Socrates' Mailbox

The Primary school

Norway 1996–1998

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I Introduction

The Socrates' Mailbox-project was started in the autumn of 1996. The initial intention was that each of the six countries would observe how ICT was used, focusing in particular on the use of e-mail as a means of communication in a lower secondary school and an upper secondary school. The Mailbox project has carried out observations in 16 classrooms and produced 16 case studies.

Norway is represented in the Mailbox-project by the National Centre for Educational Resources. France, the United Kingdom, Belgium, Italy and Switzerland are represented by individual consultants, institutions and universities. The European Commission is responsible for financing a large part of the Mailbox project, from autumn 1996 to autumn 1998.

In the spring of 1997, we carried out observations at a Norwegian primary school, a lower secondary school and an upper secondary school. It was important that the schools were geographically accessible. Most importantly, however, they were interesting because they represented schools that led the way in respect of ICT in education. We contacted the vice-principal at the school who we knew as a important actor in the ICT and education field, and our contact with him and the school administration was positive.

Since we visited the primary school in the spring of 1997, the Mailbox project has held four project meetings, produced draft reports at a national level, an internal report for the European Commission and articles in English and French. Certain aspects of the project were presented at a plenary session during a large European conference on ICT in Education, "Open Classroom II", held in Crete in September 1997.

Everyone is struggling with ICT. There is no standard answer as to how ICT can be integrated in schools. Some individuals choose to focus on equipment, others on plans. Some people attach importance to the broad-based training of all pupils, others have no plans for training. There is some uncertainty among pupils, but there is most uncertainty among teachers.

The primary aim of the Mailbox project is to look at the communication aspect of ICT. How do teachers and pupils use e-mail, the Internet, and even IRC, in the education system? The Norwegian Mailbox-schools have not been using e-mail during the periods we have been observing them, but they have used the Internet to search for information, particularly in connection with project assignments. An extra bonus was IRC, which was not part of the project until pupils in the lower secondary school in Norway began to use it to "chat" after school.

This report on the primary school is based on material collected in January and April of 1997. The material consists of written documentation, video recordings, observations, conversations and interviews. The people and the environment mentioned in the material have been kept anonymous. The report is designed so that, together with the other reports written about individual schools, it can be used as a basis for the production of joint reports on the Mailbox projects.

The object of this report is to paint a picture of the school's ICT efforts by presenting a cross-section of events that occurred over a limited period of time within mainly one specific grade.

The main focus in the Mailbox project is always: How do pupils and teachers use ICT for school work?

II The primary school

The primary school, which is the largest school in the municipality, is situated three-quarters of an hour's drive south-west of Oslo. Many people commute to the capital. A large number of the companies that operate in the municipality are involved in the field of computing and consultancy. The municipality has a good economy and the political will to invest in the school. With its scattered population, it is an attractive place for people who wish to live close to the capital city and still enjoy outdoor activities in the local community.

The school, which was built in 1992 in rural surroundings by the fjord, has a unique outdoor environment, with more than 10 acres of land, providing good conditions for play, sports and physical exercise for people of all ages. The woods are well-suited for tours and excursions.

The school building has many exciting features – it has several entrances/exits, high eaves, round and angled shapes, and is brick-built. The first floor includes a gallery around the central hall, with doors leading to the library, classrooms, staff common room and teachers' studies, the administrative section and the principal's office, each of which overlook the outdoor areas.

In the spring of 1997, the school had 21 classes with 500 pupils aged 6–13 years, and 45 teachers. The teachers worked in teams. In connection with the introduction of L97[1], the school focused on a variety of working methods and project work. Many pupils at the primary school required specially-adapted and individual learning programs. The number of teachers attached to the different grades would vary in the course of a week, depending in part on the pupils' need for special education.

The administration

In a municipal context, the principal of the primary school is a departmental chief, and reports directly to the head of basic education. According to the school's handbook, the principal is responsible for the results of all activities at school. As a leader in the municipality, the principal is obliged to follow the municipality's principles and objectives as laid down in the municipal plans for schools and kindergartens, and the national objectives for basic education set forth in the Basic Education Act and the national curriculum.

The school administration consists of the principal, three vice-principals and the people in charge of the school's two leisure time schemes. The Co-operative Committee is the school's most senior consultative body. Decentralised management is one of the school's management principles. Each year the school produces a plan of action which lays down binding objectives and areas of focus. The school's employees and the school's advisory bodies take a part in drawing up the school's priority objectives and initiatives and in assessing the results. Project management is a management tool in the school's development work.

[1] From Fall 1997 the Government introduced 10 years of schooling for 6 to 16-year-olds, i.e. primary and lower secondary school.

ICT activities, plans, intentions and objectives

The municipality has drawn up a strategic plan for IT in education. The plan establishes that the municipality is responsible for equipping new and existing schools with a minimum of ICT equipment. In addition, the plan sets forth the amount of money the municipality must grant in allocations in order to meet the requirements regarding ICT equipment so as to be able to implement the national, municipal and local plans concerning ICT in education.

As a result of the publication of a national plan of action for IT in education,[2] the school produced its own ICT plan for 1996–99. The school's ICT plan was completed in 1996, and one year later the school was ahead of its plan in respect of implementing several issues.

