment in the final report.

The way forward

In the spring of 2011 work on developing the didactic design for the use of IWBs will commence. This will involve communities of experts collaborating with teachers on developing new teaching models. After two or three rounds of developing, testing and assessing the model, the goal will be to develop the teachers’ use of the IWB in their teaching practice and to gain knowledge about what characterises a good didactic design. The project has access to solid professional resources, and it will be important to conduct ongoing evaluations of how teachers who lack the same support can develop their own practice. Work must be devoted to this perspective in the time ahead.

Several gatherings and a final conference are planned for the “Bored or Board?” project. A more detailed report and at least one article will be written on the project. Drammen Municipality is keen that experiences gained from the project should be transferred to other schools in the municipality and that the use of IWBs in all its schools should be consolidated. Any dissemination and competence-building activities in this respect must be the responsibility of the municipality.

References


EVA (2009). Danmarks Evalueringsinstituts evaluering af projektet IT i Folkeskolen (ITIF) [The Danish Evaluation Institute’s evaluation of the project “IT in Primary Education”].


NIFU STEP (2010). Rapport nr. 34 “De gamle er eldst?” Betydning av skoleressurser, undervisningsformer og læringsmiljø for elevenes prestasjoner på 5., 8. og 10. trinn i grunnpåppleringen [The older the wiser? The importance of school resources, teaching methods and the learning environment for student achievements in the 5th, 8th and 10th grades]. Authors. Vibeke Opheim, Jens Grøgaard and Terje Næss.


1 Unconfirmed figures from Futursource (2010) state that the percentage is now 39%.
"The older the wiser?" (2010), report published by NIFU STEP (Norwegian Institute for Studies in Innovation, Research and Education
SMART Technologies is the manufacturer of the SMART Board, currently the most widely-used interactive whiteboard in schools (FutureSource, 2009).
www.inqscribe.com
www.gruble.net