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ICT-use, educational policy and changes in pedagogical paradigms in compulsory education in Denmark: From a lifelong learning paradigm to a traditional paradigm?

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Abstract For years, increased use of ICT in education and training has been part of the Danish education policy, and the number of computers in schools and the actual use of ICT have grown. At the same time, school leaders' and teachers' pedagogical paradigm in primary and lower secondary schools seems to be changing from a lifelong learning paradigm (focussed on student-centred, active, and autonomous leaning) to a more traditional paradigm (focussed on curriculum-centred teaching and instructions). The aim of this paper is to describe this development in relation to the way ICT is used as well as to changes in educational policy. Beck and Beck-Gerrnsheim (2002) theory about 'institutionalized individualization' as characteristic of the reflexive society serves as a theoretical framework for better understanding the observed changes.

Keywords ICT · Pedagogy · Educational policy · Denmark

1 Introduction

By using the concepts the knowledge society or the information society, researchers within the social sciences try to describe the changes society is undergoing with industrialism loosing importance, while the technological developments make information flow easier and the world feels smaller. The concept of information—

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or knowledge society, however should be discussed. The concept is related to decreased centralisation and control, with a stress on individualisation of learning and the responsibility for own learning. Beck and Beck-Gerrnsheim (2002) prefer to speak of the reflexive modern society, a society characterised by the term 'institutionalized individualization' with simultaneous individualisation and centralisation, more rules and commitment to traditional values. This means that central institutions in a modern society as for example basic civil, political and social rights, paid employment and the training and mobility necessary for it are geared to the individual and not the group (ibid p. xxi–xxii) They argue that there are two different types of individualization one is the result of the modernity where the individual no longer has any tradition to rely on and has to make his own choices. The other one is the new institutional demands, ways of exercising power and controlling the people and demands for the citizens to live their own lives which is termed institutionalized individualization. But how are these changes influencing what is going on in the school? Are there changes in pedagogical paradigms? Several authors argue that with the knowledge society new kinds of competences as well as pedagogical approaches develop (see Kozma and Shank 1998; Reich 1992; Grother 2004; Stehr 2001).

This article is based on a comparison of Danish results from two IEA studies on the use of ICT in lower secondary school carried out in 1998 named SITES-module 1 (SITES-M1) and SITES 2006 from 2006, with particular focus on SITES 2006. It indicates that principals within compulsory schools in Denmark subscribe less to what is called a lifelong learning paradigm in 2006 than they did in 1998, although the opposite was expected, namely that the pedagogical approach would change in accordance with the rise of a knowledge society. This will be described in more detail later in the article

The aim of this article is to look deeper into possible explanations for this change. The research question that the article intends to answer, thus, is:

> How can the changes in principals' and teachers' pedagogical paradigm in compulsory education in Denmark be understood in light of changes in the Danish educational policy and the implementation of ICT?

The focus for analysis, thus, is the changes in the Danish educational policy and the implementation of ICT in schools, as well as the potential influences that these changes have had on the pedagogical paradigms in compulsory education in the years between the two studies 1998 to 2006. Before moving on we will briefly introduce the paradigms in question. Hereafter a guideline for the article will be presented.

In SITES-M1 it was decided to distinguish between a traditional paradigm and an emerging paradigm in terms of goals for teaching, teaching practice and the students' practice, as shown in Table 1. The traditional paradigm is connected to the industrial society. The concept of the emerging paradigm was developed in SITES-M1 to capture those changes occurring in classrooms internationally that align with what is believed to be conducive to the development of learning outcome for the information society. These common expectations were extracted from a literature review (Pelgrum and Anderson 1999). Some of these changes include self-directed learning, teachers taking a more facilitative role. It was expected that the national educational systems would develop from building on the traditional paradigm to the emerging paradigm, although it was conceivable that many of the teaching and learning

Table 1 Two pedagogical paradigms

Traditional paradigm	Lifelong learning paradigm
School level vision	School level vision
Cover prescribed curriculum content	Individualise students' learning experiences in order to address different learning needs
Improve students' performance on assessments/examinations	Increase learning motivation and make learning more interesting
	Foster students' ability and readiness to set own learning goals and to plan, monitor and evaluate own progress
	Foster collaborative and organisational skills when working in teams
	Provide activities which incorporate real-world examples/settings/applications for student learning
Teachers' curriculum goals	Teachers' curriculum goals
Prepare students for upper secondary education and beyond	Provide activities which incorporate real-world examples/settings/applications for student learning
Improve students' performance in assessments/examinations	Individualise student learning experiences in order to address different learning needs
Satisfy parents' and the community's expectations	Foster students' ability and readiness to set their own learning goals and to plan, monitor and evaluate their own progress
	Foster students' collaborative and organizational skills for working in teams
Teachers' practice	Teacher's practice
Present information/demonstrations and/or give class instructions	Provide remedial or enrichment instruction to individual students and/or small groups of students
Assess students' learning through tests/quizzes	Provide feedback to individuals and/or small groups of students
Use classroom management to ensure an orderly, attentive classroom	Provide counselling to individual students
	Help/advise students in exploratory and inquiry activities
	Organise, observe or monitor student-led whole-class discussions, demonstrations, presentations
	Organise, monitor and support team-building and collaboration among students
Student practice	Student practice
Complete worksheets, exercises	Students learning and/or working during lessons at their own pace
	Give presentations
	Determine own content goals for learning (e.g., theme/topic for project)
	Explain and discuss own ideas with teacher and peers
	Self and/or peer evaluation
	Reflect on own learning experience review (e.g., writing a learning log) and adjust own learning strategy