Under the section on international communication in the school's ICT plan,[3] the following is stated: "We shall teach pupils and teachers to use the Internet to communicate regionally, nationally and internationally." In addition, one of the school's principal objectives is to get all pupils and teachers to become personal IT users.

The school's ICT group consisted of the principal, vice-principal,[4] the school's local ICT co-ordinator and one teacher, who was responsible for the pupils' ICT training in grades 4 and 5.

ICT equipment

In the spring of 1997, the teachers' team/study room was equipped with three computers and one printer. One of the computers was connected to the Internet. The school administration had six computers, access to the Internet, and one printer. In the library there were 13 computers connected to the Internet, one computer was situated in the librarian's office, while the remaining computers were placed in one half of the room together with a printer.

All the classrooms were equipped with one or two computers. The 5th grade[5] classrooms had a total of three computers: an AST Pentium II, 386SX-20 with 4 MB RAM and an Archimedes 310, together with an Epson LX-800 printer and a StarJet SJ48 printer. These computers were located in the group rooms. None of the computers were connected to the Internet.

The teachers each had their own e-mail address, while the pupils shared two addresses for classes 5A and 5B, respectively. However, most of them had not begun to use these addresses in April when the observation was conducted.

The school's ICT track record

In December 1996, the principal and vice-principal prepared a questionnaire in order to evaluate the teachers' experience, knowledge of and motivation for using ICT in their teaching.

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[2] The Ministry of Education, Research and Church Affairs: *IT i norsk utdanning*. Plan for 1996–99. *(IT in Norwegian education.* Plan for 1996–99)

[3] Ibid, p. 3.

[4] The vice-principal, whom I write about in the report, had a very special responsibility for ICT at the school. He also worked for the Municipal Educational Coordinating Service, and spent two days a week at the school.

[5] 5th grade means all 58 pupils and their teachers in classes 5A and 5B. The two classes each had their own classroom, but the dividing wall between the two classes was often removed. The pupils then sat either with their backs to one another, facing the blackboards in each end of the room, or in groups which were often composed of pupils from both classes. The 5th grade teachers shared one study and generally worked together in educating the pupils in this grade.

The results of this survey formed the basis of an intensive period of training for the teachers and the pupils in January and February.

The survey of the teaching staff revealed a cleft between the intentions of the school's IT plan and the teachers' ICT qualifications. It emerged that two teachers were opposed to ICT. Only a few teachers knew what ICT was. Most of them had problems understanding why the school gave priority to ICT and why "so much" money was spent on it.

Before Christmas, the auditorium, which had room for 70 pupils, was equipped with advanced ICT equipment, a multimedia machine, an LCD[6] projector for the overhead projection of screen shots, and a digital piano. The library and the auditorium were networked. It was therefore possible to demonstrate the Internet to the pupils on a large screen in the auditorium before they went to the library to practise.

The administration decided that the school should set aside all other work during common time (within the framework of the 190 annual teaching periods that were set aside for joint activities) for five weeks after Christmas so that all the teachers and the pupils in grades 4 to 6 would be able to work intensively in order to increase their ICT skills, in using both standard tools and electronic communication. Once the pupils and the teachers had attained a certain level of skill, both in using offline and online ICT, they would be issued with ICT certificates numbers 1 and 2 as proof of their newly-attained skills. They could demonstrate their skills to anyone who already possessed such a certificate and the principal would issue them with a certificate.

The first meeting with the school

The Norwegian partner in the Mailbox project, the project co-ordinator and the observer from the National Centre for Educational Resources had met with the vice-principal of the primary school before Christmas, where it was agreed that the school would take part in the project. Our first meeting was in the middle of January. We met with the principal, vice-principal, the school's local ICT co-ordinator, the ICT co-ordinator for the department for special educational needs at the school, the 5th and 6th grade class teachers and the music teacher.

The Mailbox project was presented. We were told about the school's ICT strategy and the school's and municipality's ICT plans. We were informed of the administration's plans for an intensive period of training for pupils and teachers. The school was concerned with gender-equality and had a plan to ensure that the girls received training in the use of ICT before the boys, so that they could then act as assistants for the boys in their class. We were told about the municipality's strategy for introducing the Internet to the female teachers. We agreed that it was most relevant to observe the 5th grade because they would be working on an inter-disciplinary project on Europe in April.

The principal used the meeting as an opportunity to "sell" her ideas about the importance of ICT among the staff. Being a school that was open for observation in an international project lent support to the school's plan that everyone should undergo an intensive period of training

[6] "Liquid crystal digits" is a technology that makes it possible to use flat screen rather than a cathode ray tube.

in the use of ICT, and that the pupils should attain certification. At the meeting, the administration challenged the teachers to participate in the project, which was difficult for them to refuse considering the way it was presented. **S.,** one of the 5th grade class teachers, could not quite understand how she and her team colleagues could use e-mail and the Internet in connection with the project. She did not refuse, however, even though she felt unsure about using e-mail and the Internet. The project co-ordinator and the observer, myself, had the feeling that they were supporting the school's administration in convincing the teachers that ICT was important and that the female teachers should begin to prepare themselves to use ICT in the project a couple of months later.

