Teachers and computers

Teachers’ computer usage and the relationship between computers and the role of the teacher, as described in international research

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Foreword

The report at hand constitutes a framework around the two projects that form my doctoral dissertation: my licentiate thesis, Lärare vid datorn (Teachers at Computers), and my next project, Ny i kl@ssen (New in Cl@ss). Teachers and computers is their common theme.

The report begins with a brief presentation of the results from Teachers at Computers and continues with a longer summary of the subject matter of New in Cl@ss. Barbara Rosborg has translated this report into English.

Many thanks to Professor Ulla Riis for her comments and viewpoints.

Linköping, October 2000
Gunilla Jedeskog
Background

For more than fifteen years now, there have been computers in the schools meant for instructional use. The decision to introduce computers into the classroom was not made by teachers but by external actors, many of whom were distant from everyday school activities. Recently computers and computer usage in the schools has increased all the more. When the computer makes its appearance as *New in Cl@ss* the question arises, what influence does this have on the role of the teacher, i.e. on teachers’ work and deeds.

The aim of this text is twofold, to serve as a framework around my two projects, *Teachers at Computers* and *New in Cl@ss*, and to be an outline of the latter.
Teachers at Computers

Towards the end of my active period as a compulsory school teacher, the computer made its entrance. Being the curious teacher I thought myself to be, always open to change, it should have suited me perfectly. Instead, my reaction to the eight so-called “Compis”\(^1\) computers awakened in me a certain fear of technology, especially an antipathy towards having to learn how to use a computer. I also perceived computers as a rival to other school activities, since their introduction meant a redistribution of economic resources. Somewhere in the background, too, I may have felt a tacit threat to my autonomy as a teacher.

After leaving the compulsory school, I came to devote a great deal of my time to national evaluations of the computer in the classroom (Riis, 1987; Riis, 1991; Jedeskog, 1993; Skolverket (National Agency for Education), 1996; Riis, Jedeskog et al., 1997; Riis, Holmstrand & Jedeskog, 2000).\(^2\) This enabled me to share other teachers’ experiences which, at least in the beginning, were similar to my own. Above all, we all agreed that teachers’ participation in both decision-making and realisation processes is important for the work of successful implementation.

In 1996 my licentiate thesis was published, *Lärare vid datorn* (*Teachers at Computers*), a descriptive study in which I interviewed teachers, headmasters and municipal policy-makers about computer usage in the schools during a ten-year period from 1984-1994. In the study, two areas were explored: seven teachers and their computer usage during the ten-year period (in 1984, teachers were “pioneers” in computer usage), and the factors that had influenced their use of computers in teaching during the same period. The study showed that the computer usage of these pioneer teachers had decreased and even ceased entirely for some in 1994, when I visited them. The computer was used mostly as a word processor, an advanced typewriter, and almost exclusively within the framework of traditional teaching. None of the schools where these teachers worked could access the Internet in 1994.

The factors that influenced computer usage were described by

\(^1\) One of the early, relatively simple computers used in Swedish schools.

\(^2\) This evaluative work is being carried out through a research programme called ELOÏS, Pupils, Teachers and Organisations surrounding Information Technology in the Schools. The research group consists of researchers from the Department of Education at Uppsala University and the Department of Education and Psychology at Linköping University. Project leader is Professor Ulla Riis, Uppsala.
the teachers as barriers of various kinds: practical, psychological, value based, and power barriers. In addition, the teachers referred to organisational reforms in the Swedish school. These seven teachers’ computer usage was apparently marginal to their work, which may explain why they never commented on either the potential or possible threat of the computer in their work.

In the conclusionary part of my licentiate thesis, I made several assertions, as follows, in which I tried to capture the explanatory factors that stood out as the most important in my study.

*The way the computer was introduced in the upper grades in 1984 and certain signals sent out by the society at large contributed to a situation in which teaching with computers did not become as widespread as intended.*

The decision to introduce computers to the Swedish school system was made by politicians and actors outside the real school world. At first it was especially mathematics and science teachers who used computers in their teaching. This was a factor that contributed to a situation where the special computer campaign of 1984 had less of the breadth and reached fewer of the teachers than was expected.

*When these teachers came in contact with computer technology in the early 1980s, it happened before they had a chance to think through how it could be used and before they themselves learned how to use it.*

In 1984 the computer was not in demand among either teachers or pupils and the available training was not pertinent, since teaching was done on another kind of computer than the ones available in the schools. Computer education, which was basically limited to programming, interested only a small number of teachers in Swedish compulsory schools. The early emphasis on programming undoubtedly scared many people away. The computer was considered as belonging to the field of technology and mathematics. These circumstances applied to the interviewed teachers as a group and to their use of computers in teaching.

*During the past ten years, the discrepancy between these teachers’ knowledge of computers on the one hand and the development of computer technology on the other has increased rather than decreased.*

By autumn of 1994, we found that the kinds of computers and
computer software both inside and outside the school were no longer the same ones as ten years earlier. We could also conclude that teachers had not had the time, or inclination, to learn more about either the technical or pedagogical use of e.g., CD-ROM, and that their interest in the Internet was tepid. The discrepancy between the way these teachers used computers and the various applications that could have been used had widened over the past ten years, even if the teachers now had a certain familiarity with computer technology, partly due to the advent of more user-friendly programs.

These teachers are in fact aware of the opportunities that the computer provides, but during the ten-year period the practical problems became more and more evident, which has induced them to abstain from using it.

Several of the teachers lacked access to computers during classes because the computer room was occupied. It was problematic teaching 30 pupils with an access to only ten computers. A few teachers said that their pupils were tired of the programs or that the programs were not relevant to school work. Having a computer at home was a prerequisite for using computers in teaching, according to one teacher.

Besides the practical obstacles, one teacher stressed the necessity of human relationships between teachers and pupils and gave this as his main reason for thus far putting off using the computer in his teaching.

These teachers do not view the computer primarily as an aid in their own teaching but as a complement to their pupils’ learning.

A majority of the teachers did not know or could imagine how the computer could be used in their own work. They were still unfamiliar with the opportunities offered by the computer in facilitating teaching. Teachers regarded the computer primarily as “a learning aid” which could improve pupils’ results.

The teachers realise that computer use in the schools will affect the traditional work methods and content of teaching, as well as the traditional organisation of knowledge, and are therefore reluctant to confront the consequences.

The teachers made only occasional mention of using computers
from a more comprehensive perspective, i.e. that computers could mean something new and different in terms of work method, content and inter-disciplinary education. Two of the civics teachers, however, said they were quite willing to use the computer to implement a change of work method. Practical problems had thus far kept them from doing this.

A few of the teachers appeared to be aware of the changes that computer usage might entail. They used computers in their teaching but saw to it at the same time that neither their work method nor the substance of their courses was changed.

Against this background, the statement above must be dismissed.

*The teachers realise that with the help of computers, the traditional role of the teaching may be reformed, and they are “afraid” of this.*

Almost all of the teachers in the study were between 50 and 60 years old and they cited examples of how their role as a teacher had been affected by the use of computers. None of them, however, felt it had been a threat. Instead they spoke of the opportunities that the computer had provided them in bringing about a reform in the role of the teacher. In 1994, two of them had evolved to see themselves as more of advisers, while a third pointed out that “with a computer, you are not a traditional teacher”. The possibility of achieving more individualised teaching, which meant closer contact with the pupils, was especially appreciated by another. None of the teachers regarded pupils who had greater knowledge of computers than they had as anything but an asset during classes. Thus the statement above must be dismissed in this case as well.