activities that were well established in the industrial society such as teacher-driven instructions and students learning individually as shown under the traditional paradigm in Table 1 would still be in place. In SITES 2006 the terminology was changed to the traditional practice orientation (formerly the traditional paradigm) and the innovative practice orientation.(formerly the emerging paradigm) consisting of the lifelong learning orientation as well as connectedness orientation (Law et al. 2008a, b). The latter orientation has to do with networking and learning from other pupils and teachers from other schools and countries. This can be done face to face but also by online communication (Law et al. 2008a, b) For the purpose of this article we only distinguish between the traditional and the lifelong learning paradigm.

The Danish compulsory education system will be described before presenting the methodological approaches. The article then describes the changes in the pedagogical paradigm based on the Danish results from SITES-M1 and SITES 2006. The main part of the article presents empirical results and relates them to the changes in the pedagogical paradigm, starting with the use of ICT in compulsory school and ending with relevant aspects of Danish educational policy in the years 1998 to 2006. In the last part, the results of the analyses are summed up in the conclusion.

2 Theoretical approach

Theoretically, the article builds on sociology of education and political science, meaning that we draw on theories of education and policies. Reich (1992) offers a theory that explains the need for gaining new competencies to be fit for the knowledge society. Reich distinguished between three kinds of emerging jobs: routine production services, in-person services and symbolic-analytic services. Routine production workers include those who perform repetitive tasks as assembly line workers, data processors, foremen, and supervisors. Examples of in-person service workers are waitresses, janitors, hospital attendants, and child care workers. Symbolic analysts include engineers, attorneys, scientists, professors, executives, journalists, consultants and other "mind workers" who engage in processing information and symbols for a living. Reich (1992) argued that symbolic analysts occupy a privileged position in that they can sell their services in the global economy. They are well-educated and will occupy an even more advantageous position in the future. He argued that while the number of jobs within routine production services was decreasing, the number of jobs within in-person services and especially within symbolic-analytic services was increasing. The huge increase in symbolic-analytic jobs according to Reich implied an increase in jobs dealing with problem-solving, problem-identification and strategic brokering which would lead to a demand for new competences. He saw teaching and learning as means to improve the economic position of the bottom four-fifths of the American work force along with investing in education at all levels. One of the competences that he mentioned as important for the growing number of symbolic analysts was teambuilding and teamwork (Reich 1992).

As ICT was seen as having the potential to facilitate changes in education that would allow future citizens to be better prepared for the information society than was

currently the case, Pelgrum and Anderson (1999) argued in SITES-M1 for a new pedagogical paradigm in education to replace the old traditional paradigm related to the industrial society. As shown in Table 1 the lifelong learning paradigm can be characterized by a higher degree of active participation and involvement of the students supported by ICT (Krejsler 2002; Pedersen 2000; Pelgrum and Anderson 1999).

Kozma and Shank (1998) saw ICT as having a special role to play as support for learning and teaching. They argued that not only does the Internet connect schools with each other, but also with homes, business, libraries, museums and community resources etc., enabling the schools to draw on these resources to incorporate students' everyday lives and incorporate real life problems in the teaching etc, this being in line with the expected changes from education in the industrial society to education in the information society. ICT, then, was expected to work as a catalyst for changes in the educational system.

The educational system, however, is not an island. What goes on in schools is influenced by the national educational policy. In the analysis of how changes in pedagogical paradigms can be understood in light of changes in educational policy, this article takes an approach that focuses on implementation of policy into practice. Studies of how policy is being implemented can be described as belonging to two generations (Sabatier 1986; Croll et al. 1994; Fowler 2000). The first generation of studies researching implementation of ICT looked at the implementation process from a top-down perspective. They believed policy could be implemented as it was intended by the policy makers if a number of conditions were met. The second generation of implementation research found that successful implementation was not a mechanical process of following recipies but rather a process of "mutual adaption" involving changes in both the implementers' behaviour and in details of policy design, a bottom-up perspective (Sabatier 1986; Fowler 2000). School principals as well as teachers play an important role as those who are expected to implement the national educational policy. This article takes the position, that implementation of educational policy is both a top-down and a bottom-up process (Fullan 2007). We see teachers as implementers of the national educational policy as well as policy makers in practice.

3 The Danish compulsory education system

Denmark is a small country in the North of Europe with a population of 5.4 million people. At the same time Denmark is a wealthy country with an average GNP of $47.867 per capita in 2005. Furthermore, Denmark is a very homogeneous country, both in terms of population (immigrants and their descendants constitute less than 9% of the population) and economy. Denmark is known to be a homogenous country. It has a long tradition for equality, and belongs to the group of Nordic Welfare States (Esping-Andersen 1990) with a high rate of taxation. Thus, the State plays a major role in the economy. In 2005, public employees accounted for 30% of all employees; and 33% of the tax revenues were used for benefits (e.g. unemployment benefit and other welfare benefits) (Ministry of Foreign Affairs 2007).

