Training Teachers to Use Ict as an Integrated Part of Their Teaching

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Abstract

This article is based on an action research project at a lower secondary school in Hamar, Norway. The project tried out if ICT-supported learning processes based on a production perspective would lead to improved learning outcomes for students. In this article we want to discuss, on the basis of our experience, to what extent to conduct ICT training as an integral part of the professional development in a school will have lasting effects - beyond the project period - on the practice of the involved teachers. A main conclusion is that by being able to provide ICT support for teachers when they need, instead of general courses, the teachers has improved their ICT skills and got increased ICT confidence. We see that participation in the project have changed these teachers' practice because they have been given time to experience that ICT might improve the learning outcome for their students.
***Keywords**: ICT, professional development, secondary school*

Introduction

School development in most countries has long been characterized by an increasing effort to integrate information and communication technology (ICT) in all teaching and learning. In Norway, this is most clearly reflected in the new curriculum from 2006 (Ministry of Education and Research 2004) where to use digital tools is one of five basic skills, equally important as to be able to express themselves verbally, to express themselves in writing, to read and to count and ICT shall be used in all academic subjects. Compared to previous curricula, this implies a substantially greater emphasis on ICT in schools. There are two main arguments for the heavy investment in ICT. One is that schools have to follow the technological development so that the students are prepared for a society where the use of digital tools is a natural part of life. The second argument is the assumed learning-enhancing effects of ICT.. The argument is based on an assumption that the systematic and professional use of ICT will

enhance academic learning. The problem with this argument is that despite extensive research over many years, we lack clear scientific evidence to support this assumption. It is argued that teachers with constructivist learning style are more positive towards ICT use than those with a more teacher-controlled vision (Windschilt and Sahl 2002, Webb and Cox 2004, Becker 1999). Many therefore believe that a constructivist, student-centred approach is appropriate when it comes to exploit the learning-enhancing potential of using ICT in schools. But it is not enough. To succeed with the integration of ICT in the subjects we need teachers who are digitally competent and able to make ICT a part of the learning process (Passey 2006). It has been given numerous ICT training for teachers to get them to increase their use of ICT in education without it, given the desired results. There are many who point out that this is because they have underestimated the challenges it is for a teacher to integrate ICT in their work in school (Hakkarinen et al. 2001, Wikan et al. 2010a). It is therefore our hypothesis that it is necessary to integrate ICT training as part of general professional development for teachers. We will also argue that changing teachers 'practice is a time consuming process that can only be successful if they find that the new way of teaching will improve students' learning.

Professional development for teacher change

In what way one offer the most effective in-service training or professional development of teachers in the field of ICT and education is a central question. What one actually asks, then is how to offer professional development programmes that will change teachers' practice in the desired direction. With the desired direction, we mean here that the political authorities and leading educators at any time see as appropriate behaviour in the classroom (Griffin 1983). Thus the purpose of education is to change teachers' attitudes and beliefs about what leads to better learning outcomes for students (Strømstad et al. 2006).

These range from everything from short day courses, where teachers are taken out of the classroom on one end of the scale to training in the workplace. In addition, these programs may be short term or take place over a longer period. A common denominator for the various training programs in is that they usually are not very effective (Day and Sachs 2004). Training is ineffective because it is not taken into account what it is that motivates teachers to participate in continuing education and because it is not understood what is needed to achieve a change in a teacher's behaviour in the classroom (Guskey 2002). Study emphasizes that teachers attend courses because they want to learn something practical, or have any concrete knowledge that will make them better teachers (Fullan and Miles 1992). If they do not feel they get what they consider the course are wasted. Guskey (2002) said that

"a teacher first will change the way he or she teach if he or she has learned that this leads to better learning outcomes for students. We choose to use the learning outcomes of what a teacher at any time, believes it is showing that he or she does in the classroom works, ranging from better test results, more student activity, increased motivation and calmness in the classroom.

Guskey (2002) argues that those who create educational programs – in-service programmes - often take it for granted that the teacher's attitude to the new that comes first, and then changes into practice afterwards. He believes that this is wrong. Teachers are apparently positive for the new, but it will not permanently affect the way they teach before they have learned that it leads to better learning outcomes for students. This is why even if you have previously spent time to involve teachers in the design of the course and you are sure that it fills a need, it still will end up to have little lasting effect in the classroom practise. The main point is that it is not education in itself but the teachers 'experience of what she has learned that lead to the improvement of students' learning outcomes, which in turn will lead to changed attitudes and thereby changed practice (Malserez and Wedell 2007). A comprehensive study of education in English schools support this conclusion, the teachers changed practices because they saw that students had better learning outcome as a result of the new way of working (Deaney and Hennessy 2007). *So it is perhaps appropriate to talk about a cyclic path here, training, testing in practice, improved learning outcomes, change in teachers' attitudes that lead to sustained change in practice.* To succeed in changing a teacher's practice through continuing education the following should be considered to (Guskey 2002):