My interest in this area has lived on. The questions have multiplied and shifted somewhat. After having studied computer usage in Sweden for fifteen years, questions about computer usage in other countries crop up. What similarities and differences are there? What are foreign researchers writing about the relationship between computers and the role of the teacher? What is it, according to these researchers, that influences people’s work with computers and IT? What theories are used as analysis instruments? Who has the power over what is happening? For a better understanding of the factors that influence the relationship between teachers and computers, I will be giving concepts like power, participation and conflict more attention than I did in my licentiate thesis.

In *Teachers at Computers*, my ambition was to describe how teachers worked with computers in teaching by interviewing the various
actors, i.e. collecting empirical data directly from the activity itself. In the *New in Cl@ss* study, which is a free-standing “sequel” in the same field of interest, the analysed material consisted instead of texts on the theme of the computer and the role of the teacher, written by researchers in other countries.
New in Class

During the last years of the 20th century, the Swedish school system went through several organisational reforms. Many schools were restructured into so-called “0-16” schools and pre-school groups were integrated into the regular school system. New curriculum, timetables and marking systems were established, and more and more private schools entered (and are still entering) the scene. At the same time, teachers’ working conditions were influenced by a five-year agreement, from 1995 to 2000, that imposed such new terms as individually-based salaries, yearly-based work hours, and a requirement that teachers remain on school premises for all of their 35-hour work week. Parallel to these reforms were expectations surrounding work method, the role of the teacher and the role of the pupil.

Ever since the 1980s, several national campaigns have been conducted in Sweden to introduce computers into the curriculum. The results of these campaigns have shown that computer usage was not previously given a central role in the work of the school. However, as computers became easier to use and their area of application widened, many more teachers expressed an interest in using computers and information technology in their teaching, at least as a complement, in the late 90s. There is interest in computers in the classroom among other actors as well. The campaigns have not only continued but have been intensified, with relatively large sums of money being invested by the Government, local authorities, individual schools and private companies.

Beginning in the mid-1980s, there appear to be three main motives in the general debate behind the ambition to implement computer technology in the classroom: democracy, preparation for working life, and improved learning (Jedeskog, 1996). Towards the end of the nineties, a fourth motive came to be emphasised, namely IT as a force for change.

Technical innovations have been introduced to the schools during the entire 20th century, impacting on the role of the teacher to one degree or another (Jackson, 1967; Cuban, 1986). The launching of educational technology in the 1960s can in retrospect be seen as an external attempt to reform the work of the teacher. Teachers were expected to create educational situations in which technical aids

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3 See further Jedeskog, 1996, p. 34; Riis, 2000, Chap. 1.
could be used. This way of describing the development – a sign of technological determinism – has continued, as new technology has made its appearance in the schools. One consequence of a technical-deterministic approach could be a “de-skilling of educators”, i.e. overriding teachers’ professional skills. The teacher becomes a guide for pupils along a road lain out by others, such as the producers of software programs (Muffoletto & Knupfer, 1993).

There have been computers in education in the schools ever since the mid-80s, when they were primarily used for simple programming. Through the years, new uses have come along, while at the same time, the handling of both computers and software programs has been facilitated. Becker (1993, 1998) chooses to describe the development in the United States using a time line that shows how external actors have told teachers how computers should be used in teaching. He describes a development that very clearly shows how computer use in the schools was expected to follow technological progress. His time line starts in 1982 with programming and extends over proficiency programs, word processing, databases, simulation programs, multimedia and the Internet up until 1996 and the pupil-produced projects published for a global public on the World Wide Web. The time line shows the opportunities offered by the computer but not how it is actually used in the classroom. Allowing for a shift of years, the time picture is much the same as for Swedish conditions (Riis, 1987; Riis, 1991; Riis, Jedeskog et al., 1997; Riis, Holmstrand & Jedeskog, 2000).

The aim of the study

After having worked with questions within the field of the school and the computer using my own empirical data and a national context, I have begun to feel an increasing interest in what is being published internationally in this field. My ambition has been to describe and analyse how the relationship between computers and the role of the teacher has been treated in international scholarly literature.

This study has aimed, firstly, at finding the answers to certain questions based on the contents of concrete texts, and secondly, to outline and analyse the development of the present research field with the aid of these selected texts. I see the classroom as an arena on the micro level where various actors, of which the computer is one, have an influence on the work and deeds of teachers. The actors have different roles in this interaction. Concepts like participa-
tion, responsibility, power and conflict have been the analytical instruments I have used in reading and processing the texts.

An overall goal of the study has been to try to bridge the gap between educationalists and computer experts in their differing views of and knowledge about the role of the computer in teaching. Those who are the most knowledgeable about computer technology often know next to nothing about education and those who know a good deal about education are seldom particularly adept at technology.

The empirical study had two aims:

I. To outline and analyse the contents of the texts with regard to what is happening to the role of the teacher and teachers’ work and actions, in a time when computers and IT are being introduced and used, or not used, in teaching. Here, the focus was on the researchers’ descriptions of the relationship between computers and the role of the teacher.

In reading the texts, the following questions were to be answered:
- What have researchers in the selected texts written about the relationship between computers and the role of the teacher?
- What factors or actors, according to the texts of the referred researchers, have an affect on computer usage in teaching?
- In what way is the work of the teacher influenced, according to these researchers, by the use of computers in the classroom?

II. To outline and analyse, using the selected texts, how the research field of computers and the role of the teacher is now being moulded.

The following questions were to be answered:
- What is the purpose behind the texts?
- What ideas regarding the tasks of the teacher can be inferred from the texts?
- What positions in relation to pedagogical or other relevant schools of thought regarding computers and the role of the teacher can be understood from the texts?

Key concepts

Since I have focused my interest to the actions of various actors and how these appear in texts of scholarly claim, I will base the concept of the role of the teacher on teachers’ behaviour, that is, the work
and deeds of teachers.

In the following, the concepts of computers and IT will be used. I see the concept of information technology (IT) as one way of using the computer and have therefore decided to concentrate mainly on the concepts of computers and computer usage. This meant that in each particular case, I could forego deciding whether it is more relevant to speak of computers or IT. However, IT will be used both in contexts where the concepts of computers/computer usage did not satisfactorily correspond to what was intended and in places where I have made a quotation. The concept of information and communication technology, ICT, is not used here.

To increase the understanding of the phenomena that occur in the interactions between actors, the power concept can be a useful analysis tool. From a strictly micro-political perspective, the difference between power and authority is often kept distinct, while both concepts are used without this distinction in other contexts. In the texts that constitute my empirical data, both the concept of power and the concept of authority are used without a clear reference to their legitimacy. In the following, I will primarily use the concept of power, which in this case includes the concept of authority.
Computers and the role of the teacher

In this section, I will briefly discuss the literature and texts that touch upon the history, research and official policy of computers and the role of the teacher.

The role of the teacher from a historical perspective and in research

From a historical perspective, we can discern two clear pictures of teachers and their work: the teacher as a central figure and the teacher as an advisor. These pictures are neither unambiguous nor unproblematic. What these concepts mean and what value they are given is largely determined, as with the concept of the role of the teacher, by the person using them.