After the meeting we were shown around the school, the library, auditorium, administration, offices, classrooms and group rooms for grade 5, as well as the teachers' staff room and studies. The principal and vice-principal told us that the school had unfortunately not laid cables to the classrooms when it was built five years earlier.[7] This prevented the school from connecting the classrooms to the Internet as quickly as they would have liked.

[7] The school has since found out that there were cables installed in the classroom walls, and is now in the process of connecting these computers to the Internet.

III The observations

The observations were conducted on 20 and 23 January and for one and a half weeks in April 1997. On 22 January, I was in the municipal culture house to observe one of the municipality's initiatives concerning the training of teachers, librarians and pupils in how to use the Internet. This was a course which women were especially invited to attend.

The observations in January
On the morning of 20 January 1997, I was invited by the school's local ICT co-ordinator, who was also a class teacher in grade 3, to observe his class using ICT in the library. The pupils were 9-years-old. They were a group of pupils who had chosen especially to work with ICT in the part of the school plan entitled "Positive socialisation". The pupils could also choose to work with other activities such as calligraphy.

Twelve computers were placed at one end of a large room in the library. Before this, the whole area had been occupied by books, and there was now a little less room for them. However, this did not mean that the room was cramped.

Each pupil generally sat alone at a computer, and were using software of the type "Edutainment". They raised their hands whenever they needed help. Most of them were using "Mathblaster", a mathematics program. Their mathematics exercises were arranged according to the principles of the game, and the idea was to get as far as possible and obtain as many points as possible. In order to manage this, the pupils had to answer mathematical problems correctly. The teacher told me after class that the pupils were particularly keen to work on the mathematics programme when they were allowed to chose the software themselves. The teacher approached each pupil who asked for assistance. The pupils were very interested and the teacher was often called. He often had to ask them to take things easy because they asked for help as soon as they encountered problems.

After the lunch break, I observed a group of 13 pupils from 3rd grade. Their class began in the auditorium and then moved to the library. The school's local ICT co-ordinator was also teaching this class.[8]

The auditorium was equipped with a multimedia computer connected to the Internet. By placing a LCD screen on top of an overhead projector, the teacher was able to review and demonstrate to the pupils what they would be practising in the library. The teacher demonstrated how they should log on, and he then showed them how to start the word processing program Works. What happened on the computer screen was projected onto the wall, thus enabling everyone to see how the teacher performed the different operations. He reviewed how the pupils could save their work on the pupils' defined hard drive, H, and on a disk drive, A. In addition, he demonstrated how they could correct errors and move text.

[8] The reason why I observed the 3rd grade in the first observation period was purely coincidental. It just so happened that this grade spent most time in the computer room when I was there, and the local ICT coordinator wanted me to see the teaching.

The teacher had also planned to use the presentation software PowerPoint, but he was unable to get this to work.

The pupils seemed extremely motivated. The girls sat in pairs behind a row of boys who were sitting in the front of the room. It was often the boys who answered when the teacher asked how he could move text or save the work.

The teacher asked to borrow a diskette from one of the boys. He accessed drive C but was unable to find the boy's document. The teacher asked why he was unable to find what he was looking for. One boy answered that it was because he had not accessed drive A, which was the floppy disk drive. The teacher asked how to move text, and received a reply from the first row.

After half an hour the pupils moved to the library, where they would begin practising. Most of them were very keen to run out of the door to make sure they got a place at a computer.

In the library the pupils had already found their places at the computers when the teacher and I entered the room. A girl, who was supposed to be with another group having English, was sitting by one of the computers. The teacher told me that she had been given permission to use the CD ROM "Learning English with Asterix" because she was so far ahead of her fellow pupils in English. She was sitting wearing headphones and a microphone. Sometimes she would repeat what she heard and at other times she would write the answers. She looked like a pilot, and later I saw that many pupils surreptitiously were having a go on the flight simulator without using the equipment to work with educational software and listen to sounds and repeat them.

The pupils sat in pairs at three of the computers. The pupils otherwise sat alone at the computers. The pupils were told to log on to the network, open the utility program and access their own diskette. They were then to use a text which they had written the last time they had used ICT. They were to work on this text, correct it, change it and move text.

The teacher came over to the pupils when they raised their hands and asked for help. When some of the pupils became impatient and felt that they had waited long enough, the teacher had to ask them to stop nagging him. One boy became impatient. He did not want to work anymore. The teacher let him sit on the sofa in the part of the library containing books so that he could relax. For the last fifteen minutes of the lesson, the pupils were allowed to choose whether they wanted to work with "Asterix" or "Mathblaster".

Three days later I observed the girls in grade 6. All the 6th grade girls were assembled in order to learn and use ICT so that they could obtain a certificate. As I mentioned, this was part of a conscious plan to allow the girls to attain their certification before the boys.

The vice-principal was responsible for the basic training at this level. The female class teacher from one of the classes participated as a co-ordinator because she usually taught these classes. She would also be learning ICT together with the pupils since this intensive period of learning was intended for pupils and teachers.