1. Recognize that change is a gradual and difficult process for teachers
    a. Extra work in the beginning
    b. Creates uncertainty, lack of coping, may seem threatening
    c. Possibility of failure, at risk of spending time on something that does not work
2. Ensure that teachers receive regular feedback of students' learning outcomes
3. Provide ongoing supervision, support and pressure
    a. The new must be a natural part of the teacher's repertoire
    b. Important to follow-up because education must be seen as a process and not as an "event".

Research design and the action

The present article is based on both qualitative and quantitative data. Qualitative data was gathered from a selected group of teachers who took part in a project aimed at developing

their ICT skills. It was in collaboration with school leadership selected two teams of teachers, a total of 10. These were responsible for each group of students, 60 students in each group. It was established a working group consisting of the two team leaders and two from the research group that planned the action part of the project. The collaboration lasted three years, from fall 2007 to spring 2010 and the same group of students were followed from the beginning to the end 9.klasse 10.klasse.

At the start of the project we interviewed all teachers individually in order to identify their professional background and experience as well as any formal or informal competence in the use of ICT in teaching It turned out that most of the teachers had attended computer courses, but that there were only three who felt very knowledgeable.

We agreed that teachers should be trained in MS Photo Story 3 and a simple animation program and that there were teachers who would teach the students. The Microsoft Photo Story 3 software was introduced to the teachers at the start of the project, encouraging them to apply this as a presentation tool. Ms Photo Story 3 is presentation software which enables the learners to present their work as short movies with pictures, music and recorded text. Before the school year started, training programs were conducted with the teachers involving digital storytelling as a particular genre and general software training.

At the initial stages of the project the majority of the teachers started out with a very enthusiastic attitude towards the idea of ICT- supported learning but gradually they became more reluctant to the whole project and at one stage almost negative. Many factors may explain these phenomena, but gradually it became apparent that the main problem was rooted in the lack of ICT competence among the teachers. This initiated a series of elementary upgrading courses offering training in basic ICT skills such as Windows office, file handling and internet ethics in order to boost both teachers' competence and confidence, which are considered as vital factors for the successful integration of ICT in their daily practice and The research team was regularly in school to support teachers in their use of ICT in teaching and was always available by mail and telephone if the teachers needed help. Teachers needed to be confident in the technical side of ICT use before they were confident enough to plan ICT use in their teaching. Initially, we underestimated the teachers' need for security on the computer technical field.

Focus-group meetings were used monthly in order to discuss the teachers' attitudes and discuss their experience with using ICT. The focus-group meetings lasted approximately 1.5 hours and with a few exceptions all the teachers attended the meetings and communicated their experience. Typically, the teachers came up with different examples related to their own subjects and elaborated on what impact ICT might have on teaching and learning. Between September 2007 and June 2009 two researchers conducted 20 individual teacher interviews and 10 focus-group interviews. We also asked the teachers to write reflection notes.

The data was analysed by sorting the answers and observations' into categories representing main themes that appeared on a regular basis. Some of the themes were later discussed with teachers and learners during interviews, and teachers were asked to consider them in their reflection notes. Recurring themes were the learning outcome of ICT, when and how teachers' used ICT, how they evaluated learners' attitude to school work when they used *ICT,* and their evaluations of how well the learners collaborated .The steps of analyses followed the principles in grounded theory, we developed analytical interpretations of the data and used these for further data collection in order to refine the theoretical analyses (Denzin and Lincoln 2003).

The quantitative survey was conducted at all three secondary schools in the municipality of Hamar. The survey was carried out during June 2009. 59 teachers filled in a questionnaire. This is 65 % of the total number of teachers in those schools. The data were analyzed using the Statistical Package for the Social Science (SPSS) and tested for representativeness. In the questionnaire we gathered information about age, subject of teaching, sex, attendance on ICT courses, and if and for what purposes they used ICT. We also asked them about their views on ICT and learning outcome. 58 % were women and 42 % men, 39 % were between 25 – 35 years old, 27 % between 35-45 and 34 % more than 45. This resembles the universe which means that our sample is representative.

How the project influenced use of ICT

At the end of the action research project, in June 2009, we tested all of the municipal school teachers, their attitudes to and use of ICT in teaching. The aim was to see whether the teachers who had received training, "project teachers, differed from the others in the community.