One of the differences involves the view of the pupil, i.e. whether the teacher sees the pupil as a subject or object. It is as problematic to isolate the various roles of the teacher as it is to unambiguously see the pupil from only one aspect. The task of the teacher to be a guide and a counsellor and to steer the pupil in the right direction at the same time is a balancing act related to both pupil and context.

There are many obstacles to reform in the schools and thereby also to computer usage. A limited survey of selected texts on the subject of teacher research reveals a number of factors worth taking into consideration. Teachers’ individual characteristics, traditions, varying views on knowledge, and experience, in addition to the pupils and the complexity of the context of the school, all have an impact on what happens in the classroom.

Traditions lend stability to people’s lives while also limiting their opportunities for innovation and new thinking. The realisation that a change in a teacher’s practice will also have an affect on her daily life can help others to understand that reform takes time. Traditionally, the role of the teacher means that the teacher is an expert to whom the pupil turns to get some help or an answer to a question. It can be difficult for a teacher to relinquish this expert role – and thereby bring about a shift in the prevailing power relations – whether it be to a computer or to pupils with better computer and IT skills. It is not self-evident that teachers like to see themselves primarily as advisors and catalysts and are willing to let pupils be the experts on computers and IT (Skolverket, 1997).
Technical innovations in teaching

The introduction of the early technical teaching aids – film, radio and television – was in many ways similar to the later introduction of computers in education. In spite of the problems experienced with these early technical aids at the time, later computer introduction into the schools did not take these earlier experiences into consideration (Cuban, 1986). The participation of teachers in the decision-making process, for instance, was conspicuously absent.

Teachers develop strategies for handling change. One way, if the change is undesirable, is to make a tacit demonstrate by simply not using the new technology. The teacher may feel that the new technology won’t help alleviate or get rid of problems that the teacher has identified. Incessant petitions for reform can make the teacher prefer continuity and stability in education rather than welcoming innovation, especially innovations that come from “above”. It should be a matter of professional norm to let teachers, together with their pupils, be the ones to determine when computers are to be an instrument for achieving their designated goals.

Computers and IT in school-related documents

In the political documents for schools that apply now, at the turn of this century, especially in Western-oriented countries, reforms are described with an attitude of openness and flexibility. Reform means studies over subject boundaries, group flexibility, independent learning, active pupils, teaching teams, resource centres and access to computers for pupils and teachers (Robitaille, 1997; Pelgrum & Anderson, 1999). In these school-related documents there are also expressions of the expectation that the computer will facilitate the implementation of these reforms. These documents are so similar in content that it is possible to speak of a global trend among industrialised countries regarding the official view of computers and IT in teaching.

In documents from countries that have had longer experience with computers and where major national campaigns have been undertaken in the field of IT and the schools, the expectations on IT as an agent for reform are quite clear. Information technology is expected to help:

- develop teaching strategies and pupils’ cognitive skills

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4 These documents include both the real documents used in governing the work of the schools and more general documents from the National Agency for Education, teachers’ unions, etc.
- encourage the independent, creative, investigative and experimenting pupil
- offer pupils the opportunity to search for, evaluate, organise and present information
- bring about fundamental changes in the roles and functions of schools, teachers and pupils
- reform educational practices by making schools into dynamic and innovative institutions with a closer connection to society, where pupils become all the more motivated, creative and curious
- create the conditions for lifelong learning.

Computer and IT know-how are often seen as a pupil’s fourth basic skill, after reading, writing and arithmetic. The goal of the school as it is described in international school-related documents means preparing pupils for life in a world permeated by IT.

The school-related documents reflect the rhetorical views of politicians and school administrators vis-à-vis computer usage and IT in the schools but also their wishful thinking regarding school and reality.

Commentary

A parallel can be drawn between the view of the teacher as “the creative God of the new era”5 and “the prophet of the true God”6 and today’s view of the role that computers and IT are expected to play in education. The computer is seen as a liberator. The expectations of the effects of bringing computers into the school are as high as the expectations that have been placed on teachers throughout the ages. When technology “takes over” the role of the teacher as a “cultivator of gifts” and “the architect of the soul” (Fejan-Ljunghill, 1997), the teacher is expected to become an advisor, coach or mentor or the person in charge of the computers. There are expectations that the guiding type of teacher will finally, with the help of the computer, have its breakthrough. At the same time, the introduction of computers means that the teacher’s balancing act in relation to pupils regarding the distribution of responsibility and control now must include consideration of the computer. The balancing act has become one step more complicated.

Theoretical platforms

In order to understand the interaction between various actors, I have availed myself of three theoretical platforms. The first theory, House’s innovation theory, was used to explain different reactions to the introduction and use of innovations, stipulated by external actors on the macro level, into a particular activity, for example, the introduction of computers into education. The second theory focuses on the role of the computer and views the computer as one of the actors in a co-operative network. In both of these theories, with their focus on relationships between actors, the importance of such concepts as power, participation and conflict is emphasised. The third theoretical platform views the relationship between teachers and computers in the school context, on the micro level, and phenomena such as power and conflict emerge in a micro-political perspective.

Innovations and actors

House (1981) has identified three predominant perspectives regarding ways of introducing innovations as well as researching them: a technological, political and cultural perspective. He points out that there is really no end to the number of perspectives that can be used, but that these three have proven helpful in analysing many innovation experiments. These perspectives can be used as starting points, both separately and combined, in explaining reforms and innovations, or the lack of such, in the schools. House also stresses that these three perspectives are not clear-cut and simple and that it is important to be aware of the interaction between them.

House’s three perspectives have to do generally with innovations in the school. In this study, I have used House’s innovation perspectives in investigating the conclusions of others who have studied the introduction of computers and IT in the schools. I used the perspectives collectively as an analytical instrument for elucidating the important role that power over the innovation plays in the relationship between computers and the role of the teacher.

House (1979) has shown how research perspectives on teaching and education have changed over time. He distinguishes between teaching as an art and teaching as technology, which he links to the question of whether the implementation of innovations in the schools is a matter of conflict or agreement. He explains how dif-
different perspectives have dominated at different points of time when it comes to theories of innovations. The first era, the pre-innovative era, lasted up to 1965, when it was replaced by the technological era. During the pre-innovative era, according to House, teaching was regarded as an art and the introduction of innovations took place with co-operation taken for granted. Developments were urged on by charismatic leaders.

In 1979, when House developed the three perspectives mentioned above, he applied them to the ways in which researchers had explained the success or failure of innovations. Later, politicians and other policy-makers, after having read these research reports, began to deliberately choose their actions based on one of these perspectives. This would thus be an example of how research findings and conceptual tools influenced policy-making and decisions.7

The technological perspective

The technological perspective, which, according to House, dominated innovation studies from 1965 to 1970, was influenced by the academic discipline of economics and by theories of how societies are governed by economic markets. This perspective had its base in concepts like production and efficiency and the central question was: “How should we get the job done?” The focus was put on the innovation and its features. The introduction of the innovation was perceived as necessary, and reform was seen as a rational, mechanical process. Interest in the actors, the people who were intended to use the innovation in their daily work (e.g. teachers), was marginal. It was assumed that there was consensus among actors when the innovation was about to be introduced (House, 1981; House & McQuillan, 1998).

The political perspective

Tendencies in the society at large in the early 1970s led to a situation in which the political perspective replaced the technological, at least partly, from 1970 to 1975. The actions of politicians and policy-makers can be understood and/or explained using the political perspective as an analytical instrument. Policy-makers started to take

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7 cf. a similar discussion in Lindblad 1994.