The focus on equality is also evident in Danish educational policy, where equal opportunity for education has been a principle for decades (Bryderup 2002). Since

the beginning of the twentieth century, Danish educational policy for compulsory education has shown a clear development towards a less radical and a later and more flexible tracking of students. In 1993, the last reminiscence of tracking in compulsory education in Denmark was eliminated creating the present comprehensive school (Hansen 2003). Today, there is no tracking from preschool to the end of an optional grade 10. Students stay in the same class till grade 10 for all subjects. They are continuously evaluated, and teachers are obliged to draw up individual learning plans for each student, whilst progression to the next grade is automatic (Cirius 2006; Pedersen 2003). Danish children attend 9 years of compulsory education, starting in grade 1 in the calendar year of their seventh birthday. Prior to grade 1, Danish children may attend a voluntary one-year pre-school class.[1] In grade 8, the target grade for SITES 2006 on the use of ICT in education referred to in this article, the Danish children will typically be about 15 years old.

4 Methodological approach

The analysis presented in the article can best be described as exploratory research. It builds on former analyses of the data (Pelgrum and Anderson 1999; Bryderup and Larson 2008).

The analysis of the change in the pedagogical paradigm is based on Danish data from two IEA studies of the use of ICT in education (SITES-module 1 (SITES-M1) from 1998 and SITES 2006 from 2006). The SITES-M1 dataset was derived from a survey carried out in 1998 among schools with grades 7 to 9 that were using ICT for educational purposes. Questionnaires were sent to school principals and technical coordinators (person at schools responsible for the ICT facilities) of a random sample of 250 schools and a total of 229 Danish schools participated in the survey (Pelgrum and Anderson 1999; Pedersen 2000).

In SITES 2006, questionnaires were sent to school principals and ICT coordinators at 400 randomly selected schools as well as teachers, who were teaching mathematics and science respectively, in grade 8 in the year 2006. The selection of respondents was done by a two-step stratified process. In the first step, 400 schools where randomly selected. In the second step, two to four teachers of mathematics and science respectively in grade 8 were again randomly selected from each participating school. In case a school did not wish to participate, up to two replacement schools where selected for each chosen school. Including the replacement schools, the participation rate among the schools was 66%. The response rate of principals from the participating schools was 80%, and the response rate of the teachers was 80% for the mathematics teachers and 78% for the science teachers. The collection of data in 2006 predominantly took place electronically via the Internet. In cases where the respondents either had not been able to or did not wish to answer the questionnaires electronically, they could obtain a paper version of the questionnaire.

[1] From August 2009, grade 0 will be mandatory, and the years of compulsory education be increased to ten (lov nr. 369 af 27. maj 2008; Lov nr. 388 af 26. maj 2008)

The analysis of the principals' and teachers' use of the two paradigms in 2006, builds on questionnaires completed by principals and teachers. In the questionnaire targeted for principals, the principals were asked to what extent they agreed or disagreed that the school leadership encouraged the teachers to achieve a number of specified goals (see Fig. 1).

In the questionnaire targeted for teachers, the teachers were asked 1) how important it was for them to achieve a number of specific goals in their teaching, 2) how often they used specific activities in the scheduled learning time in the class, and 3) how often their students engaged in a range of specified activities. Table 1 shows the distribution of the goals and activities in relation to the two paradigms below (Law et al. 2008a, b).

The analysis of Danish education policy related to compulsory education builds on an analysis of laws and executive orders implemented in the years 1998 to 2006. Focus in the analysis has been on major changes in the rules and regulations.

It is our intention to explain how changes in principals' and teachers' pedagogical paradigm in compulsory education in Denmark can be understood in light of changes in the Danish educational policy and the implementation of ICT. We identify and describe where there is an alignment in the development of the use of ICT and the educational policy on the one hand and the changes in pedagogical paradigm on the other hand. Our choice of theoretical approach influences the analysis in a way that specific emphasis is placed on changes that are associated with the emergence of an information society. The reason for this is the expected changes from education in the industrial society to education in the information society.

5 Changes in pedagogical paradigms in compulsory education in Denmark

As mentioned in the introduction, one of the findings of the SITES 2006 study is that the relative importance of the emerging/lifelong learning pedagogical paradigm has decreased from 1998 (SITES-M1) to 2006 (SITES 2006) as compared to the traditional pedagogical paradigm.

Though only a few of the Danish schools in the 1998 study were committed fully to either paradigm (Pedersen 2000), the prevalence of the emerging paradigm was

