



ICT in Swedish Schools 1984 - 2004: How computers work in the teachers' world

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Abstract

For over twenty years government initiatives have promoted the use of computer/ICT in Swedish schools. This paper, based on national evaluations, briefly describes experiences about these processes, from 1984 to 2004. Discussed are the actors, from outside the school arena, who sat in motion the campaigns and processes at both macro and micro levels. It is concluded that the involvement of teachers at an early stage and a combination of time, technology and the culture of schools are basic conditions for a successful innovation of ICT in school.

Keywords: school, Sweden, information and communication technology, innovation, longitudinal.

Introduction

At the turn of the 21st century there are some keywords referring to school development circulating worldwide. Learning to learn, digital literacy, collaboration, project work, team teaching, searching for information, lifelong learning, etc. are mentioned both outside and inside schools. A common goal of teaching is to help students develop the ability to manage their own learning, handle information, collaborate and solve problems. ICT, information and communication technology, is expected to be a means to fulfil this goal and at the same time the use of ICT may be regarded as one of the reasons for the goal. With respect to the contents of policy documents and expectations, it is possible to speak of a global trend among industrialised countries regarding the official view of computer and ICT in teaching. The intention is to prepare students for life in a world permeated by ICT (Robitaille, 1997; Pelgrum & Anderson, 1999; Kozma, 2003). Computer and ICT know-how are often seen as a student's fourth basic skill, after reading, writing and arithmetic.

The Swedish history of the use of computers in school dates back to the early 1970s, when small-scale experimental work, initiated and monitored by the National Board of Education, was carried out in a few schools (Riis et al., 1997). Since the middle of the 80's there have been a number of initiatives and campaigns introducing computer/ICT into Swedish schools. Many projects have been implemented, differing from each other in regards to extension,

agents and content. Resource funds have been invested, with each campaign monetarily outdoing the one before (Riis et al., 1997; Nissen et al., 2002).

The aim of the article is to discuss perspectives, contents and changes related to processes of ICT innovation in Swedish schools over the twenty years period of 1984 – 2004. In particular, attention is paid to that of the school and the teacher as they have responded to the ICT policies over time and what knowledge has been gained about their role in change. The experiences and findings of four national campaigns directed at compulsory and upper secondary schools are considered.

The evaluation reports of these four campaigns are the main sources of this article¹. Evaluators visited schools involved in computer/ICT projects. Teachers, students, parents, principals, politicians and school administrators were either interviewed or given questionnaires to describe their experiences with and express their opinions of computer/ICT use in school. This article is based on a qualitative analysis of the evaluation reports. Concepts as time, technology and the culture of school are focused on.

The processes of innovation

There are external as well as internal perspectives reflecting the driving forces of technology. The former indicates technological artefacts and processes influencing schools from a top down perspective. Actors outside the school such as researchers, inventors, engineers and innovative industries, often with the assistance from marketing operations, are the decision-makers. The inside actors, teachers and principals are by themselves expected to implement ICT. The other perspective, from the bottom up, involves a demand or need from teachers and principals to be fulfilled. They expect the decision-makers outside school to fund and support the implementation of ICT in school. “There are problems when money ceases, when the equipment gets old, but we expect politicians to realise that” (Riis, et al., 2000 p. 58). Both of the perspectives are found in schools, although the first one is more common in Sweden as elsewhere. Innovation is a multi-layer, complex process. Let us consider what these complexities are by looking at levels and stages of innovative activity.

Levels of innovative activity

As pedagogical practices are multifaceted, an innovation can be analysed at different levels: macro, meso and micro. At the macro level, actors outside the school seek, as outcomes of national policies and guidelines, goals and intentions that often are influenced by international trends and issues of competitiveness and massive pressure from the information society. Factors at the meso level are to be found inside schools. Conditions, such as the role of context and school culture, readiness for change as well as leadership and the degree of support from the organizational environment have to be taken into consideration when analysing an innovation. At the micro level the classroom environment and its activities are in focus. Teachers’ pedagogical and technological skills, size of the classroom, access to ICT and the number of students, etc. are of importance (Kozma, 2003). My own experiences show that successful implementation is characterized by close connections and co-operation between these levels.