8 The word ‘technological’ makes one think of ‘technical science’ and ‘technology,’ central concepts in this study. However, the technological perspective has nothing to do with technical science in this sense. Here, it means a rational/instrumental way of viewing innovations.
the actors who were involved in the innovation into consideration and to anticipate a certain amount of resistance and negotiation. The innovation was thus seen in its context, and its reception by the involved actors was important, making the relation between the policy-maker and the implementer or user important. Support and participation, as well as insight into the needs of actors to defend their own interests, are concepts that are emphasised in processes that can be described using the political perspective (House, 1981; House & McQuillan, 1998).

The cultural perspective

The third perspective, the cultural perspective, emerged in the mid-1970s and was first used to study diffuse and intangible effects of innovations. Nowadays, we find it used in, e.g. ethnographic studies, to help explain processes as an expression of cultural phenomena. It can be a way of understanding how different actors give different meanings to an innovation. House, for example, feels that there must be a meeting of different cultures for the innovation to be accepted by those involved. The cultural perspective has points in common with anthropology. Seen from the cultural perspective, groups like professional and religious organisations become important as expressions of different cultures (House & McQuillan, 1998).

In the cultural perspective, interest is directed towards the individual’s relationship to the context, how people create meaning, how work is structured, how the innovation is interpreted and how it affects human relations.

Actors in networks

The actors-network theory describes how actors mutually create and assign each other roles in constructing and working with networks. Permanency and a feeling of affinity among actors are important components of the actors-network theory, where actors negotiate their roles with every other actor and achieve their position by participating in the network. In the networks that thereby emerge and in which both people and artefacts are integral parts, everyone is viewed as an actor whose influence over the course of events is not predetermined at the start but is decided by the development process or the social context. Interaction between people and technology is seen as a socio-technological whole, in which the
human and the non-human are assigned equal value in terms of negotiations, delegation and control. In this approach, the role of technology, such as of the computer, is treated in the same way as that of the human actors, which means that even non-human actors can be assigned power (Grint & Woolgar, 1997; Bigum, 1998).

The computer – an actor
The introduction of the computer means a new actor’s entrance into an earlier, relatively firmly established network. In order for the computer to survive in education, it must have allies. In the eighties, when the computer was introduced into the schools, alliances were formed between the computer and one or more teachers who advocated the use of computers in their classes. To these teachers, who were relatively few and often had a mathematics or science background, the computer meant a source of capital in a culture of technology. Their computer savvy gave them higher status at school, among other things. This was also advantageous to the computer, since it was being used by knowledgeable enthusiasts and not by teachers who were forced into using it or who were sceptical of its merits in the classroom (Bigum, 1998).

Bigum (1998) gives some examples of actors-network constructions in the schools in reference to four stages of actor involvement:
- computer enthusiasts need to persuade school communities that the solution to some of their problems would be found in taking computers into the school
- computer enthusiasts free up sufficient curriculum and material sources to support the establishment of computer classrooms
- computer studies and other computer-dependent subjects quickly form a defined and often substantial part of the curriculum
- the computer initiatives might be spoken for by the principal as helping the school achieve its mission to prepare students for work and life in a highly technologized era.

Micropolitical studies
In school, there are actors with different positions, levels of knowledge, functions and goals, which leads to division and conflict. Every actor or interest group guards over its own interests and influence, and there is a constant struggle as to how the work should be carried out. This becomes especially evident when reforms are
involved. Studies that follow the micropolitical tradition concentrate on capturing the social phenomena of the culture of the school. In micropolitical studies, strategies and their consequences can be explained, and what constitutes a reasonable standpoint can be discussed (Ball, 1987; Lindblad, 1995).

**Commentary**

The three theoretical starting points – House’s innovation theory, the actors-network theory, and the micropolitical perspective – overlap and complement each other. In all of them, the main interest is on the actions of actors, actors on different levels of an activity such as the school. Here, concepts like negotiation, participation, power and conflict, which are central to my study, are relevant. House’s three perspectives – technological, political, and cultural – are identifiable in micropolitical studies. The actors-network theory shares its emphasis on negotiation with House’s political perspective and is justified by the fact that it not only includes human actors but also legitimises the computer as an actor. The theories can be used collectively to support the work of analysing the text material.
Method

In *New in Cl@ss*, I chose to leave the national arena and turn to international experience to gain new knowledge by looking at what researchers from around the world, primarily the Western part, are writing about the relationship between computers and the role of the teacher. It is also my intention to use the selected works to illustrate how computers and the role of the teacher as an area of research is presently taking shape.

The search process

My study can be said to cover the relation between two fields of research. For one of them at least – research on teachers – there was a plenitude of literature. The availability of published research on the use of computers in teaching, however, is still relatively small. My study required a literature base that would connect the two fields: teachers and information technology.

The criteria I used in selecting literature for my study were as follows:

– literature that in some way dealt with the relationship between computers and the role of teacher
– texts from scholarly sources, for the most part international journals published over a ten-year period, 1988-1998. Occasionally, articles from daily newspapers were used, if they had been authored by researchers who are well-established in the field and whose work has also been published in scholarly journals.

My aim while collecting the texts was not to take a total inventory of scholarly publications in the field, nor to conduct a traditional literary analysis of each text. My ambition was to provide examples of how the relationship between computers and the role of the teacher is described in the selected texts.

My primary source in searching for relevant material has been educational handbooks,9 scholarly publications, databases and reference lists.

The database search was concentrated to two behavioural sci-

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ence databases, the Social Sciences Citation Index (SSCI) and the Educational Resources Information Center (ERIC). An initial search through SSCI and ERIC, in December 1998, using the search words teacher role and computer gave 1 and 0 hits, respectively. I interpreted this to mean that material published on the subject of computers and the role of the teacher was decidedly limited. By changing, complementing and using various combinations of the search words, the number of hits increased. The number of texts in the databases has grown considerably since the first searches were made, and a similar search made now, in autumn 2000, would probably force me to restrict the selection criteria of the study at hand, for instance through a narrowing down of my questions.

The literature used in the study focused on primary and secondary schools, i.e. excluding research on the use of computers in higher education or teacher training.

I found the reference lists given in the texts to be especially useful, in particular at the introductory stage, in helping me find more texts on the subject. Titles in the references that indicated a content that was relevant or gave names of familiar researchers were also a big help, as were the more exhaustive references cited within the texts themselves.

A review of the references listed in almost one hundred texts shows that a number of references recurred relatively frequently, i.e. in more than ten of the texts. These authors were thus given prominence in my material. Without pre-empting the results to come, six of these can be mentioned here. Three are American researchers: Henry Jay Becker, professor of education at the University of California (22 references); Larry Cuban, professor of education, Stanford University (19 references); and Seymour Papert, professor of mathematics, from the Massachusetts Institute of Technology in Boston (12 references). The only woman that falls into the frequently-referred-to category is Deryn Watson, Ph.D., King's College in London, whose references (13) pertain primarily to articles in the anthology Integrating Information Technology into Education, co-edited by David Tinsley. The other two Europeans are Tjeerd Plomp, professor, and Willem J. Pelgrum, director of research, at the University of Twente in the Netherlands (15 references in my empirical text material).

