**Changing teachers practices from within classrooms: IPads as mediators for change**

Bente Meyer  
*Aalborg University Copenhagen  
Denmark*  
bm@learning.aau.dk

This paper focuses on how teachers’ professional development was initiated in connection with a project where iPads were given to seven graders and their teachers for an entire school year. The paper discusses the ways in which the presence of these mobile technologies in classrooms generated new perspectives on teaching and technology as part of teachers’ reflections on and conversations about practice. The paper argues that the ubiquitous presence of technology helps teachers to understand from within their practice how changes in their teaching are both necessary and desirable for pupils. The paper discusses how changes initiated by tablets as mediators of teachers’ practices and reflections on practices can be understood as respectively augmenting and transforming practice.

**Introduction**

Research in the integration of technologies in schools underlines that teachers are central actors in the implementation and transformation of ICT in schools but that the full integration of technology into practice is a complex process that is dependent on several factors to succeed (Ilomäki 2008, Granger et al 2002, Lim and Barnes 2002). These complexities in school development challenge how we can think of teachers’ professional development and their part and agency in transforming their practice through ICT.

In terms of professional development a number of studies have argued that formal out of school course activities do not adequately support teachers’ needs and competences towards enabling them to integrate technology into their practice (Mouza 2003, Sugar 2005, Windschitl & Sahl 2002, Granger et al. 2002). Often these courses are restricted to a few hours of instructional learning, and are not targeted to teachers’ actual practices and needs or followed up by support and development in classrooms. In addition to this the integration of ICT is often conceptualized as a top-down process led by administrators rather than practitioners (Bryson and De Castell 1998, Sugar 2005, Ilomäki 2008). The digitalisation of schools can in this way work against teachers’ professional knowledge and agency, effectively ‘deskilling’ teachers rather than relying on their knowledge and experience.

As a response to these challenges a number of studies recommend that teachers’ professional development should be understood and generated in the context of teachers’ actual uses of technology in practice and in the context of communities of practices constituted by teachers or teachers and students (Burden et al. 2012, Windschitl & Sahl 2002, Sugar 2005, Ottesen 2006). The argument of these studies is that teachers need opportunities to reflect on their practices with peers and others and to be supported in their uses of ICT in the classroom. In this paper I am arguing that teachers’ situated reflections on their practice and on changes generated by ICT are qualified by the presence of ubiquitous technologies in their classrooms – in this case iPads. In making this argument I am not advocating a technology centric understanding of tablets but understanding devices as phenomena that both capture the attention of teachers and mediate their reflections on practice. In the paper I use data from a school development project in a lower secondary school in Denmark to describe how the iPad acts as a mediator for teachers’ situated reflections on respectively enhanced and transformed learning.

**Teachers and ICT**

Teachers are often understood to be hesitant towards change, specifically change that involves new technologies (Bryson & De Castell 1998, Ottesen 2006). However, teachers’ response to the processes of change may depend on how technologies are understood and on how they intervene into teachers’ practices. As suggested by Bryson & De Castell (1998) teachers’ resistance to becoming competent users of educational technologies may include “a well-hewed skepticism toward faddish educational “innovations of the moment”, lack of direct hands-on experience with new technologies, and an adaptively cautious response to the challenges posed by an already over-loaded work-related agenda” (548). One of the barriers for integrating ICT in teaching may therefore be the fact that administrators and teachers are not speaking of the same thing when they talk about ICT. In this sense ICT policy and strategies for implementation may not be adequately contextualised for teachers.

Other factors that impede teachers’ integration of ICT – and the transformation of teaching practices - is how the professional development of teachers is conceptualised by schools and political actors. Research for instance indicates that teachers need to experience that ICT brings a positive change into their teaching if they are to use technology and that they learn and are supported in their implementation of technology by others as part of the communities of practice in which they engage (Drent & Meelissen 2008). These needs are often not supported by traditional teacher training courses.