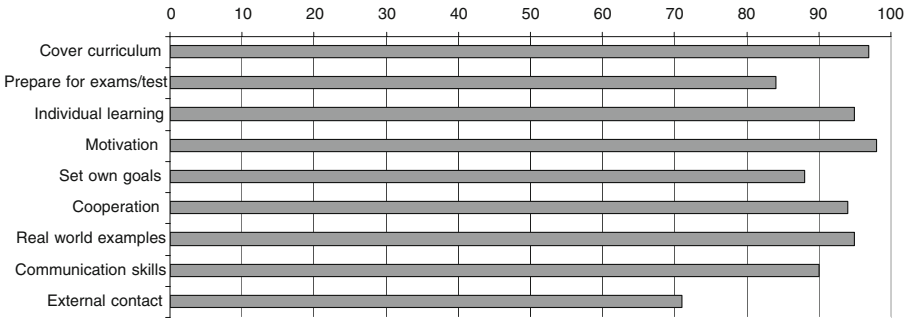

Fig. 1 Percentage of principals who agree/strongly agree that they encourage the teachers to obtain concrete goals in their teaching (Bryderup and Larson, p. 120)

quite high in Danish schools in 1998 as compared to most other countries participating in SITES-M1. In 2006, values related to the lifelong learning paradigm were still emphasised by Danish principals as shown in Fig. 2. Further, compared to the other countries in the study, Danish school principals were still among those most likely to agree on a number of statements related to the lifelong learning paradigm.

However, as can be seen from Fig. 2, the percentage of Danish school principals who indicated much presence of the emerging/lifelong pedagogy had decreased from 1998 to 2006. This decrease was primarily due to the fact that Danish school principals put less emphasis on practices like "individualizing student learning experiences" and fostering the students' ability to plan, monitor and evaluate their own progress (see also Table 1). It should however be stressed, that Danish school principals still considered differentiated education and cooperation as important pedagogical methods. In fact, as shown in Fig. 1 over 90% of the principals responded they either "agreed" or "strongly agreed" that they encouraged their

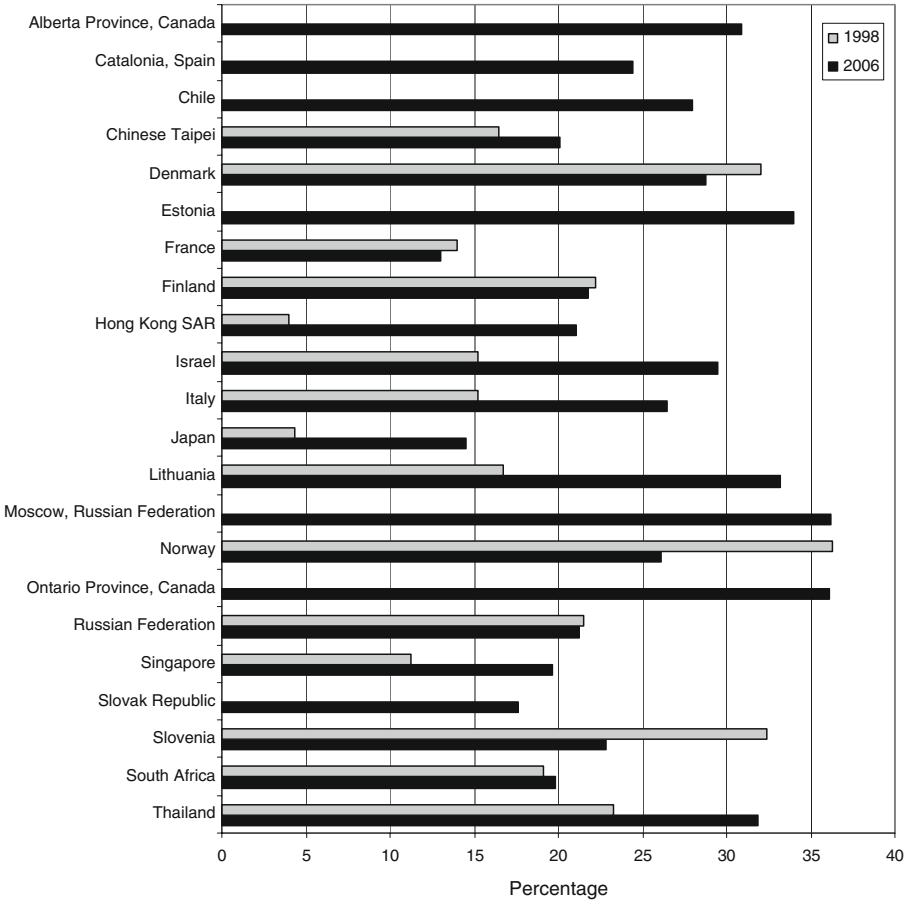

Fig 2 Percentage of school principals averaged across a set of items indicating "a lot" of presence of emerging pedagogy in SITES-M1 and SITES 2006 (Pelgrum 2008). Note: Missing bars: data not collected

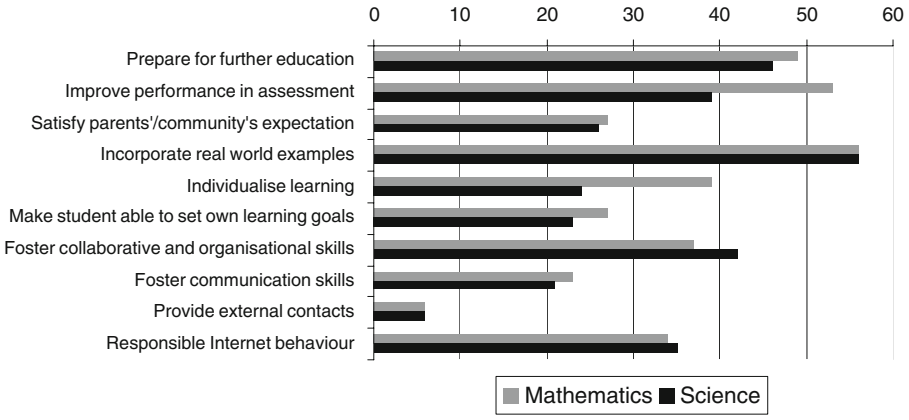

Fig. 3 Percentage of mathematics and science teachers who consider it very important in their teaching to achieve set goals (Bryderup and Larson 2008, p. 124)

mathematics and science teachers in grade 8 to use these activities in their teaching. In spite of these recommendations from the principals, the traditional paradigm is even more present in the teachers' practice, as well as the students' practice as the teachers report it (Bryderup and Larson 2008).