Twenty-four girls sat in the auditorium, eagerly following the vice-principal's demonstration. With the aid of an overhead projector and an LCD screen, he showed the pupils how to log onto the system and how to use "Works". The vice-principal reviewed a lot of what they required to obtain certificate number 1. He asked them questions about why they had to log onto the network, and many girls were willing to answer. He reviewed the different tools in "Works", showing them how they could minimise windows and how to play Solitaire. He showed the game of Solitaire to the pupils so that they could practise using the mouse. He taught them how they could stop in the middle of a game and save it. In addition, he showed them how they could start the program from DOS.

Everyone watched as the vice-principal opened "Works" and reviewed how to move and correct text. Throughout the session, more than half of the girls wanted to answer when the teacher asked them questions. Once he had finished his review, a couple of eager girls tried to jump the queue to get out of the room so that they could get to the library first and find a computer. They wanted to sit together as a pair.

In the library, the pupils were busy qualifying for certificate 1 by practising skills, based on a check list which the teacher had handed out (see appendix 3).

The girls shared an assignment sheet and discussed with one another what they should do and how they should carry out the assignments. The vice-principal paced around the room and provided assistance and help to the pupils

This whole session should have lasted an hour and a quarter, but two of the girls did not want to leave the library when it was time for a break. They wanted to finish their assignments and were allowed to remain there.

The observations in April

In grade 5 all the pupils had undergone training in the use of offline ICT and had qualified for certificate number 1 (see appendix 3). Owing to illness and other unforeseen circumstances, however, not all the pupils had had time to qualify for certificate number 2 (attachment 4) before they were due to begin on the interdisciplinary project. Two groups had not yet started their Internet training. The observations were therefore conducted both when grade 5 were being introduced to the Internet and when they were working on the project. These activities took place simultaneously.

In the first period on 9 April, I observed a group of 21 pupils being taught how to use the Internet. The pupils sat in three rows in the auditorium. In the first row there were five boys, behind them sat three girls and three boys, and at the back sat nine girls with one boy in the middle.

AS.[9] asked the pupils what "homepages" and "links" were. When he began to demonstrate the Internet on the wall, he found out that the computer did not work and went off to fetch the

[9] **AS.** was a subject teacher for the 5th grade and was responsible for the Online and Offline teaching of ICT use to this grade.

vice-principal. “Perhaps someone has stolen the hard drive?” suggested one of the boys in the first row. The vice-principal discovered that “the computer could not locate the hard drive,” and he suggested that they changed computer.

The teacher continued to explain about the Internet without being able to demonstrate what he was talking about. This proved to be meaningless and he suggested instead that they should go to the library without seeing the demonstration.

In the library **AS.** explained about the rules concerning the use of Internet at school. He explained that if a teacher found out that a pupil who did not hold a certificate had been searching the Internet without a teacher present, the punishment would be that certificate number 1 would be revoked. The teachers were responsible for deciding how long the punishment would last. A breach of the rules regarding the use of Internet would be punished more harshly than, for example, fighting in the school playground or eating in the vicinity of the computers.

The teachers had beforehand appointed three pupils who would sit alone, while the rest of the class would sit in pairs. **AS.** assisted and helped the pupils. The vice-principal came by to say that the computer in the auditorium was now working. The pupils seemed to be very eager to do their assignments. Some of them were too busy to read their assignments properly. Two boys, who were sitting alone, had problems because they did not understand what they were supposed to do. Most of the pupils worked very quickly and efficiently.

Two boys were discussing how to solve the assignment. They took turns at using the mouse. Two girls took turns at writing the answers on their assignment paper. Two other girls were cutting out a picture from a print-out and took great care to ensure that it would look good when they glued it to their paper. The pupils helped each other as well. They were allowed to walk around and talk to one another. The pupils often had to wait to get help from their teacher as so many pupils wanted help.

AS. occasionally raised his voice to say something to the whole group. For example, he would hold up a mouse to explain which button they should press in order to click on icons on the screen.

Very few of the pupils wanted to take a break. The break was not compulsory, and the teacher remained in the library together with all the pupils who wanted to continue working. All of a sudden, two boys came in and sat down at the computer of one of the boys who had been sitting alone. The boy himself had taken a break. The teacher asked what they were doing, and they told him that they had been asked to do the assignment for the boy who had left the room. The teacher asked them to “use their heads” and kindly leave the room.

Interdisciplinary project on “Europe”

On 11 April, the pupils began to work on the project on Europe. The pupils and the teachers in the 5th grade assembled together with the principal and one person from the administration in the auditorium. The adults began the lesson with a role-play in order to motivate the pupils and to focus on the subject of their work.

The role-playing was such that the adults represented a country/people through simple characterisation of, for example, France with one teacher who wore a beret, had a moustache and spoke Norwegian with a French accent. Everyone spoke at the same time and read aloud from newspapers from the different countries. The point of the exercise was to demonstrate that there are many news items in the world, but if we are to understand what is going on, that information must be sorted, edited and presented to the recipient.