House (1981) and House & McQuillan (1998) identified three predominant perspectives regarding ways of introducing innovations: technological, political and cultural. The technological perspective at the macro level means decision-makers adopt an approach to innovation. The other two perspectives, which might be regarded as more considerate of the views of teachers, can be looked upon as more bottom up, as the innovation seen in its context. The

political perspective means that actors involved in innovation, and their interests, are taken into consideration by decision-makers through negotiation. At the micro level the cultural perspective puts the focus on teachers' reactions and actions in encountering a technological innovation, which is expected to enter into and be used in the school.

Stages of innovation

Theoretically, changes are often described as linear processes consisting of different stages that have to be gone through before an innovation is implemented. Fullan (2001) makes use of a three-stage process: initiation, implementation and institutionalization. The first stage includes decision making to initiate or to adopt the innovation. The individual receives information about the innovation's existence. Then she/he must form a favourable or unfavourable attitude and make a choice to adopt or reject the innovation. The length of the innovation decision period differs greatly between the potential adopters. Depending on the innovation there is also a deviation in the length of the innovation-decision period. Some innovations are adopted quickly, for example innovations that are relatively simple in nature, such as word-processing. The next stage deals with putting the innovation into use - the implementation. In the third stage, institutionalization, the innovation becomes part of a regular practice.

However, reality is more complex and complicated than level and stage modes suggest. Those in schools are continuously involved in many different processes and changes. Statements from teachers often suggest that they are concerned about the lack of time to deal with all that is demanded of them; time, for example, to learn how to handle and use the computer as a pedagogical tool. A teacher's statement: "It takes more time than expected. It is like turning a transatlantic liner around, a very slow process" (Riis, et al., 2000 p. 58). Accordingly, a generous time-scale is an essential requirement. Given this complexity of innovation it is worth considering what has happened in Swedish schools over the life of these policy initiatives.

What has happened to ICT in schools over time?

Reasons for introducing computer/ICT

The curricula and syllabi (1994) as well as other governmental policy documents state that computer/ICT literacy is important. One of the important guidelines for implementing ICT in Swedish schools is democratic: a right for all students irrespective of gender, class, ethnicity and geographical location to become familiar with ICT in school. This democratic outcome presupposes ICT to be disseminated to all schools and to be adopted by teachers in all subjects. Other important reasons identified in policies for introducing computer/ICT in the Swedish schools concern: preparation for working life; improving learning; change involving school development and the internationalization of education (Jedeskog, 2002).

The democratic aspect involving student rights to become computer literate in school has been recognized in all campaigns launched by the state. The fact that a majority of Swedish students have computers at home has not meant that access to ICT in school has been emphasised any less. On the contrary, as ICT literacy is now regarded as a basic skill in society, the school, according to this democratic rationale, has taken on the responsibility to guarantee *all* students this competence. It is regarded as a matter of course in a democratic society.

The original reasons for introducing computer/ICT in schools have permeated all the campaigns, but to a different extent and with different outcomes. Argument for preparation of students for working life as well as the argument of internationalization of schools has been less emphasized than the others during this twenty years period.

ICT is also expected to bring about fundamental changes in the roles and functions of schools, teachers and students; and to reform educational practices by changing schools into more dynamic and innovative institutions. Official school documents have expressed such intentions: "ICT facilitates and supports writing"; "The Internet provides unique opportunities for communicating in a simple way"; etc. (ITiS, 1998, p. 13). However, there is no unanimous research supporting the potential of ICT to achieve such outcomes in school contexts. ICT as a facilitator for learning and teaching is, as it turns out, a much more complicated issue. ICT may enhance student learning, but it depends on time, technology and the culture of schools. They are all to be considered as crucial factors in this context.

Let us consider each of these in turn.

Time

Schools are large organizations with many actors and long traditions, and changes take time. This becomes evident when the change not only concerns attitudes, opinions and habits but when these also presuppose a certain technology. However, schools cannot neglect technological innovations that impregnate society at large. Since the potentials for the use of ICT change very rapidly schools are challenged to discuss their needs from the new applications offered and of the potential they hold. Each new application can be related to Fullan's (2001) three stages. First, knowledge about the innovation's existence and then making a decision whether or not to adopt it. Second, to put the innovation into use, the implementation; and lastly, to consider continuing. Each process is time consuming and as one innovation is being implemented another is knocking on the door. In the case of the 20 years period in Swedish schools we can see a shift from initiation to implementation and, to some extent, to institutionalization of ICT.