Though teachers are central actors in the integration and implementation of ICT in schools, the professional development and support of teachers in practice is, therefore, as mentioned above, often lacking in terms of responding to teachers’ needs and to the development of their practices over time . This may be due to lack of resources and time or to insufficient goals for teacher development in a time where school and municipal leadership has been preoccupied with acquiring and distributing equipment rather than qualifying classroom practices (Mouza 2003). In many cases teachers are therefore left to manage on their own on the basis of a few in-service technology workshops. In addition to this, workshops often focus primarily on training teachers in using computers, and less on preparing them for the challenges and deep transformations of practical teaching with technology.

As a consequence of these inadequacies in teachers’ professional development with regard to integrating technology, recent research has focused on how development can be organized around and based in practice, for instance in teachers’ communities of practice or in classroom environments (Burden et al. 2012, Windschitl & Sahl 2002, Ilomäki 2008). This move toward the contextual and social aspects of teachers’ professional development places renewed significance in teachers’ agency and in their role as knowing and competent professional actors. In addition to this contextualized and situated approaches to teachers’ professional development shifts the focus from teachers’ behavior, preferences and roles as individuals to knowledge as a phenomenon that is distributed across individuals (Windschitl & Sahl 2002). In this understanding of professional development knowledge is constructed by teachers in practices over time and the classroom and the school are seen as centres of development and change. In the following I shall discuss how this may affect our understanding of how teachers can transform their practices through the use of ICT.

**The iPad study**

This paper draws on data from a research project in a lower secondary school in the west of Denmark. The project followed 5 classes of 7graders (aged 13-14) who were given iPads on a one pupil one device basis to keep for the entire school year of 2012. Two of these classes were special needs classes and the research project focused on how the use of iPads in teaching and learning could support inclusive learning environments. My research focused mainly on pupils’ learning, but also included understanding the ways in which teachers reorganize and redefine their teaching as an aspect of having technology accessible on a daily basis in classrooms and at home. I followed pupils in all five classes for three months at the beginning of the school year observing them in their daily lives in school and interviewing groups of pupils. In addition to this I followed teachers in classes, at meetings and during breaks, lunch hours and introductory courses. I had numerous informal conversations with teachers and did formal interviews with the group of teachers who taught the seven graders as well as individual teachers responsible for the classes.

**Teachers in Middletown school**

Middletown is a lower secondary school in the west of Denmark in a municipality that has a high profile in school development and integration of ICT into education. The school has recently been through a process of merge where pupils from an associated school for children with special needs were integrated into the school. The school has not had a prominent ICT profile before the project, mostly due to budget restrictions.

The school teaches pupils at three levels, i.e. 7th, 8th and 9th year of schooling. Pupils come to the school from other schools in the area, and it is therefore important for the school to accomodate pupils from different neighborhoods and backgrounds.

At the time when tablets were distributed to teachers, technology was, as mentioned above, not a widely used tool in the daily life of the school. What was available to pupils and teachers at this school was primarily two computer labs in the basement of the school as well as whiteboards (Starboards) in all classes. When the school decided to invest in iPads for the seventh grade pupils and teachers, it was therefore necessary to install wi-fi in major parts of the school, which immediately enhanced teachers’ and pupils’ access to the internet. The investment in iPads therefore initiated something the school had wanted for years, i.e. the opportunity to integrate technology on a more general basis into teaching and learning. The iPads therefore became significant actors and mediators in moving school development in the direction of a more innovative and ubiquitous use of technology.

Teachers of the seventh grade were given iPads before the summer holiday, so that they would have time to explore the tablet before using it in classes with pupils. In addition to this they were introduced to the iPad through two whole day courses which focused mainly on iPad functionalities and on choosing relevant apps for teaching, for instance Pages, IMovie, ExplainEverything. These courses were traditional ‘instructivist’ courses that did not directly link tablet ‘affordances’ directly to teachers’ practices. After the courses teachers were expected to develop their teaching with the iPads on their own or through collegial collaboration in the time usually given for the preparation of lessons.

In my conversations with teachers these introductory courses were seen as useful for initiating their use of the iPad and their exploration of its relevance for teaching, but not for the continuous development of their teaching with technology. Teachers generally felt that they lacked support and time in using the new technology in the classroom and that a deeper integration of tablet use in practice would be enhanced by collegial interaction and learning.

In the following I shall describe how teachers’ focus on students and colleagues’ use of the iPads influenced the ways in which they proceeded to conceptualize teaching and learning and to some extent transformed their everyday teaching during the three months that I was doing fieldwork at the school.