A couple of days in advance, the principal had given a lesson on working with projects as a method with the pupils and the teachers. **S.**[10] now reviewed the objectives and method for implementing the project. The project was due to last for two weeks. One of the objectives of the project was to combine knowledge on newspapers and the Internet. The pupils had visited the local newspaper some time beforehand. One of the tools they could use to collect information was e-mail. There would be no regular lessons, only physical education and crafts would be scheduled as normal. They would work in groups, or as editorial staff, with one pupil in each group acting as editor, and together they would produce a "European newspaper".

S. asked the pupils if they wanted to do a project like this. An enthusiastic show of hands demonstrated that they were ready for this.

The pupils were given a form on which they were to choose the countries or areas in Europe with which they wanted to work. Similarly, they could tick which type of job they wanted to do as part of the editorial staff. **S.** and **AG.**[11] would then put together six groups of editorial staff.

The pupils were going to produce a newspaper about Europe. Each groups would be responsible for one country or one group of countries in specific geographical areas in Europe. Each group would have an editor who would be responsible for ensuring that the group produced articles from this region. The group members would agree among themselves on which articles or topics they would select. The editor was in charge and was to approve the jobs undertaken by the editorial staff. In addition to the editor, one person in each group would be in charge of pictures/photographs. The rest of the pupils in the group would be journalists. The pupils could look for literature and information in books in the school or municipal library, in magazines, on the Internet, by asking or interviewing other people, or through other sources.

For the rest of the school day, I observed the last group that was due to learn to use the Internet. They came directly to the library because the teacher had given up the auditorium to another teacher.

AS. walked around the room and gave the pupils assistance. Two girls raised their hands and asked for help in finding their way on the Internet. "There are lots of shortcuts here, there generally are. Where do you think you can find such information?" said **AS.**

[10] **S.** was form teacher in one of the 5th grade classes.
[11] **AG.** was a form teacher in the other 5th grade class.

SU.[12] entered the room and sat down at a computer in order to find information on Kidlink.[13] None of the pupils asked her for help even though they had to wait for a long time to get help from **AS.**

Two boys were discussing which one of them should click on the "print" icon on the toolbar. Four girls and one boy were waiting in trepidation by the printer for their printout. Two boys who, when I asked them, told me that they had access to the Internet at home, were working efficiently on their assignments.

It was difficult to get the pupils to listen when the teacher asked them towards the end of the lesson to log off and stop work. **AS.** said that anyone who did not listen would receive a warning, and could later have their certificate revoked.

In the auditorium

On 14 April, the pupils and the principal assembled in the auditorium. **AS.** handed out certificate number 1 to the pupils. Each time a pupil was given a certificate, the rest of the pupils applauded, and the whole event turned into a small ceremony. There was less clapping for some of the pupils, and more for some of the tougher boys, which is the way it is among a group of friends.

Afterwards, **S.** placed some transparencies on the overhead projector and reviewed the project objectives one more time. She pointed out how far they had come in the implementation and what they were going to do today. **SU.** took over and began to talk about the pupils' work process. The pupils sat in the dimly-lit room. Some of them were noisy. The teachers had to ask them to listen and keep quiet. **SU.** generally asked the boys questions, or used the boys as examples. She may have done this in order to prevent these boys from causing a disturbance rather than paying attention.

"Taking a copy is not the same as producing your own work, you have to rewrite whatever you find in your own words. You are not allowed to directly copy someone else's text," **S.** interjected.

Afterwards there was a 20 minute break before they were due to meet in the classroom. I was invited into the teachers' study – a study which was not large, but which had room for four desks and was shared by five or six teachers. **SU.** had found Kidlink's homepage. The teachers had planned that some of the pupils could use this network to obtain information for their project. **AS.** and **SU.** discussed how the training in the use of Kidlink should take place. They suggested asking the vice-principal if he could teach the editors of each editorial board along with those pupils who had access to the Internet at home

In the classroom

In the classroom, the pupils were supposed to find their groups and form their own editorial teams with an editor, photographer/illustrator and journalists. **S.** told them that everyone who

[12] **SU.** taught 5th grade pupils who required special education.
[13] http://www.kidlink.org/norway/index.html

wanted to use computer would have to fill in a form, giving a brief description of what they were going to search for. The editor would then have to approve the job in advance.

In the library
With the exception of individual periods, the computers in the library were reserved for use by grade 5 for the duration of the project. **AS.** was stationed in the library and was responsible for assisting pupils who used the Internet or other software. The computers in the group rooms were used for word processing. After a while, it was necessary for some of the pupils to use the computers in the teachers' study rooms for word processing. A so-called "sheltered area" was constructed.

I spent most of my time in the library because that was where the pupils would be working on the Internet. The first pupils to log onto the computer were two girls, followed by a girl and a boy from the "Italy" group.

AS. raised his voice in order to tell the pupils that the quality of the images from the Internet was not very good, and that it would be better if the pupils drew their own illustrations or found pictures in books in the library.

Two girls wanted to wait to log on until they had asked **AS.** how they should do it. One of the two girls was uncertain whether they should wait for the teacher before they logged on, but she waited together with her friend.

AS. reiterated that the images on the Internet were "hopeless".

One pupil said that he had just downloaded an image and that it seemed to be very good.