Furthermore, the computer as well as other technical innovations is often connected to contradictory attitudes and conflicting feelings. The computer is a very complex artefact involving everyday life. One may like or dislike the technology but one cannot avoid its impact. New technological innovations have often been rejected (Jedeskog, 1996). One reason is the impact on practice that implementing this technology has had on other activities in school, e.g. teachers' reactions against financial investments at the expense of other investments such as schoolbooks and the quantifiable representation of teachers (Riis, et al., 2000).

Using ICT in school means teachers need more time to discuss its use in terms of pedagogical issues. An essential component for pedagogical development and change is the opportunity teachers shape in order to adapt the technology to their practices (Hargreaves, 2003). The last two campaigns have facilitated such meetings (Chaib & Tebelius, 2004). More teachers have been involved in discussing the potentials of ICT and the barriers to implementation are not as great now as they were twenty or fifteen years ago (Jedeskog, 1996; 2005).

Technology

The technological challenges of computer/ICT use have changed radically in the last twenty years; for example, from programming to using the Internet (Becker, 1998). Teachers have, at different times, adopted applications suitable for their own teaching from teachers in mathematics and science involved in

the first campaign to teachers irrespective of subjects in the fourth campaign. The Internet has invited teachers and students to use ICT inside and outside the school. The possibilities afforded by technology itself seem to have been of more importance than the pressure from outside decision-makers (Chaib & Tebelius, 2004). However, welcoming an innovation such as the computer in teaching reflects not just an interest in technology but also a positive attitude towards change in general.

Even if successful integration of ICT in teaching takes as its starting point pedagogy and not technology, access to computers is important for successful use in schools. In 2004 municipalities complained about the lack of money for investing in both new equipment and support. This presents a risk that the use of ICT in schools will decrease. These concerns arise from the fact that state subsidies for municipalities to purchase computers ceased in 2004 for almost the first time in twenty years. From 1984 to 2001, the state spent in total some € 450 million on computers and computer use in schools. Moreover, the state required that the municipalities give an additional financial contribution; this added an estimated € 145 million to the expenditure. In all, within the Swedish school system, approximately € 4,000 has been spent per Swedish teacher or approximately € 500 per Swedish student on computers and computer use from 1984 to 2001. (All amounts are given in the money value of 1999 at the start of the fourth campaign; 1€=9SEK.)

There was a “brutal stop” when government financing ended in 2001 (Jedeskog, 2005). Still, there is no official answer as to why the national ICT investment in schools ceased. Perhaps the state expects ICT to be a “natural tool” in school today, supported by students and parents, as well as by teachers. And perhaps the compensatory political urgency has changed as most homes can afford and actually have computers? Thus the use of ICT in Swedish schools can be regarded as a rather vulnerable activity, dependent on financial as well as human support. A complex issue in a complex context.

The culture of schools

In the mid 80's actors outside the school made the decision to invest in the new technology in schools - a top down initiative at a macro level. The confidence in technology was rather strong among decision-makers. At that time just a few teachers were interested and engaged in using the computers in their teaching. The first three campaigns were top down projects that influenced teacher engagement in an affirmative, but limited way. Fifteen years after the first initiative, teacher involvement had changed. Teachers were listened to and the outcomes seemed more successful than during the previous campaigns. The technological perspective had yielded to the political and cultural perspectives of innovations (House, 1981; House & McQuillan, 1998).

The introduction of computer/ICT can be compared with the introduction of such pedagogical tools as film, radio and television in school during the 20th century. In spite of the problems experienced with these tools, by teachers at the time, later policies for the introduction of ICT did not take these previous experiences into consideration (Cuban, 1986). This seems to be a universal phenomenon. Experiences of the first two campaigns were almost totally neglected by actors involved in the last two campaigns. Everyone has to make and learn from his own mistakes, not from others'.

An adoption of ICT means changes in the schools everyday life. Not only will the school organization change but also the role of teachers and students and their ways of working when technological artefacts are implemented and used in the classrooms. Fullan (1992) relates the concept of implementation not just to the innovation itself but also “to learning to do and learning to understand something new” (p. 22). When new technology enters the school, teachers and

students are expected to learn how to use it and also to realise that teaching and learning are expected to change. For teachers the implementation of computers contains possibilities, challenges and threats according to their own interest in educational change. Teachers have to decide to support or reject the innovation. Their choice deals with intuitive attraction and great uncertainty, excitement and hardship, enthusiasm and exhaustion; visibility and high public interest combined with unknown results. Since the mid 80's all these reactions are found among teachers as related to the introduction of computers in school (Riis, 1987, 1991; Jedeskog, 2002).