**Ubiquitous technologies: augmentation or redefinition of learning?**

In their analysis of the ways in which the use of a portable, always connected device, i.e. the iPad, in Scottish schools affected and qualified teachers’ professional development Burden et al (2012) distinguish between two effects of teachers’ professional development with technology in practice, respectively enhanced and transformed learning. Drawing on Lave and Wenger’s concept of communities of practice and on the idea of legitimate peripheral participation, Burden et al. focus on change as embedded in teachers’ emergent and unpredictable processes of sharing experiences with the educational affordances of the tablet in practice. This collegial sharing and experiential approach to teaching with the tablet is seen as an informal process of learning and professional development that understands teachers as active participants in their own learning. This is seen as a both transformative and enhancing practice that is associated with the tablet as an always connected and present device, a practice that contrasts with the relatively insignificant role of formal teacher training in teacher development. The ubiquitous presence of technology in the classroom is therefore well matched with situated forms of professional development.

Drawing on respectively McCormick and Scimshaw (2001) and Puentedura (2012)[[1]](#footnote-1) Burden et al argue that the gain of using portable always connected technology in the classroom may be efficiency and functional improvements (enhancement) or transformed learning, where the latter implies a redefinition of activities and classroom dynamics. What constitutes transformative aspects of learning are of course not easily defined, as this will depend on contextual issues, and are therefore not clearly conceptualized in Burden et al.’s analysis. However, one of the aspects that are clearly associated with Burden et al.’s analysis is the reshaping of teacher and learner roles towards a more student centered learning environment. I shall discuss the implications of enhancement and transformational approaches to teaching and learning with technology below.

**Initial understandings of technology: efficiency and classroom management**

In my data from Middletown School teachers generally highlight the significance of tablets in augmenting and enhancing teaching and learning processes, and are less focused on the transformative aspects of the technology, although the improvements in efficiency to some extent has a transformative effect on their daily life in the school.

With regard to professional development teachers underline how tablets become significant for change and for school development through their presence in practice and in the daily life of the school. Change is therefore for these teachers situated in practice and is deeply embedded in the challenges and concerns of everyday teaching. This is true for both the relatively simple efficiency changes that are associated with the technology and for issues of deep learning less voiced by teachers. Tablets therefore initiate change within practice as a material and discursive presence in teachers’ lives.

Based on the data it can be claimed that teachers first of all focus on the ways in which ubiquitous technologies are efficient and affect small but significant changes in schooling, i.e. how they facilitate the daily processes of teaching and therefore save time for teachers and pupils alike. Time is a central concern for teachers in this school and in Danish schools as a whole, as it is compulsory for teachers as part of their work load to account for their time, for instance how much time is spent on meetings, teaching, preparation etc. Teachers are therefore generally extremely competent in managing time, and in reflecting on how their time is spent – as well as occasionally wasted. In addition to this teachers are to an increasing extent pressurized by policies that require different kinds of accountability, for instance for pupils’ learning, progress etc.

The overall concern voiced by teachers in the interviews mentioned above is therefore saving time and making teaching and learning more efficient, by for instance facilitating classroom management, and making efficiency changes to their administrative work with parents and colleagues. These simple but important efficiency changes help to engage teachers in the technology, i.e. teachers appreciate and acknowledge the change initiated by the just in time advantages of the technology. Examples of efficiency changes described by teachers are classroom management issues such as keeping children quiet in class by letting them play games after tasks, and saving time by not having to make paper copies for pupils. In terms of administration and accountability teachers mention their own easy access to answering email during for instance breaks, a time consuming task they would earlier have to do after school at home or at one of the shared computers provided by the school.

In terms of what the presence of iPads means to pupils, teachers also underline structural and management advantages of the tablets, i.e. pupils’ ability to access and store homework and learning material online through the iPad, and sharing information with others for instance through Dropbox. In addition to this teachers mention how they have observed that pupils take more notes on their iPads than they used to do with their jotters, how they profit from having easy access to information and how they take pictures of tasks displayed on the whiteboard in order to memorize and handle assignments and information. One aspect of these management advantages of the iPad is, according to teachers, that pupils in the seventh grade need to learn how to learn and to become more organized in their approach to learning. These teenagers are on their way to growing up and the pressures of education and general life planning requires pupils to manage learning and to solve problems on their own. The ubiquitous presence of technology therefore seems to support both the learning objectives and socialization aims connected with lower secondary school as well as teachers’ need for more efficient classroom management and time administration.