Looking closer into the teachers' goals for their teaching, as can be seen in Fig. 3, they consider it important to incorporate examples from the real world and foster collaborative and organisational skills, both goals in line with the lifelong learning paradigm. But the figure also shows an emphasis on traditionally important goals such as improving performance in assessment.

As mentioned earlier, the 2006 study also included information on the students' practice as reported by the teachers. Figure 4 shows that the students tend to be most likely to use ICT in the teaching and learning when they learn and/or work during

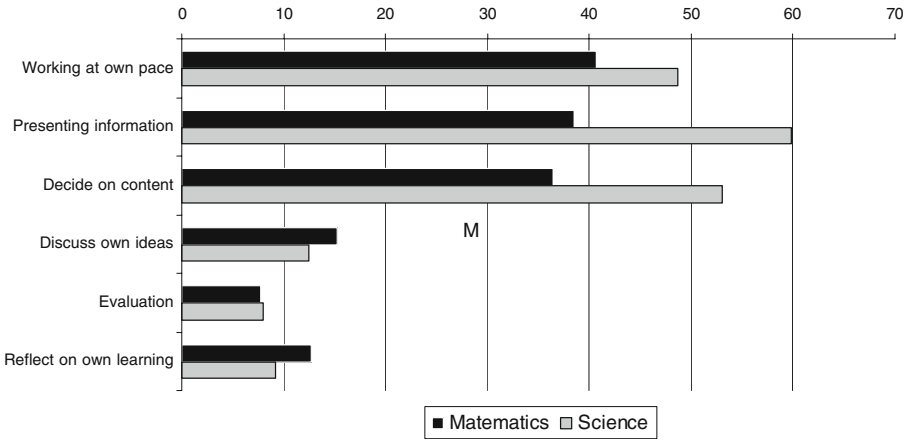

Fig. 4 Percentage of mathematic and science teachers that argues that their students use ICT in connection with concrete activities (Bryderup and Larson 2008, p. 134)

lessons at their own pace (individualizing student learning experiences in order to address different learning needs, give presentations and when they determine their own content goals for learning (for example theme or topic for projects), in other words: activities related to the lifelong learning paradigm see Fig. 4).

The data also shows that science teachers are more likely than mathematics teachers to respond that their students use ICT in relation to the teaching and learning, especially concerning the use of ICT for presentations. Thus, 60% of the science teachers respond that their students use ICT when they give presentations, while only 39% of the mathematics teachers do so.

6 Use of ICT in compulsory education

According to statistics from the Danish Ministry of Education the average number of students per computer in municipal schools in 2006 were a little less than five, up from ten students per computer in 2002 and approximately 35 students per computer in 1992. The computer coverage at the schools, thus, saw a substantial increase in the years between the two studies. During this time, the percentage of computers with access to the Internet increased from 81% in 2002 to 97% in 2006. In 2006, all computers in 70% of the public primary and lower secondary schools had access to the Internet (Danish Ministry of Education 2007a, b; Reusch 2007).

Though the student-computer ratio in 2002 was as high as 10:1, almost all (93%) of the students in compulsory education in the 1998 study had used ICT in class. According to Pedersen, the most common activity involving use of ICT were searching for information and using e-mail (Pedersen 2000).

Though the data for 1998 and 2006 are not directly comparable, as the 1998 study refers to all subjects in grades 7 to 9 and the data is based on information from technical coordinators or ICT supervisors, and the 2006 study only refers to mathematics and science classes in grade 8 and the data is based on information from school principals and teachers, it is interesting also to look at the use of computers in 2006. In 2006, 77% of the mathematics teachers and 70% of the science teachers in grade 8 had used ICT in their teaching in a specified class. The teachers especially used ICT when presenting information/demonstrations and/or giving class instructions which is in line with the traditional paradigm (see Table 1), while it was very seldom used in relation to team building or classroom management (Bryderup and Larson 2008).

For the science teachers, the activities in which they most often used ICT belonged to both paradigms. Forty-one percent of the science teachers responded that they used ICT when they presented information/demonstrations and/or gave instructions in the class. The same share of science teachers responded that they used ICT when they helped and advised students in exploratory and inquiry activities.

The mathematics teachers were most likely to use ICT when they presented information/ demonstrations and/or gave the class instructions, i.e. activities related to the traditional paradigm.

Figure 5 shows the mean score for the pedagogical paradigms for teachers. Overall both mathematics teachers and science teachers are most supportive of the traditional paradigm.