My work on this project has not been limited to a mere methodi-

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10 Searches were made on the following combinations: teacher role computer; teacher computer; teacher teaching IT; teachers knowledge computers; teachers knowledge information technology; teacher role information technology; teachers teaching information technology.
cal search of databases and reference lists in order to collect texts; reading and searching have gone hand in hand. In other words, it was not the number of texts that decided when the search was over. Rather, the search ended when I found that the content of new texts no longer offered new perspectives to the questions formulated as the first purpose of the study. The empirical exploration of both aims of the study was based on the same literature – 99 texts – and was chosen on the basis of the same selection criteria stated above.

More than half of the close to 100 texts were written by researchers from the United States, which is not surprising since the searches were performed on English-language databases. Only about ten of the texts were by researchers who did not have English as their native tongue. These texts were related to the conditions in the authors’ countries, but the researchers had chosen to publish in English.

The reading process

The questions formulated for the study have been crucial to the method used to fulfil the goals of the study. This means that my reading of the material and the work of analysis and interpretation were carried out in steps, based on an approach closely resembling the hermeneutic.

One task has been to fulfil the first of the two purposes of my empirical study – to outline and analyse the content of the texts with respect to descriptions of what happens to the role of the teacher, teachers’ work and teachers’ deeds, when computers and information technology are introduced and used, or not used, in teaching. The work involved in this pursuit has involved:

– reading and viewing every text as an entity in itself
– finding ways, in the analysis of the texts, to structure the content, which resulted in a number of preliminary themes
– viewing all of the texts as one and reading them with the preliminary themes as a starting point. A trial run to see if the themes would hold. Possible restructuring of or within the preliminary themes
– finding answers to my questions, using both the text and the themes as starting points
– putting the answers to my questions into a theoretical framework.

The work associated with the first purpose of the study involved
trying to relate to the content of the researchers’ texts on the subject of the relationship between computers and the role of the teacher. The study’s second aim – to outline and analyse how the research field is presently being moulded – has implied a second reading and analysis of the texts. The second time, my approach was phenomenographical in that I was interested in the researchers’ purpose in writing the texts and in how they perceive the work tasks of the teacher. I have also examined what position the texts had in relation to the schools of educational and other relevant theory on computers and the role of the teacher.

The work of the second aim of this study involved:
- making a second reading of the texts
- categorising the texts with respect to their purposes
- grouping the texts according their understanding of the work task of the teacher
- looking for sub-categories among the texts.

Commentary
Using texts out of context can be somewhat problematic. Context is important in both the writing of the text and its later interpretation (Ongstad, 1999). However, in their global overviews on education and the use of computers, Tiffin & Rajasingham (1995), Avalos (1999), and Pelgrum & Anderson (1999) show that there are a number of similarities in the international educational context. They emphasise, among other things, decentralisation tendencies, pupil-focused teaching, lifelong learning, and the substantial economic investment that has been made in the area of computers, thus far mainly in schools in Australia, the U. S., Canada and Europe. On the basis of this, I maintain that the texts are useful, despite possible contextual differences. In addition, the use of the Internet could well mean that educational content will one day be globalised in countries that have the resources to use computers and IT in their teaching.
Results and commentary

The relationship of computers and the role of the teacher as described in the texts

As stated above, one of the purposes of my study of other researchers’ texts was to summarise and analyse international scholarly reports on what happens to the role of teacher and their work and deeds when computers and IT are introduced and used, or not used, in teaching. One element in meeting this goal was to look for factors/actors that, according to international research, influence teachers’ work with computers in the classroom, as well as to find answers to how this influence occurs.

In the teaching situations of interest to this study, there are three actors: teachers, pupils and computers. External actors such as school politicians, school administrators and computer experts also exert a more indirect but none the less significant influence on work in the classroom.

To investigate, in the reading, analysis and interpretation of the texts, how the actions of the parties affect the relationship between computers and the role of the teacher, I began from a conflict-related micro-political perspective.

The complicated and many-faceted picture I could draw from the research available to date can be summarised under four headings, as follows:

The teacher

*The individual teacher’s attitude toward the use of computers in teaching and his or her judgement regarding its benefits appears to be decisive as to whether, and to what extent, the technology is used.*

Beginning in the early 1980s, in an attempt to improve knowledge of how teachers think before, during and after one of their lessons, the interest of researchers has been directed towards activities at the micro-level (e.g. Ball, 1987, Goodson, 1992, 1996, Hargreaves, 1998a). This can be seen as an example of a political or cultural perspective for analysing and understanding teachers’ work. In the selected texts, there are expressions of these perspectives and an in-
terest in the teacher as a person as well.

There are also, however, examples of texts in the material studied in which the relationship between computers and the role of the teacher is viewed from a technical-rational perspective, resulting in several attempts to describe the ideal image of the optimal computer-using teacher. Here, the attitudes of individual teachers toward teaching and technology, as well as to their own faith in themselves as teachers, determine their ability to live up to this ideal.

Based on the importance ascribed to the teacher as an actor, there is better understanding for the claim that there is no clear connection between the number of computers in a school and the number of teachers who use them. If the aim is to increase computer usage, it would thus be of far greater interest to investigate the meaning computer usage has for the teacher than to study the technology itself. From this point of view, the strategies used to introduce innovation into the school are very important. Attempts to effect changes that can be described based on House’s technological perspective have in this context proved quite unsuccessful, with the exception of cases involving recipients who are already computer enthusiasts, such as teachers with an expressed interest in technology. Bigum (1998) gives an account of a gradual implementation of computers into the classroom and points out, with the support of the actors-network theory, the importance of alliances in the network between computers and computer-savvy teachers. Seen from a technological perspective, external actors, sometimes aided by individual teachers, “force” computers into the schools. A more successful method, awakening the interests of more teachers, would be based on strategies that can be understood using House’s political and cultural perspective. More attention would then be paid to negotiations between the teacher and the teacher’s culture.

Innovations of various kinds usually entail demands for some kind of change. Changes in the role of teacher, irrespective of computer and IT usage, manifest themselves at a rhetoric level in a number of concepts that are introduced in lieu of the term teacher. One way of underlining this change is to use terminology from areas such as industry, sports, and the arts, and to speak of the teacher as a manager, coach, or accompanist.

In order for these new epithets for teacher to be seen as meaningful, they must offer something new. The traditional tasks of teachers include teaching, creating visions, and devising methods, as well as drawing inspiration and ideas from outside the school. Based on this view, calling the teacher a mentor, planner or wan-
derer is nothing but a word game and can have no meaning to teachers themselves nor give a fair picture of their complex work situation.

The teacher and the computer

Three variants of the role of the teacher in education stand out in connection with computer usage:

– The teacher functions as a link between the pupil and the computer, e.g. helping to interpret program instructions.
– The teacher functions as a technician, e.g. when technical problems arise.
– The teacher delegates routine work to the computer, e.g. correction of multiplication tables.

In the texts, examples were found of micro-political phenomena, i.e. how computers can increase both teamwork and power struggles between actors. If teachers see the advantages of using computers in their teaching, and if the use of computers affirms the teacher’s own view of knowledge and learning, the chances are good that the computer will be used.

Viewing the computer as an actor, supported by the actors-network theory, increases the number of actors surrounding the teacher. Within the network, negotiations are carried out and even if actors are regarded as equals, power games take place. Using a definition of power that assumes that one or more of the actors has the “ability to evoke, change and obstruct action and achieve intended consequences” (Persson, 1994, p. 28, in Swedish), it is relevant, in this context, to speak in terms of power. The definition of action, which also includes non-action, such as the ability to influence people’s thoughts and actions by one’s mere presence, also lends support to the assertion that the computer is not neutral. This claim means that the non-human actor, the computer, is ascribed yet another human dimension, which further strengthens the computer’s status as an actor.