Two girls sat together with their civics book open and were looking for information on food traditions in Italy and Hungary on the Internet.

Two other girls were searching for information on this year's Italian fashions. They wondered whether they would find anything on it, and **AS.** explained to them about the search engine Kvasir.[14]

One boy was looking for information about ski resorts in Italy.

Two boys were sitting searching for information about football in UK.

One girl and three boys were looking for information on sport in Italy.

One boy was searching for information on food traditions in Italy.

S. came in and informed the pupils in the library that they would have to stop what they were doing because it was time to eat and because some pupils from another class were

[14] Kvasir: Subject-based catalogue of Norwegian and Nordic resources. Size as at 19 August 1997: 7653 records. (http://www.jbi.hioslo.no/referanse/hovedopp.htm)

supposed to be using the computers. None of pupils were enthusiastic about leaving their spot infront of the machine.

Next day the pupils first assembled in the auditorium to summarise what they had achieved so far. Afterwards, the library was full. At three of the computers, the pupils sat in pairs, while the pupils sat alone at the other computers. Five girls and ten boys sat by the computers. Wherever the pupils sat in pairs, they were always of the same sex.

Three boys and two girls searched for information on football clubs and footballers in different European countries.

One boy and one girl searched for information on fashion in Italy and Norway, respectively.

One girl and one boy each sat at their computers and searched for information on Norwegian culture.

One boy was searching for Italian ski resorts, while another boy was looking for information in outdoor life in Switzerland.

Two girls wanted to learn more about tourism in Austria.

One girl was using her computer for word processing.

After a while, the pressure grew from other pupils who wanted to access the computers. A couple of groups had occupied several computers simultaneously, which deprived other groups of the chance of accessing the Internet.

***Mailbox comment**: It appeared as if the teachers had not properly given consideration to the distribution of computer access. Some of the pupils were allowed to sit for a long time and play with the computers, while it was impossible for others to gain access to the computers. It seemed to be a case of "first-come-first-served". Many enthusiastic pupils, often the girls, stood too long waiting for a computer to be available. When the teachers discovered this, they changed from a random to a systematic distribution of computers to the groups. Each of the groups was allowed to use two computers. It was then up to the editors to control the use of the computers within the group. Even though it stressed in an interview with one of the teachers that the editors were supposed to make sure that pupils who had not used the Internet before would get experience now, several of the groups found it problematical to follow this up in practice. Since there were not enough computers, is it reasonable to expect the pupils can be responsible for allocating the use of this resource?*

Later it emerged that the teachers reconsidered the proposal that the group should be responsible for the text illustrations. This was because it proved difficult to distinguish between the assignments, especially when the source of information was the Internet.

SU. spent a lot of time in the part of the library that contained the books, helping the pupils to find information in the books. Two girls were looking for information in books.

***Mailbox comment**: The library offered the pupils several opportunities. They could choose to use ICT and download information from the Internet, they could choose to search for information in books, or they combine these two activities. **AS.,** who was a man, helped the pupils to use ICT. **SU.,** who was a woman, assisted the pupils in using the school library. Throughout the time I was there, there were more boys than girls using the computers, while the girls used books to a larger extent. As long as it was possible to search for information on the Internet, the boys hardly used the library at all. The girls availed themselves of both possibilities. Nevertheless, there were some girls who only used the library, while there were other girls who only used the Internet. These girls worked more like the boys.*

When I was in the classroom, after I had spent one week in the library, I saw girls whom I had not seen at the computers before. They were working on their articles and they told me that they had found their information in books or magazines. These girls were concerned with the fact that their assignment was to write articles in their own words, using information gathered from several sources, not necessarily only from the Internet.

When they used the Internet, the boys felt that school was exciting. They were allowed to work with things that interested them. They could compete with each other and find information that their fellow pupils greatly appreciated. Who could find the naughty pages? Who dared to break the rules defined by the teachers? Who could find the greatest football heroes?

***Mailbox comment**: The observations indicate the power the Internet has to "trigger" the pupils' attention. Content which manifests the pupils' role models, interests, overstepping of norms, new roles, and which is constantly being updated, represent opportunities for "the living life" as opposed to the static and retrospective content found in textbooks. Since the Internet also utilises graphical and audio tools, and provides opportunities for interaction between pupil and content and between the pupils themselves, we must also assume that the Internet will be increasingly important as a tool for the pupils' learning and socialisation. A major challenge for the school will be to make the pupils and teachers aware of this, and to relate their own practise to the new opportunities which the Internet provides.*

It appeared that getting access to the Internet was most important for the boys and some of the girls. This was a situation where learning was controlled by the will to find new and exciting places on the Internet, but where the result could often have no effect on learning because the pupils could easily believe that learning was all about finding the greatest number of exciting websites, and not about working with the content on the pages. It is therefore especially important that the teachers do not believe that their pupils' learning is under control and positive since the pupils are capable of finding places and new websites on the Internet. The pupils' feeling of omnipotence and independence in their role as "Internet rider" can easily create false illusions about the learning benefits among those people who only see the superficial activity without testing what the effects generally are.