Whereas classroom management and efficiency issues are highlighted in teachers’ discourses about the use of tablets for learning, the deep and more fundamental transformations of learning and curriculum that the presence of tablets in the school may initiate are, as mentioned above, less voiced by teachers. This may be because teachers lack opportunities for talking about these changes, do not yet have a language for speaking about these changes or because it is still too early to talk about these transformations a few months into the project. However, my observations and conversations with teachers may suggest some answers to how teachers are involved in deeper changes in teaching and learning with tablets and how this is supported by the school environment and by teachers’ communities of practice.

**Emergent transformations: teachers and new classroom dynamics**

As proposed by research teachers will often have to redefine their roles as authorities in the classroom when engaging in technology enhanced teaching (Orlando 2009, Bauer & Kenton 2005). Ubiquitous access to technology may change teaching from within, from discoveries, experiences and experiential learning embedded in practice.

Lynn is a middle-aged teacher who has taught students with special needs for many years. She describes herself as someone who is engaged and competent in using technology as part of her profession and daily life. Generally, special needs teachers in this school are familiar with using technology as this has been part of the practice of working with these learners. Lynn has been used to using laptops with students as well as an interactive whiteboard installed in her class which she often uses to share and display learning material and assignments with learners. She also uses her smartphone on a daily basis for texting, accessing email, making notes etc.

Lynn is generally enthusiastic about the new technology and the possibilities that the tablets give for helping the pupils in their daily life and learning at the school. From my observations of Lynn’s teaching and my conversations with her I pick up how the presence of the iPads in the classroom create ideas about new connections between the resources used by her and other teachers in class and how this to some extent redefines how Lynn can interact with the learners. I also observe how her collaboration with her maths and science colleague John who is a persistent and very competent user of the iPads in his lessons inspires her to understand how she can do new things with technology in her teaching of Danish and English. In Lynn’s special needs class two or more teachers are often present and collaborate on supporting the pupils in their learning, I therefore propose that the emergent deep changes in Lynn’s teaching will arise from the ways in which she manages the use of the IPad in the ecology of resources accessible in the classroom and the ways in which she will use peers to negotiate transformative uses of the tablet in her teaching.

*Ecologies of learning*

As proposed by recent research the idea that iPads act as isolated and unique actors in school development must and can be challenged. A study of the use of iPod touch devices in primary education in Australia for instance underlines that in many cases teachers integrate mobile devices with other ICT technologies such as desktop computers and laptops, Nintendo Wiis, digital cameras, podcasting software, video editing suites, etc. (Murray & Sloan 2008). The mobile device in this way emerges as one of a range of tools that teachers employ to motivate and stimulate student learning. Similarly, Burden et al. argue from their experience with the use of iPads in primary and secondary education in Scotland that “results suggest students use the device as part of a wider ecology of learning ressources, integrating the iPad with existing tools such as the jotter” (2012, 51).

With regard to the ecology of resources available to teachers in this school Lynn tells me how the presence of the iPads interacts with the use of technology in the class as a whole as well as how the tablets interact with her own present and prior use of technology. With regard to her own use of technology she tells me how her different devices work in different ways in her professional life. Her smartphone is for instance a device that is well suited for storing notes and accessing email and a device that is easily synchronized with for instance the iPad. Lynn handles a lot of confident information about pupils which she prefers to store on her iPad rather than her phone. She sometimes uses a laptop at home for writing things, but has recently invested in a laptop that she feels has become superfluous after she got her iPad from the school.