The computer is also treated as an actor in the school, whether consciously or not, in so far as it makes people act in different ways. In comparison to humans, the computer is fast, efficient and teeming with information, but it is also worth noting that despite its immense capacity, the computer lacks the ability to have intentions and to think. In this sense, it is not an actor of equal standing in the
network.

In reading the texts, I noticed that there was a research interest in grouping teachers according to how they use computers, a technological perspective. One way of understanding this interest is to see the findings as a means of increasing the awareness and understanding of external actors, such as school politicians and computer experts, for the different ways teachers view their work, with or without computers. Furthermore, the preconditions for helping teachers strategically and effectively are improved if you concentrate on a limited number of groups with varying interest in computers instead of on individuals in the larger teacher collective. A more critical approach to the researchers’ findings means asking how the results were to be used. For example, is it possible to use the findings to create understanding for or change teachers’ practices vis-à-vis computer usage in teaching? The findings could be used to “classify” teachers according to their interest in computers and then consciously give support to those teachers who have been judged to have the qualities that research has shown to be important. This I see as constituting both a breeding ground for conflict and a way of ignoring teachers’ own understanding of their work.

The attempt to group teachers and label the groups can jeopardise the striving for reform. In my opinion, this tendency in the texts, to compartmentalise teachers rather than seeing the role of the teacher as something that is created in every new teaching situation, can lead to a cementation of roles.

The teacher, the pupil and the computer

Five variants can be observed of the role of the computer in teaching, as perceived by teachers:

- as a rival, e.g. taking over the work of the teacher
- as an “alarm clock”, e.g. waking up new ideas on education
- as a mediator of contacts, e.g. facilitating contacts outside the school
- as an obstacle to contacts, e.g. inhibiting contacts between colleagues
- as a replacement for the school, e.g. threatening the existence of schools.

The use of computers in the school is intended to both reform and improve teaching. The outcome is expected to be new teaching
strategies, with benefits such as increased independence in the pupil, individualised teaching, and less authoritarian teachers. Whether or not these should be regarded as improvements should, in my opinion, be discussed.

The ambitions of some actors, primarily external policy-makers, are permeated by a technological perspective of teaching, in which the envisioned goal is that the use of computers will lead to greater effectiveness, i.e. more pupils can learn more and faster. However, this approach does not take into account the effect that the involved actors – the teacher, the pupil and the computer – have on one another. The relationship between these three actors can be likened to the eternal triangle, in which one alliance may be stronger than the other two.

In recent years, the political ambition, as expressed in both national and international school-related documents, has emphasised two points: that greater consideration be paid to the individual pupil in the teaching situation, so called pupil-focused teaching, and that computers must be used in teaching. A question that comes to mind in reading this is whether it is even possible to work with these two ambitions at the same time. Should we buy computers for the schools and hope that they are used or is it better to persuade teachers to work in a more pupil-oriented manner as an indirect way of increasing computer usage?

These questions must be seen from a time perspective. Computers now exist and it is maintained that they should be used in school-related documents. Arguing against this and claiming that the work method of the school must first become more pupil-oriented, seems meaningless. In fact, the school-related documents clearly state that the use of computers and IT is expected to lead to radical change. The expectation is that the goals that cannot be achieved by human beings, the teachers, will be taken care of by another actor, the computer. However, this faith in the computer’s ability to effect change is hardly shared by all working teachers.

The importance of teamwork vs. power struggles between teacher and pupil cannot be ignored. The balance of power between pupils and teachers is not a new phenomenon; it was heeded as far back as by Rousseau, who stressed the importance of not giving in to the will of the pupil yet allowing the pupil freedom. There are built-in, legitimated power structures in schools, in the form of discursive, generational and institutional power, that strengthen the position of the teacher in relation to pupils. Sarason (1991) points out that if the power relationship between teacher and pupil in the classroom is not allowed to change, teaching reforms are doomed
to failure. This applies to computer usage in teaching as well.

The new actor, the computer, is an integral part of the interaction between the teacher and the pupils in the classroom. In the interplay of the three, the teacher is still expected to be in charge of and maintain control over the work that goes on in the classroom. The role of the computer can however be exploited by other actors to strip teachers of their power. Pupils sometimes use the computer as a means of gaining control over classroom work. For instance, they may prefer the computer to the teacher and in this way influence the role of the teacher. The individual teacher may thereby become either a victim of or a master over the computer.

The roles of the three actors shift depending on each teaching situation. Still, the threat that some teachers feel the computer poses to their authority can well be regarded as relevant. Perhaps the alliance between the pupil and the computer will enable many pupils to come out as the stronger party of the struggle. Some teachers see this as a threat, while others see it as an opportunity.

**Interaction with other actors**

*In decision-making, external actors appear to take little heed of the teacher’s view of computers in teaching.*

The composite picture from the texts shows that the context in which the teacher works is complex in many ways. If the school as an organisation is seen as a hierarchy, then teachers are controlled in a top-down manner by external actors such as politicians, school administrators, computer experts, teachers unions and parents. In the selected texts, as well as in school-related documents and older documents, external actors act from of a technological perspective when making decisions on innovations in the schools. In school-related documents from the late 1900s, IT is presented as something outside the curriculum that will put pressure on teachers, which is expected to lead to reform such as a reform in the role of the teacher.

The empirical texts confirm House’s assumption from 1979 that the technological perspective that dominated in the late 1960s would come to live on alongside the political and cultural perspectives.

Experiences from the past century, both in schools and in research, show that innovations in schools can more readily survive if the recipients, mainly the teachers, have been involved in the deci-
sion-making, i.e. that they have the opportunity to make the change their own by owning it, e.g., economically. This experience has seldom been given any attention, which means that the IT investments now made in the school run a risk, if not of total failure, at least of being met by more scepticism than necessary by some teachers.

The actors appear to be caught in a vicious circle. True, the distribution of work among various actors is, in some respects, clearly stated in school-related documents, and as a result external actors expect teachers to fulfil their obligations. If teachers are not given the opportunity to partake in decision-making and see the purpose of the proposed reforms, they may develop strategies that in various ways obstruct the implementation of the decisions.

The research field of computers and the role of the teacher

The second aim of my study was to present and analyse the field of research on computers and the role of the teacher using the selected texts. This was carried out by identifying the purpose of the texts, trying to identify the researchers’ views of the task of the teacher, and by outlining their different positions in relation to pedagogical or other relevant areas of research dealing with computers and the role of the teacher found in the texts.

The results can be summarised into three points, as follows.

The purpose of the texts

The researchers expressed primarily two purposes in their texts. They sought to elucidate computers and the role of the teacher in education by:

- presenting results from their own empirical studies
- illustrating and explaining phenomena related to computer usage in the schools, with or without support of their own empirical studies.

In the overall aim of my study, I expressed a hope that more researchers with a knowledge of schools and teachers would devote themselves to the area of computers in the school. Interest in this area has up to now been very limited and it might therefore be of value to look more closely at the purposes held by those researchers who none the less did attend to this research area.
The texts used in the study were written over a period of ten years, 1988-1998. There were no significant differences in the purpose of texts written at different points of time within this period. This may be due to the fact that the chosen period was rather short and/or to variations in the time computers had been used.