All of a sudden, three pupils, one girl and two boys, flocked around a computer where two boys were sitting. They had found the website of the pornographic magazine "Lek" on the

Internet. They were all pointing and laughing and looked as though they were amused about the fact that they had accessed a forbidden area of the Internet. **AS.** was at a safe distance but understood that something was going on at one of the computers. He asked the pupils to go back to their places and to settle down. By this time, many of the pupils had begun to wander around for no apparent reason. **AS.** tried to keep them quiet, he tried asking the pupils what they were doing and whether they were finished with what they were supposed to be doing.

Tow girls were searching for "No Doubt", a pop group. "Look! No Doubt, we're good, we're good!" exclaimed one of them proudly.

Mailbox comment*: Here is another example of how the pupils find satisfaction in locating things on the Internet. The actual process of finding appears to give a positive reinforcement of the mastering of technology. One of the characteristics of the Internet is that it is easy to get confirmation of whether there is something to find. As such, the pupils receive an immediate response to their actions. Either one managed to find something, or one did not. When teachers demonstrate in words and actions that the Internet is something that they are unable to use, or they do not think they will be able to handle it, the status of people who have a command of the new medium is boosted. The question we can ask ourselves is whether it is enough for many teachers that a pupil is able to find something on the Internet without requiring an understanding and use of the content?*

Most of the pupils searched for information about things they liked reading or doing. Sport and music were generally evenly distributed among the girls and the boys, as one of the boys told us during the interview.

One girl was using a word processing package. She said that she was so glad that she had obtained certificate number 1 because now she would not get stuck. She would now be able to solve some problems herself, without having to ask others.

Six pupils were still working on the Internet when they should have logged off and taken a lunch break. Five boys were eagerly copying the addresses they had found when they had to stop. **AS.** tidied the room after the pupils and checked that none of the computers were logged onto the Internet. As they ran out of the door, ten minutes after the break had begun, two boys were keen to talk with one another about what they had found on the Internet.

In the library the next day there were 21 pupils working at the computers. The teachers had now divided the computers between the editorial teams, and each group/region had two computers at its disposal.

One girl was looking for information on tourism in France.

Three girls were searching for information on tourism in Italy.

One boy was sitting at the next computer and was working on the same topic.

Three boys were working together and looking for information on football in France.

Two boys were looking into food culture in Switzerland.

Four boys were searching on two computers, although I am not sure what they were searching for.

One boy was searching for information on sports in Germany.

One girl was using a word-processing program.

Three boys were on the Internet trying to find information on sport in Germany.

A girl and a boy were sitting at separate computers and were studying Norway, sports and agriculture.

The printer was a meeting point. Many pupils thought that the printer was too slow. They wanted printouts instantaneously. Instead of waiting, some of the pupils clicked to print the same document several times, which meant that they had to wait. The noise level in the room was relatively high. Many pupils appeared to be able to work in a noisy atmosphere with fellow pupils wandering back and forth between their computers and the printer.

One of the boys printed nine pages of pictures of Ronaldo, a footballer from Italy. He did this nine times. He could not wait. **AS.** noticed this and explained to everyone that they would have to relax and that everyone would get their printouts. “It doesn’t help if you keep clicking on ‘print’, the printer takes the time it needs.” This particular pupil was responsible for the photographs and illustrations in his group. He had found himself a place by the window, beside two boys from his group, and they were searching for information on football in Italy. When they found a picture they wanted to download, it was this pupil’s job to click the print button, This meant that the boy’s role was minimal. I do not know whether the teacher saw how passive his role was. He had interpreted his job as just pressing the right button when the others found a picture. It should also be said that the pupil in question was one of the pupils who received special education from **SU.** In the interviews with the teachers, I learned of their experience with precisely this group of pupils and the problem they had of not having planned any special follow-up tuition for them in connection with the project.

Mailbox comment*: This illustrates that the role of picture editor was unclear, and that not enough thought had been given to what the Internet really is. On the Internet, images and text are inseparable/closely linked. Since the aim of the project was to find information, e.g. via the Internet, consideration should have been to the fact that text and images are integrated.*

After the lunch break, the pupils continued to search for information on the Internet. One of the girls was originally supposed to look for information on the pop group “No Doubt” but she had altered her assignment to that of searching for information on “Spice Girls”. The teacher asked her why she had changed the assignment herself. “Spice Girls” were a band from England and not from France. This episode was later cited by the teacher as an example of an

infringement of the project rules. In the interview with the girls, we will hear more about what happened, as an example of a breach of the rules.

***Mailbox comment**: Is it professionally correct that most of the pupils use the Internet to find information about their sports, fashion and pop heroes, and spend most of the time set aside for study on such matters? What can pupils learn by searching the Internet for topics which they already have an interest in? How can we exploit this to fulfil the requirements relating to objectives and content in the basic school curriculum? As we have mentioned earlier, the school faces a major challenge in building a bridge between the curriculum requirements in respect of objectives and content, on the one hand, and content that appears to appeal directly to the pupil's' motivation and which is far more characterised by the pupils' world. How can one create a balance between these considerations?*

The following day the pupils and teachers assembled in the classroom. The teachers had discovered that during the first three days of the project there had been too little writing and too much searching. On this particularly day, the computers in the library would only be used for word processing. The teachers also said that they no longer wished to divide the assignments between a journalist and a picture editor.