In addition to this Lynn is a confident and constant user of the whiteboard installed in the classroom. She prefers to display her learning material and assignments on the whiteboard which is placed at the center of the classroom close to her desk. She tells me how she uses both her iPad and the pc available in the classroom to project material onto the whiteboard. One of the interesting shifts that takes place in Lynn’s teaching in the three months in which I am present at the school is that she creates new connections between the whiteboard screen and the small iPad screen available to pupils. In fact, what she seems to discover is how the two screens can support different needs of the pupils and how this interacts with her different roles as a teacher. Some of the pupils for instance have cognitive challenges and find it difficult to keep track of and focus attention on what is going on on the big screen. These pupils can benefit from working on the iPad on their own or with Lynn at their side – which will for instance allow her to show what she has displayed on the big screen on the iPad which is closer to the learner. Lynn for instance observes how for a specific boy in the class the iPad is a tool that supports his need to focus attention on what he is doing and to work with information that is tangible and concrete rather than abstract. As a teacher she can work with this pupil in a much more tangible and intimate way through the iPad which can act as both a tool for the pupil on which he can try out different things, or as a tool between the teacher and the pupil on which different items and information can be displayed. These are affordances of the tablet that Lynn discovers through her interaction with and use of the ecology of technologies in class.

*Peer learning*

In the special needs class teachers often, as mentioned above, work in pairs to support the pupils in the class in different ways which means that collegial sharing is built into the daily teaching routine. The roles of the teachers are to some extent divided into the subject competences that they have or in supporting specific learners that they have established a specific relationship with. Lynn’s subject competences are Danish and English and she works closely with several colleagues, among them the maths and science teacher John. John is a very enthusiastic and engaged user of technology, and often asks the pupils to use their iPads during his lessons in different ways. In maths he for instance asks the pupils to access assignments through an internet platform, through email or Google docs. In physics lessons he asks pupils to take pictures and films of experimental set-ups and use them in presentations. He also makes them do projects based on films he links them to on educational websites. John can be described as a teacher who is focused on activating pupils’ learning through their access to, use of and control over the small (iPad) screen whereas Lynn is more committed to using the whiteboard screen as her central teaching resource. This is not to say that John doesn’t regularly use the whiteboard as well, he does, but he seems to prefer to activate students through their use of the iPad for finding and accessing information. In comparison Lynn is discovering the potentials of the small screen through her own interest in technology and through her observations of John’s teaching.

Lynn has a very experiential approach to understanding how the iPad can enhance teaching and learning and is dedicated to understanding how the technology can support the pupils in their learning – this seems to be her main objective in experimenting and trying out apps, though she does also describe her fascination with the device as ‘a toy to be played with’. Lynn’s observations of the pupils’ use of the iPad in John’s classes is a significant aspect of how she discovers the potentials of the tablet. Lynn for instance reflects on how John uses the tablet to make the students active in handing in assignments and working on projects on their own. She also reflects on how apps used for maths and science education are relevant for her own teaching in Danish and English. For Lynn, her observations of and reflections on John’s teaching become significant mediators in the professional development of her teaching with technology.

**Perspectives on the enhancement and transformation of teachers’ professional practice**

In this paper I have proposed that new models of ownership and access such as those made possible by tablets support teachers’ possibilities for reflecting on their professional development from within practice. IPads are technologies that attract teachers’ attention as they are ubiquitously present in classrooms – when they are given to pupils as part of a one pupil one device strategy. In this sense iPads become mediators for teachers’ reflections on and development of practice, as do the relationships and interactions with peers with whom they discuss and collaborate about teaching with technology in or outside classrooms.

In the study described above teachers primarily focused on how the use of iPads supported functional improvements and efficiency in classroom teaching. Teachers were less focused on the more transformative changes in their practices which may indicate that teachers are preoccupied with the practical functionalities of everyday teaching and will link their engagement in technology with the ways in which it supports these priorities. However, the deeper changes in teachers’ practices affected by technologies may not be as easily described or visualized, or teachers may not yet have developed a language for conceptualizing them. This may explain the relative lack of reflections by teachers on these changes. In my data, there are however indications that more transformative changes may arise from the ways in which teachers use peers and the shifting relationships between devices to redefine classroom dynamics and their own role in teaching. These issues should be taken into consideration in developing teachers’ competences from within their practice.

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1. See <http://www.youtube.com/watch?v=1YXNGcjbN1c> (Burden et al. 2012) [↑](#footnote-ref-1)