Several researchers concern themselves with the reasons for teachers being or not being computer-users. Others avail themselves of variables related to individuals to explain differences in teachers’ attitudes to computer usage. In doing so, the researchers presuppose that individual qualities govern people’s actions. This technical-rational perspective, often shared by politicians, would appear to be a simplified way of viewing teachers and the factors that influence the way they work with computers.

The tasks of the teacher

Analysis of the texts shows three ways of describing the tasks of the teacher. The teacher is seen as:

– a technician, whose task is to manage the technology
– an educator, whose task is to support pupils in their learning
– as both a technician and an educator, whose task is to assemble the best possible resources, including computers, to facilitate pupils’ learning.

If the views reflected in the texts are representative of researchers’ general view of the task of the teacher, the idea of the teaching profession as full of complexity is reinforced. No matter how teachers choose to perform their job, the risk is eminent that, from some perspective, they will be seen as doing something “wrong”.

In many of the texts, the role of teacher is seen from a technological perspective with little regard for teachers’ knowledge and experience, i.e. political and cultural perspectives. Researchers who focus on the interaction of technology and teaching have a tendency towards a way of viewing different actors that is in line with the actors-network theory, in which technical and social aspects are part of a whole.

The texts’ position in relation to other research

An analysis of the research area shows that it is possible to distinguish four categories of texts:
Texts with no distancing and of a largely empirical content:
– results are presented with no reference to earlier research.

Texts that demonstrate distancing:
– reference is made to research on processes of innovation and reform
– reference is made to research on knowledge and learning
– reference is made to research on the relationship between school and society.

A map of the field of these texts shows that it is possible to clearly distinguish two categories. Slightly more than half of the texts included in my empirical study are of a descriptive nature. The researchers present results from an empirical study or relate their text to some particular phenomenon, such as teachers’ fear of technology, without coming forward themselves or referring to other research. The texts that fall into this category are to a large extent empirical studies, which in itself is not a sufficient justification for the researchers’ lack of distancing and theorising.

Naturally, readers can draw their own conclusions from the presented findings, but thoughtful reasoning and references to other research would help readers understand connections or, with the help of the text, their own activities.

The large number of basically empirical texts can be explained by the fact that this is a relatively new area of research. Such an explanation may be justified in the generation of new theories, but is hardly applicable here, considering existing theories and research. Another explanation could be that the texts I have used in my study are not, at least in this respect, representative of texts written on the relationship between the role of teacher and computers.

The eleven texts within the category of processes of innovation and reform represented researchers from different disciplines, including teaching and psychology as well as education and IT. Most of the references in these texts are made to Michael G. Fullan, a school researcher, and to his perception of the importance of teacher participation in innovation and reform.

In nine of the texts, the researchers distance themselves from their own writing by relating the content to theories of learning, cognitive processes or teachers’ views regarding knowledge. These texts discuss the concepts of teaching and learning. The active learning process of the pupil is seen as central and a possible connection between certain curricular programs and teachers’ views of knowledge and pupils is discussed. The texts make reference,
among other things, to constructivism, to Lave and to Vygotsky.
The third category, which comprised 15 texts, applied to re-
searchers who saw the relationship between the role of teacher and
computers from a broader perspective. The work of the teacher
was set in relationship to labour market, capital and technology,
and questions of policy and practice, like power and status, were
discussed.
A remaining fifteen texts of a distancing nature did not fit into
any of the three categories above.
Discussion

The computer as an actor

The picture of the results that emerges in the analysis of the researchers’ descriptions of the relationship between computers and the role of teacher make it possible to claim that computers affect the role of teacher, teachers’ work, and teachers’ deeds. This impact, which can be experienced as both positive and negative, varies in strength among individual teachers and teacher groups. The results, which are not especially startling, show that there is a relatively strong global consensus as to the factors that influence teachers’ relationships to computers. The factors that emerge in the texts thus also confirm Swedish findings, which could well guarantee that the requirement of agreement between reality and the researchers’ interpretation of reality has been fulfilled (Larsson, 1994).

Similar descriptions of the global investment in computers expressed in international school-related documents, regardless of local context, suggest a faith in the opportunities offered by the computer. This faith is perhaps found primarily among external actors, but also among a share of teachers, which awakens further questions about the computer as an actor. What is it about this technology that makes it so attractive – in teaching contexts as well? What difference do computers and IT make?

Teachers’ dilemma

In many respects, teachers may regard the use of computers in their job as problematic and the directives from school politicians and others as contradictory. Two examples can serve as illustrations of the kinds of issues that teachers have to contend with in using computers in their teaching. One of the advantages attributed to the computer is its potential to individualise teaching. The computer enables every pupil to work at his or her own speed with material suited to that particular pupil. On the other hand, we often emphasise the importance of discussion for the pupil’s cognitive and social development. The teacher’s task is thus to find a balance in teaching between the pupil’s individual work and the collective work of the group. One interpretation of current school-related documents
could well give an undue bias to individual work. Computer usage is further complicated for the teacher by the fact that the computer is not a neutral tool but an actor with intentions, even if it is ultimately programmed by humans.

The perception of the computer as a threat to a teacher’s autonomy also implies a disassociation, by the teachers, from the notion of the computer as an actor. Even if teachers do not ignore the computer as an actor in the classroom situation, I feel that it is important not to regard the computer as having equal status with the other classroom actors, the pupils. The concept of equal actors in a network – the cornerstone of the actor network theory – must be modified in this regard. Just because I have used the actor-network theory as an analysis instrument for studying power structures in the classroom does not mean that I view the pupil and the computer as equals, nor that most other teachers in their daily work do.

As a counterweight to the picture of computers in the schools as problematic in the eyes of the teacher, there is a brighter side presented in national and international school-related documents. In some of these documents, there is a strong faith in the computer as the solution to eternal educational matters, which can be seen as an example of oversimplification.

Computers and teachers’ power

Reform means that the actors’ roles are affected differently. A focal question in the study of the relationship between computers and the role of the teacher is who does what and in whose interest, i.e. the question of how power is distributed in the classroom. What the teacher has control over, besides leaving routine tasks to the computer, is the choice to not use the computer at all, or to use it for tasks where he or she sees the computer as superior to other aids.

The teacher’s role as a link between the pupil and the computer involves varying powers of authority. No doubt, most teachers experience playing the role of service technician as something that steals time from their pedagogical endeavours, while the possibility of delegating routine tasks to the computer, on the other hand, leaves the teacher with time to do other jobs. The teacher’s power in relation to the computer has also, in one respect, to do with how time is used in school. The teacher decides when the computer will be used and to some degree for what, and what happens later in the meeting between pupil and computer lies for the most part outside the teacher’s power of influence. The teacher’s ability to observe the
pupil’s work, to intervene and to maintain control, decreases when the pupil works with the computer. This, in itself, is not unique to computers and is fully comparable to other learning situations where students work independently.

The use of computers in teaching leads to new challenges for the teacher in her work with pupils. But if the technology helps improve the pupil’s cognitive and emotional skills, and if this does not disrupt established power relationships, acceptance of computers on the part of teachers appears favourable.

An integrated view of the texts in the study shows that teachers, at least in one respect, are victims and stripped of power regarding the computer. Teachers have neither taken part in the planning or the introduction of computers into teaching. Research findings (Fullan, 1982, Hoyle, 1983), which have long been recognised and which prove the importance of teacher participation, have been ignored by the policy-makers. On the other hand, the teacher is the more influential actor and can gain back power, with respect to how and when computers are used in the classroom. The individual teacher’s attitude toward the use of computers in teaching is very important but can also be said to be socially constructed and context-dependent. Teachers can be forced to have a computer in the classroom but it isn’t as easy to force them to use it.