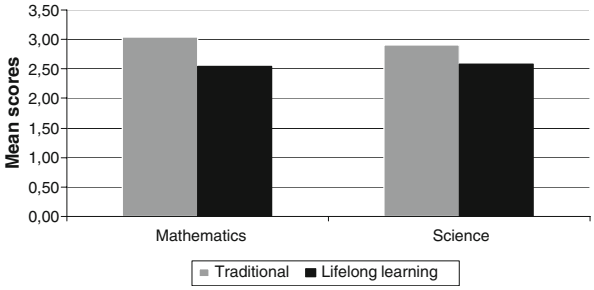

Fig. 5 Teachers mean score in relation to pedagogical paradigms (Bryderup and Larson 2008, p. 127)

7 Use of ICT and pedagogical paradigm

As the data on use of ICT for 1998 and 2006 are not directly comparable, it is not possible to say whether the use of ICT in compulsory education in Denmark has changed during the years. What can be concluded is that the number of computers with access to the internet has increased markedly, and that the teachers are using ICT in their teaching more in 2006 than in 1998. In spite of this, the influence of the lifelong learning paradigm, though still important, is decreasing (see Fig. 1).

Further, the information on when and how ICT is used, however, can give a hint on whether the use of ICT is acting as a catalyst for changes in education being in line with the lifelong learning paradigm. There is thus in the data no evidence to suggest that ICT is more often used by the teachers in activities in line with the lifelong learning paradigm as compared to activities in line with the traditional paradigm. Contrary to what was foreseen by Kozma and Shank, access to the Internet seems not to have made teachers using ICT to involve the students in real-life problems or to coordinate the formal education with informal learning and integrate the community in the daily life of the schools. In addition, Fig. 4 shows that team building, one of the competences mentioned by Reich (1992) as important for the growing number of symbolic analysts does not score high. Based on information from the teachers on the other hand, students seem to be using ICT related to activities within the lifelong learning paradigm, which speaks in favour of ICT having a positive relation to the development of a lifelong learning paradigm.

According to the analysis, increased use of ICT in teaching and learning cannot automatically be expected to lead to an increased influence of the lifelong learning paradigm and a correspondingly decreased influence of the traditional paradigm. It can, however, neither be concluded that it has the opposite effect.

8 Danish educational policy from 1998 to 2006

In the years between the two studies, Danish educational policy went through substantial changes, of which some were in line with the lifelong learning paradigm, while others were more in line with the traditional paradigm.

In 2001, the Social Democratic/Social liberal government was replaced by a Liberal/Conservative government. This led to changes in the educational policy.

In 2003, the national control of what is to be learnt in primary and lower secondary school was increased. With changes in the law for municipal primary and lower secondary schools, set objectives for most subjects at different grades were introduced. A development, which the Danish Minister of Education substantiated in the following way: "The students must—regardless of where in the country they go to school—have the opportunity to acquire the same knowledge and skills" [own translation] (Fælles mål 2008). Until then, the Danish national curriculum for primary and lower secondary school was very sparsely described consisting mainly of a general description of objectives. That implied that it was very much up to the individual teacher to decide on what the students should learn within the different subjects. With the introduction of the set objectives for the individual subjects, it is the Ministry of Education that describes the goals to be aimed for in the subjects, and what the students should master at different grade levels as well as what they should master when they leave school. Though compared to many other countries, the set objectives are still far from being a national curriculum and there are no mandatory national textbooks. However, the changes imply a considerable increase in the central control of what is learnt in compulsory school.

In 2005, group examinations were repealed at all educational levels. The decision was taken at governmental level and was mentioned in the government platform for 2005. The argument for banning group examinations were that all students should be allowed to sit an individual exam and be evaluated individually (Danish Government 2005).

In 2006, individual national tests were introduced and the final examination after the ninth grade, which had previously been optional, was now made mandatory. The introduction of national tests was a result of a governmental intent for the development of a new school culture with increased focus on assessment. In addition, the average marks for the school leaving examination at grade nine was obliged to be published by the schools on a school-by-school basis to promote competition among the schools (Danish Ministry of Education 2007c).

Also in 2006, the Danish Parliament decided that all students attending municipal primary and lower secondary school should have individual learning plans. The plans must specify how the student has performed in individual tests and how he/she can progress (Lov om folkeskolen 2006). The introduction of individual learning plans have been met with resistance from the teachers and their unions, who primarily consider it as yet another task to be carried out by the teachers without extra time being allocated.

As part of a general reform of examinations in Denmark, a committee was set up by the Ministry of Education in 2007. One of the committee's tasks was to take a closer look at the use of online tests (Thune et al. 2008). The committee recommended that online tests are used for documentation of skills and factual knowledge (Thune et al. 2008). The implementation of an increased use of ICT in examinations and tests seems to encourage the traditional paradigm rather than the lifelong learning paradigm.

9 Danish educational policy and pedagogical paradigm

Simultaneously with the increased focus on what is learned as mirrored in the introduction of tests at nearly all levels in compulsory school, the government

decided that the average results for the school leaving exams of each school must be made public. The idea was that the schools and teachers would get an incentive to prepare students optimally for the tests and exams. In light of that, it might not come as a surprise that more than half of the mathematics teachers in the 2006 study stated that they considered it a very important goal to prepare the students for exams and assessments. Among the science teachers, however, nearly 40% considered it a very important goal. The reason for differences between math and science teachers is unknown.