The involvement of teachers is a key factor for the effective use and survival of an innovation. To a great extent innovations are introduced without taking this into consideration. Fullan & Hargreaves (1991) state that administrators and politicians often drive school development - a top down perspective at a macro level. Decision-makers often ignore teachers' needs and thereby disregard years of school life experience. Staff development initiative "takes the form of something that is done to teachers rather than with them, still less by them" (p. 28). Teacher attitudes and willingness are the essential basis for school development to become successful. Teachers might also be regarded as the link between decision-makers and students, and between the rhetorical and the practical level.

Once again the complexity of the school and the role of the teacher have to be taken into consideration. There are two divergent pictures of how teachers respond to change. On the one hand the optimum teacher may be regarded as a spider with a complicated web or network, both within and outside the school, effectively coping in his or her complex situation (Jedeskog, 2000). This is a description of a teacher playing an active and central role as a gatekeeper, trying to handle diverse interests. On the other hand, the teacher can be a kind of victim in the interaction with members of the web or network, depressed by a bureaucratic environment. Most teachers are found between these two pictures, sometimes listened to, sometimes not. To develop the practice in school, with or without ICT, it is not only dialogue with mere feedback in all directions that is necessary, but also an elaborated collaboration between actors at all levels - macro, meso and micro (Olson, 2002). Findings, especially from the fourth campaign, reveal tendencies towards the first teacher we pictured as being well established in a complex setting. Teacher's involvement in school development with the use of ICT is increasing.

Conclusions

A school is an institution that is based on a belief in the future and the need to further societies long-term growth. ICT is considered to play a key role in creating the school of tomorrow. The Swedish experiences of the four campaigns, dealt with in this article, would be regarded as rather favourable for the future use of ICT in school. There is a stock of useful knowledge for the future. A question mark however hovers over the possibility and need for financial support. Glancing in the rear-view mirror suggests:

- there is a shift from a technological to a political and cultural perspective on ICT innovations,
- there is a shift from technology to pedagogy,
- there is a shift from initiation to implementation and, to some extent, to institutionalization, according to the use of ICT in school;
- and there is a shift from programming to the use of the Internet.

The four campaigns have supported the implementation of computers and ICT in Swedish schools to different degrees and there have been some important changes directly connected to the development of technology and to the development of the use of modern technology in schools. Most of the changes involve a shift in patterns of schoolwork. The role of the school is constantly modified. Participation in decision making for principals, teachers and students has meant increasing responsibility and influence during this twenty years period. A bottom up approach to change has successively replaced the top down perspective (House, 1981; House & McQuillan, 1998).

Furthermore, human aspects are increasingly more important than the technology in school activities. Teachers and students are in focus instead of the technology. The conditions for a successful innovation grow when decision-makers listen to teachers (Cuban, 2000). The attraction of ICT has changed from learning to program to learning other applications like word processing and the use of the Internet. Attempts to produce pedagogical software have failed and the use of more general software dominates.

The requests of many teachers, who have been involved with the use of ICT in schools, represent a force for a greater focus on the process of teaching and learning with and about ICT, and the use of ICT from students' perspectives. Another issue raised in the last two campaigns deals with a view that ICT is looked upon as a threat to the school's institutional role. New technologies enable learning to stretch far beyond the physical space of the school. What will happen when more students prefer working at home equipped with a computer and a telephone line to their teachers, instead of being in school (Jedekog & Nissen, 2004)? The monopoly of schools on learning as well as the legitimacy of school will be challenged.

Lastly, an overall political intention at the beginning of the 21st century is for teachers to create a good learning environment, which includes ICT, for the autonomous learner. The conditions may already be present as a new campaign currently is starting. However, this campaign, again initiated by actors outside the school, is directed towards supporting ICT in teacher education: will it, once again, strengthen teacher competence with ICT?

A full version of this paper Jedekog, G. (2005) Ch@nging School. Implementation of ICT in Swedish School, Campaigns and Experiences 1984–2004 can be found at
http://www2.ibv.liu.se/pius/personal/gunilla_jedekog.

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¹ The author of this article has been involved as an evaluator in the first three campaigns.