Learning from others

One of the expectations I had concerning this work, in accordance with the second aim of my study, involved learning how the texts position themselves in relation to the schools of educational or other related theory on the role of teacher and computers. Researchers and teachers alike find themselves in a force field of different expectations, and the purposes behind their texts vary. A review of these purposes reinforced my expectations. The issues that the researchers were trying to elucidate in their texts were related to a number of different areas of knowledge. In texts that deal with the relationship between the role of teacher and computers, we find points of contact with research on both teaching and processes of reform, even if this is often not linked to computers and IT. A review of the texts has also shown that researchers represent different kinds of institutions and that they perceive the tasks of the teacher differently. This might have contributed to the fact that the texts contain theories both with and without a connection to technology, but roughly half of the texts lack such associations.

The researchers’ texts have offered insight into and thus lived
up to my expectations of increased knowledge about the relationship between computers and the role of the teacher, at least in some respects. While preparing to read and analyse the texts that make up my empirical study, I expected to learn from theoretical applications, for example in the fields of reform, organisational development and education. However, half of the texts lacked a connection to theory in the activities and interactions described by the researchers. In most of the other texts, theoretical ties could be as little as a single reference. Nor were there any examples that new theories had been generated from the conducted research. Bigum’s work (1997, 1998) on the actors-network theory is an exception. Most of the texts described teachers’ activities with computers in teaching in an uncritical tone. Only a small number of the texts problematised the introduction of computers and its anticipated or actual effects on the actions of teachers.

The research I studied forms to a large extent its own descriptive discourse, characterised largely by a lack of history and theory. The activities described can be viewed as the first link in a chain, “Behold – I make all things new”,11 as opposed to the last. The possibility of tying in experiences or theories, not necessarily technology-related ones, were seldom exploited. In this respect, there are thus similarities between researchers and the external actors whose actions, in implementing new technology, have been mentioned above.

Based on the descriptive, largely empirical texts mentioned above, the conclusion can be drawn that the researchers have fulfilled the contract with their principals: they weren’t too much this or too much that, their findings satisfy as many people as possible, and they have acted as “a diplomatic defence attorney for teaching staff everywhere”. Because the use of computers in the school is an area where actors both in and outside of the school can be heard in the debate, the low profile chosen by most of the researchers is surprising. Their lack of distancing and references to earlier research evokes a number of questions concerning the role of the researcher as well as of in whose interests the texts were written.

When it comes to the researchers’ own attitude toward the teachers they are writing about, their image is at times clearer. A very large share of the texts can be analysed using House’s political perspective, in which it is stressed that teachers be given the opportunity for participation and to make their own definition of the

11 NT, Revelation 21:5.
need for computers in teaching, and thereby also the need for professional development. This interest among researchers for the possibilities of teachers to influence their own work situation could constitute the starting point for expanded co-operation between researchers and teachers. It could also lead to a clearer profile among researchers as opposed to other actors.

Local – Global

My licentiate thesis, Lärare vid datorn (Teachers at Computers), was based on interviews conducted in 1994 with seven Swedish teachers who ten years earlier had used, or planned to use, computers in their teaching. The paper makes up Part I of my work on teachers and the use of computers, continued in New in Cl@ss.

The platform in my licentiate thesis was local, i.e. the use of computers by seven Swedish teachers over a ten-year period. The study of other researchers’ texts, on the other hand, has a global perspective, with the reservation that this perspective is confined to the countries represented in my text material. The synthesis that ensues, partly in the licentiate thesis and partly in the study of the texts, shows that there are great similarities between Swedish and international conditions. The local material had quantitative limitations as compared to the global material, especially in terms of the number of studies, represented countries, and researchers involved, but it can still, taking these factors into account, be used for comparative purposes.

In presenting the local and global pictures, similarities emerge that can be attributed to different levels. The use of computers in teaching primarily concerns using the computer as a word processor. The obstacles, in the form of practical, psychological, value-based and power barriers discussed in the licentiate thesis, are supported in the research material of the present study.

In Sweden, as in other countries, decisions on the introduction of computers into the schools were made by other people than teachers. It was politicians and school administrators on the national level, presumably with the support of the producers of the technology, who were responsible for “forcing” computers into the school (Riis, 1991, Riis, Jedeskog et al., 1997, Riis (ed.), 2000).

In fact, it is not surprising that the two contexts, local and global, have so many similarities. The countries represented in the empirical data are all industrialised countries with democratic forms of government. Insight concerning the meaning of citizen education
for a country’s welfare and development permeates school documents, as do honourable words like lifelong learning and a learning organisation, hand-in-hand with a focus on pupils’ active part in learning. Even the confidence in computers and the perception of computer competence as a necessary skill in facilitating and improving learning can be found in the documentation, in particular in actors outside the school.

Conclusions
Based on my two projects, Lärare vid datorn (Teachers at Computers) and Ny i kl@ssen, (New in Cl@ss) the following comprehensive conclusions can be drawn:

– a rational/instrumental perspective has dominated and continues to dominate the attempts to implement technology into the school, although the use of the other two perspectives increases successively over time
– policy-makers seldom pay heed to earlier experience of innovation work and the implementation of technology in the schools
– the computer can obstruct collegiate co-operation if teachers who use computers form subgroups that exclude colleagues who do not
– teachers are in some respects victims and in other respects “masters” of computers in education. They are victims, for instance, in relation to the actions of external actors and they are “masters” when it comes to deciding if and how the computer is to be used in their teaching
– both external actors and pupils can use the computer as a means of influencing the role of the teacher, teachers’ work and teachers’ deeds.
– the similarities shown in local and global empirical findings suggest that the local context is not of primary importance when the object of study is the relationship between the role of teacher and computers. School-related documents from the countries covered by the study do not differ significantly from one another.

The relationship between computers and the role of the teacher can, from a power perspective, be further specified:

– teachers can give up and leave the schools
– teachers can refrain entirely from using computers, despite the directives of external actors in school documents
– teachers may perceive the computer as a threat, abdicate, and surrender their position to the pupil
– teachers may perceive the computer as a threat, abdicate, and surrender their position to technology
– teachers can view the computer as an opportunity and use the technology constructively when it facilitates classroom work and helps achieve educational goals
– teachers can choose to give voice to their views of the computer in teaching, whether they advocate its use or not.

Suggestions for further research

In the introduction, I expressed the hope that an increased number of education researchers would become interested in the use of computers and IT in teaching. Further research in the area could provide the answers to questions of a more general nature concerning computers and the role of the teacher. The future role of the teacher will in all probability become more complex as time goes by and come to include elements of the traditional knowledge-mediating teacher, the adviser and the technician.

More knowledge is required concerning what a changed teacher role, as technician or educator, will mean for pupils and their learning. It is also crucial that the real “principals” of the school – the pupils – are given more attention than they have received to date in the research on computers and IT in the schools.

In conclusion, I can readily state that findings in this area of research could well be used as a basis for new and more analytical questions. Moreover, the possibility for researchers to work cooperatively at an international level has been facilitated by the opportunities offered by information technology.
References


“Självpositionering” i en (post)modern skola som exempel.