The fact that group exams were banned in 2005 is well in accordance with the decreased focus on cooperation and project based teaching and learning among the teachers. By banning group exams and stressing the right for the individual to be assessed individually, the government signalled that team work should not be the corner stone of education and training, though students are still allowed to work in groups, as long as they sit the exam individually (Danish Government 2005). The ban of group exams, however seems not to have made the teachers ban group work and cooperation among students totally, as about 40% of the teachers consider it a very much important goal to foster collaborative and organisational skills among the students (Fig. 3). In addition, the focus on individual exams might also be seen as a reflection of an increased focus on the individual student and his /her needs instead of the needs of the educational system, which is in line with the lifelong learning paradigm.

The current policy as described above, seems to reflect a vision that is predominantly consistent with the traditional paradigm, with a focus on meeting nationally prescribed learning objectives, improving students' performance on assessments and examinations, and preparing students for further education, but also with elements of a 'lifelong learning pedagogic vision' in form of an individualisation of students' learning experiences in order to address different learning needs.

Thus, Danish principals and teachers in municipal primary and lower secondary schools face a development with an emphasis on the individual pupil combined with an increased central control of the curriculum. The analysis, however, shows that even though the comparison between the 1998 study and the 2006 study as reflected in Fig. 2 indicates a decline in the importance of the lifelong learning paradigm, Danish teachers still emphasise goals in accordance with this paradigm, as learning to cooperate and include examples from everyday life in the teaching and learning (see Fig. 3). The decrease in the principals' support for the lifelong learning paradigm is the result of a drop in the support for some aspects of that paradigm, namely independent learning, learning at own pace as well as project based learning (Pelgrum 2008), although the principals still regard these as relevant activities. Over 90% of the principals in 2006 report that they encourage the mathematic and science teachers in 8 grade to use the above mentioned activities.

10 Conclusions and perspectives

The aim of this article was to analyse how changes in principals' and teachers pedagogical paradigm at compulsory schools in Denmark could be related to use of ICT and changes in educational policy.

For many years, the Danish educational system has seen an increase of the number of computers at schools. In terms of hardware, Danish schools seem to be well prepared for the knowledge or information society. Parallel to this development there has, however, been an apparent decrease in the perceived importance of the lifelong learning paradigm among the principals in compulsory school although Danish teachers still emphasise goals in accordance with this paradigm, as learning to cooperate and include examples from everyday life in the teaching and learning.

Further, in spite of the fact that the teachers in 2006 claimed to subscribe to aims and values equally related to the two paradigms, the traditional paradigm was dominant in the actual teaching and learning. In addition, when using ICT in their teaching, it was mainly related to activities within the traditional paradigm. Contrary to what was expected by Kozma and Shank (1998) it was found that the use of ICT does not automatically foster a paradigm in line with the needs of the knowledge society.

The analysis of the changes in the Danish educational policy shows that the decrease of the support for the lifelong learning paradigm are due to less commitment among the principals to the lifelong learning paradigm, partly reflects a change in policy, though again, it cannot be described as a simple mirror of the policy. Further, in spite of some of the policy changes being in line with the traditional paradigm like an increased focus on tests, other changes are more in line with the lifelong learning paradigm, like for example an increased focus on the individual students. The present situation both in relation to Danish education policy and pedagogical paradigms in compulsory school in Denmark might, thus, best be described by Beck and Beck-Gernsheim's (2002) concept of institutionalised individualism with a simultaneous individualisation and centralisation, in few words an education system that is geared to the individual and not the group with emphasis on curriculum centred teaching and instruction.

References

Beck, U., & Beck-Gerrnsheim, E. (2002). *Individualisation. Institutionalized Individualism and its Social and Political Consequences*. London: Sage.

Bryderup, I. M. (2002). Integration af IT i undervisningen–nationale visioner og decentral virkelighed. In I. M. Bryderup, K. Kowalski, U. Brinkkjær & J. Krejsler (Eds.), *Integration af IT i Folkeskolens undervisning* (pp. 47–70). [Integration of ICT in teaching in public compulsory schools]. Copenhagen: Danish University of Education Press.

Bryderup, I. M., & Larson, A. (2008). *IKT og pædagogisk praksis på danske grundskoler–resultater af en international undersøgelse [ICT and pedagogical practice in Danish lower secondary schools–results from an international study]*. Copenhagen: Danish School of Education Press.

Croll, P., Abbott, D., Broadfoot, P., Osborn, M., & Pollard, A. (1994). Teachers and education policy: roles and models. *British Journal of Educational Studies, 42*(2), 333–347. doi:10.2307/3121675.

Cirius. (2006). *The Danish education system*. Copenhagen: Author.

Danish Government. (2005). *Nye mål. Regeringsgrundlag [New goals. Government platform]*. Copenhagen: Author.

Danish Ministry of Education. (2007a). *Tal der taler 2007 [Facts and figures 2007]*. Copenhagen: Author.