It turned out to be relatively large differences between the "project teachers and other school teachers in the use of ICT. 63% of the "project teachers' use of ICT frequently in their teaching, figures for the other was only 16%.Project teachers" seemed also more often to allow their pupils use ICT at school, the figures are 75% versus 42%. The results indicate that participation in the project, the training they have received and the experience they have done makes the "project teachers" see the benefits of using ICT in school more than the other teachers in the district.

Those teachers who have received systematic training and support in the use of ICT find ICT more useful as a leaning enhancing artefact than the teachers who have not been involved in the project (Table 1). The vast majority of teachers in the project argued that increased learning outcome is a result of the fact that the students are working harder when they are

allowed to use computer for school work and at school. In addition, the quality of submissions and presentations of home work is better. It is still a lot of wasted time with unfocused surfing the web and computer technology buzz, but this is offset by the fact that students are more motivated. Teachers in the project experienced that they could get students to work more systematically on the web when they gave them strict limits and complete URL address.

Table 1 Teachers' views on ICT and learning outcomes for students.

	improves performance	Increases learning outcomes	Learning more subjects	Motivates	Promotes collaborative learning
Continuing education project	75 %	62%	62%	75%	50%
Not included in the project	29%	58%	22%	76%	14%

Some teachers expressed specifically that to challenge students to create digital multimodal films gave higher learning outcome because the students became more motivated and that means they spend more time on schoolwork, work focused and through it learn more. Many emphasize that with these method pupils who have never submitted homework do so. Very often these are boys. Many of these have computer skills and spend much of their off school time in front of a screen. Now they could use this skill a school as well. The leisure competence of the students is drawn into the classroom and it allows more people to succeed in school.

Many teachers also believe that when students are allowed to produce their own digital multimodal texts they work much harder and more motivated and not least, work better. This means that the benefits of teamwork and project work is better and more after the intention with these working methods. A known problem with group and project work is that the students engaged in extensive division of labour and do not really cooperate not to say collaborate. When the presentation is to be a short film, they are forced to discuss and collaborated on the script and production. In the fact-finding phase that consists of surfing the web, more than reading the book, we still generally low and most cooperative labour, as one teacher put it:

Requires group collaboration in order to make a multimodal text, 2-3 must work together, they must also work at home. I think the group process is important for evaluating the complex texts they provide. But it is an important process, how to work with multiple digital tools in the same product. See more pupils deliver excellent products of group work and I do not think they could if they worked more traditionally, with pen and pencil I mean. (female teacher age 37).

The results of the quantitative study show that teachers who have participated in the project are more positive towards that ICT can improve learning outcomes than the other secondary school teachers in the municipality. Through the project, they have received support to try out different ways to use ICT with particular emphasis on putting students into production perspective. We the researchers have helped the teachers to overcome their lack of technical skill and encouraged them to try the use of ICT in their teaching. They have gotten feedback from their students that they liked to work with computers and they have seen that many students have delivered better products with greater academic insight than before. It is this experience that makes them more confident that the ICT used in a professional planned way, improve learning outcomes for students. Many of the other secondary school teachers had also undergone various computer courses before but it does not seem to have effect on their attitudes to and use of ICT in their teaching (Wikan et al. 2010b).

The teachers use of ICT one year after

One year after the project was finished, spring 2010, we carried out interviews of the teachers to see if they still used ICT in teaching. The purpose was to study whether the program had lasting effects on practice or whether teachers had fallen back to old practices when the project was over.

It was found that ICT use had changed from what it was before the project started in autumn 2007. All teachers except one said they either had used or had in the annual plans to use MS Photo Story 3 or similar program in this academic year. All said they also used other PC tools, and felt that the project had upgraded their skills that gave them confidence to choose to use ICT in teaching if it could lead to increased learning outcomes for students. They felt competent digital in the sense that they were able to assess the usefulness of ICT on a par with other tools they had available to promote student learning.

All but one teacher said they believe that by using ICT to put the learners in the production role leads to increased learning for many students. In addition some students can express themselves better when they get to work with digital productions.

One of the teachers who have always been sceptical about whether this was useful in her subjects have not yet found the time to use ICT to create multimodal texts, but as there is a separate learning goals in the Norwegian course she says she will use it, but then as digital storytelling in which students express their opinion. Another teacher who has been positive to the project but who have expressed a need for more training after the project was over, however, has ensured that the use of digital multimodal texts were given to her class by getting others to do so. One is the slightly older female teacher who needs a lot of support to even dare to use ICT. She says that she is now so old that it is not so easy to start something new. But because she has experienced that the new – ICT - is useful to improve learning outcomes for students, she makes sure she has others to help them, including teaching students in practice. The teacher in Norwegian is also typical of her profession. There are other studies that also show the mother tongue teachers is often sceptical to ICT and feel that they should represent a counterculture against all the new (Erstad 2004).
One other teacher came late into the project and had little training in ICT but has always been positive. He has not started according to himself to use ICT this year, but has plans for next year. Here he blames on the practical organization and cooperation with a new teacher who has used digital multimodal texts, he does not say that he did not think it can lead to more learning outcomes for students. Because he came into the project after it was founded, he has not been involved in the process by which the other teachers in the team and therefore not received the same training and follow-up from the researcher as the other teachers. There is reason to believe that he has not had enough time to go through the process necessary for that he should be able to take an independent position on ICT from his own experiences on students' learning. As one can see from the quote he has not taken the initiative to continue the program:

> *No not made such films, it was PowerPoint instead. Has set up a plan for digital storytelling, we will use it with the nine grade in Norwegian, good for writing and / or the presentation of a book (male teacher in 40-years).*

Only one of the teachers said he had neither used what he had learned in the project, nor had plans to use it in his academic subjects. He teaches physical education and mathematics and he cannot see that digital multimodal texts lead to improved learning outcomes for his students. He is possibly the most computer literate teacher at school and he has been a driving force in the project and believes that multimodal texts produced by students can lead to increased learning in most subjects. This shows that it is not lack of ICT competence that hold him back from using ICT in the classroom, but lack of enhanced learning outcome for the students according to his experience.

The main impression is that most teachers have continued to use what they have learned through the project. They use it in their teaching because they have experienced through their teaching that the use of ICT such as digital mulitimodale texts can improve learning outcomes for some students. However they underline that students do not necessarily get enhanced learning outcome when using at a computer. ICT use must be planned well and to be an integrated part of the academic work for it to make sense in school. In the beginning, there were many teachers who said that it took more time than normal teaching. As one teacher put it:

> *But it does not come by itself it takes a lot of time in the beginning. One must be very aware of what is the goal, which is important and use time on content and not just on the technical (male teacher in 40-years).*

Discussion

A year after the project collaboration was over there was a positive attitude among teachers who had been participating with the use of ICT in education in general and to the use of digital multimodal texts more specifically. They said that for them, ICT has become a natural part of the toolbox. All teachers use ICT in their teaching and all but one had used or would use digital multimodal texts as work requirements for students. An important reason why they would continue to use ICT was that they have seen that their students work harder, more focused and more motivated with school work. It was particularly pointed out that, for boys it worked well as a motivating factor. So, both directly and indirectly, the teachers said that they believe that ICT use in a production perspective can enhance learning outcomes for students.

It is interesting to see that teachers today are so positive given that they started out being very sceptical towards the usefulness of ICT as a learning artefact in their subject. Many of the teachers seemed to regret that they had let themselves be involved in the project. They claimed that ICT took too much time, it could be technical problems and they always had to schedule with back-up solutions (Wikan et al. 2010a). They also said that the project stole time from other academic work so that they had trouble getting through the curriculum. ICT was in other words, set up against learning objectives of the national curriculum, and was not initially seen as something that helped to achieve learning goals. It was the present of the researchers that pressed on by constantly asking what they had experienced since the last meeting, invited them to short up grading courses and laid plans for further progress was probably an important reason why they did not quit. It was only in the second year that the

teachers stopped to look at ICT as an issue. It turned out that many of these arguments against using ICT were forgotten as the teachers became more confident in their computer use. They experienced that the students worked hard, motivated and submitted good products. We experienced much the same as Guskey (2002) said; to change the way a teachers work in a classroom is a gradual and troublesome process. It takes a long time to change practice and it can only occur if the teachers themselves find that the new they have learned leads to improved learning outcomes for students. We as researchers had to give much more support in the use of ICT and also ideas for how it could integrate into the subject than we thought at the start of the project. Discussions with teachers in focus group meetings and also one to one, were useful forums for exchanging experiences and useful for the project took a shape and direction that gave meaning to the teachers in their daily work. We therefore believe that we can conclude that this way of conducting in-service training have a better potential to change practice than short courses. This is supported by most teachers at our school.

It is not possible for us to prove that the knowledge and experience that "our" teachers have been through trial, error and learning in the project have spread to their colleagues. There are a few of the teachers who have not been involved in the project who see benefits from working in the same way, that is use ICT to permit the pupils to produce multimodal texts. But it is uncertain whether this is a direct effect of the project. Most teachers at the school do not use this digital work method. Team organization can be a barrier to the spread of new working methods and techniques such as Photo Story 3 and the production perspective. The role of the headmaster and the rest of the school management must be vital to ensure that good practice is shared. They must have the responsibility to create an environment for continuous change and reflection on own work and a milieu for sharing (Fiszer 2004).

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