Danish Ministry of Education (2007b).*Trends in the use of computers in Danish primary and lower secondary schools*. Retrieved February 23, 2008 from http://us.uvm.dk/folkeskolen/initiativer/fokusomraader/documents/Notatvedr.itifolkeskolen_English.pdf

Danish Ministry of Education (2007c). *Evaluering og test i folkeskolen* [Evaluation and tests in municipal primary and lower secondary schools]. Retrieved March 26, 2007 from http://www.uvm.dk/evalueringskultur/index.htm?menuid=1008

Danish Ministry of Foreign Affairs. (2007). *Denmark DK. The official website of Denmark*. Retrieved November 12, 2008 from http://www.denmark.dk/en/

Esping-Andersen, G. (1990). *The three Worlds of Welfare Capitalism*. Cambridge, UK: Polity.

Fælles mål - forord [Common goals - preface]. Retrieved February 24, 2008 from http://www.faellesmaal.uvm.dk/forord.html

Fowler, F. C. (2000). *Policy Studies for Educational Leaders*. New Jersey: Prentice-Hall Inc.

Fullan, M. (2007). *The New Meaning of Educational Change*. Teachers College: New York.

Grother, J. (2004). "In and against" lifelong learning: flexibility and the corrosion of character. *International Journal of Lifelong Education, 23*(2), 125–136. doi:10.1080/0260137042000184174.

Hansen, E. J. (2003). *Uddannelsessystemerne i sociologisk perspektiv [Educational systems in a sociological perspective]*. Copenhagen: Hans Reitzels Forlag.

Krejsler, J. (2002). IT i folkeskolen, projektpædagogik... og forestillingen om nye tider. In I.M. Bryderup, K. Kowalski, U. Brinkkjær & J. Krejsler (Eds.), *Integration af IT i folkeskolens undervisning* (pp. 111–144). [Integration of ICT in municipal primary and lower secondary schools]. Copenhagen: Danish University of Education Press.

Kozma, R., & Shank, P. (1998). Connecting with the twenty-first century: technology in support of educational reform. In D. Palumbo & C. Dede (Eds.), *Association for Supervision and Curriculum Development 1998 Yearbook: Learning and Technology* (pp. 3–27). Alexandria, VA: ASCD.

Law, N., Pelgrum, W. J., & Plomp, T. (2008a). *Pedagogy and ICT Use in Schools around the World. Findings from the IEA SITES 2006 Study*. Hong Kong: University of Hong Kong & Springer.

Law, N., Pelgrum, W., Monseur, C., Brese, F., Carstens, R., Voogt, J., et al. (2008b). Study design and methodology. In N. Law, W. J. Pelgrum & T. Plomp (Eds.), *Pedagogy and ICT Use in Schools around the World. Findings from the IEA SITES 2006 Study* (pp. 13–36). Hong Kong: University of Hong Kong & Springer.

Lov om folkeskolen, lbk 1195 af 30/11-2006 [Act on municipal primary and lower secondary schools]. (2006).

Lov nr 369 af 27. maj 2008 om ændring af lov om folkeskolen [Law nr. 369 of 27 May 2008 on changes in the law on municipal primary and lower secondary school]. Copenhagen: Retsinformation.

Lov nr. 388 af 26. maj 2008 om ændring af lov om friskoler og private grundskoler m.v. og lov om folkehøjskoler, efterskoler, husholdsningsskoler og håndarbejdsskoler (frie kostskoler) [Law nr. 388 of 26 May 2008 on changes in the law on private schools etc. and law on boarding schools...]. Copenhagen: Retsinformation.

Pedersen, D. (2003). National policies and practices on ICT in education in Denmark. In T. Plomp, R. Anderson, N. Law & A. Quale (Eds.), *Cross-national ICT policies and practices in education* (pp. 179–196). Greenwich: Information Age Publishing.

Pedersen, D. (2000). *IT i folkeskolen [ICT in municipal primary and lower secondary schools]*. København: The Danish National Institute for Educational Research.

Pelgrum, W. (2008). School Practices and Conditions for Pedagogy and ICT. In N. Law, W. J. Pelgrum & T. Plomp (Eds.), *Pedagogy and ICT Use in Schools around the World. Findings from the IEA SITES 2006 Study* (pp. 67–120). Hong Kong: University of Hong Kong & Springer.

Pelgrum, W. J., & Anderson, R. E. (eds). (1999). *ICT and the Emerging Paradigm for Life Long Learning*. Amsterdam: IEA & University of Twente.

Reich, R. (1992). *The work of Nations. Preparing Ourselves for the 21st–Century Capitalism*. New York: Vintage Books.

Reusch, S. (2007). *Opgørelse af folkeskolens computerudstyr pr. 1/1-2006 [Specification of computers in public compulsory schools as of 1/1-2006]*. Copenhagen: Uni•C.

Sabatier, P. A. (1986). Top-down and bottom-up approaches to implementation research: a critical analysis and suggested synthesis. *Journal of Public Policy, 6*(1), 21–48. doi:10.1017/S0143814X00003846.

Stehr, N. (2001). *The Fragility of Modern Societies: Knowledge and Risk in the Information Age*. London: Sage.

Thune, C., Baade, J., Brøndum, S., Egelund, N., Møller, H. R., Nicolaisen, A., et al. (2008). *Prøve- og eksamenssystemet. Udfordringer og muligheder [The test- and examination system: Challenges and possibilities]*. Copenhagen: Danish Ministry of Education.