AS. raised the issue that several pupils had visited Internet sites that they knew they were not allowed to visit. "These pupils may find out that they will not receive certificate number 2." The teachers reiterated that everyone who was supposed to work in the computer room had to have a form which had been approved by their editor, and which set out they were supposed to be working on.

There was a lot more room in front of the computers when the computers were being used for word processing. There were now five girls and thirteen boys working on their own. At two of the computers sat two boys and two girls. The girls had interviewed pupils in the playground and used a word processing program to write up the interviews.

One girl sat with her right side facing the computer. She was resting her head on her left hand, and writing very slowly, one letter at a time, with the index finger on her right hand. There was a great difference between the pupils as far as their touch-typing skills were concerned. In spite of the "Internet ban", **SU.** and a girl who was an editor sent an e-mail to Denmark via the computer closest to the librarian's office.

The next day the pupils were again allowed to search the Internet. Two boys whom I had observed every day returned to search for information on sport. They were looking for recent news about the handball player "Anja Andersen".

> "Try 'VG' or 'Dagbladet' (daily newspapers), they have written loads," said one of them.
> "No, try Internet Super guide instead," his friend replied.
> The first boy typed "VG" in the search field.
> VG's homepage appeared.
> "Yes, yes, yes, yes. Anja Andersen or Valencia?"
> "Huh? The search returned no results!"

"You'll have to search again!"
"No hits."
They searched and went on to look at "Dagbladet".

S. walked through the library without stopping at any of the pupils sitting at the computers. This day there were more boys in the part of the library containing the books. The boys took books with them across to the computers, searched for words or worked on texts.

One girl was using a word processing program to write about Spain. Another girl wrote about the "Red Cross" in Austria. They had both found their information in books. One of the girls said it was a little bit difficult in her editorial team because the group were fighting over who should use the Internet. She had found most of her information in books.

One of the boys was supposed to be searching for information on football in Italy, but he wanted instead to download something on "Ferrari": "Couldn't find anything about football, so I looked at Ferrari instead," he said with a smile. He agreed that they were not allowed to change topic like that for no reason.

***Mailbox comment**: This observation shows which opportunities pupils have to replace their assignment with one which more closely matches their interests and motivation when they have access to the Internet. This raises the question of the teacher's management and control of the pupils' learning. If we wish to avail ourselves of the opportunities the Internet gives pupils to work with topics that interest and motivate them, is it then possible for us to define problems and topics as rigidly as we have been used to doing? Will not the information society of the future to an increasing extent require that pupils develop skills and competence in defining and delimiting problems themselves, and thus also the key content of their learning? Or does this represent a threat to the pupils' academic learning and curriculum. We must assume that in the school of the future it will be increasingly difficult to assert the advantage of a national curriculum with a strong content framework as the only correct determinant for the pupils' future direction of development.*

IV The interviewees and their experiences

The principal

The principal had a great deal of experience from working in many types of schools. She had been a vice-principal in a combined primary and lower secondary school for ten years, and before that she worked as a teacher for eight years. At the same time, over a number of years, she had taken post-qualifying evening courses in English and music. She had been leader of an educational centre in the municipality for one year, after which she applied for the post of principal at three different schools. She chose an old, traditional and robust school. During her time as a principal of this school, she has taken further education courses in management and schools development and a 30-credit course in education, with a focus on educational management. The three and a half years she has been the principal at the primary school have been "one long period of development".

It would seem appropriate to describe the principal as innovative, assertive, cooperative and goal-oriented. She was direct and confrontational, demanding and charismatic. She was supportive and gave her co-workers positive feedback.

The principal's goal was to create a school where the teachers did not speak any more than was absolutely necessary, and where the pupils had the opportunity to take in information at their own level. She was very interested in the project work as a method. She knew it was risky for the teachers because it left them feeling as though they were losing control. In addition, many teachers were afraid of the technical equipment, and teachers liked to be in control. She herself had been keen to introduce ICT because it fitted in well with her view of learning. Control means that the pupils sit and listen at a very early stage in their school career, she said.

The principal's strategy for restructuring everyday life at school was to change the space for action. She did not want to "undress everyone" and make the teachers feel insecure. Her job was to change the school by changing the physical space. She envisaged challenges for the school, for herself, for the staff, for the pupils and, in part, for the parents, too. She was interested in changing the role of teacher and pupil through a holistic strategy for changing the space for action around the pupils and teachers. She wanted a school in which people communicated and cooperated. She felt that the communication aspect of ICT was the most exciting. "ICT is a tool for supporting a new learning concept that attaches greater importance to the pupils work processes and less importance on the dissemination of knowledge." "The pupils need to be autonomous, curious and motivated in order to work. Control turns pupils into passive listeners as early as grade 2."

The administration used a number of instruments in order to achieve these goals. Manifestation in order to achieve legitimacy and a common understanding of why ICT is important were crucial for the school administration. The administration designed a questionnaire which was answered by all the teachers at the school, but not by the pupils. The principal felt that it was essential for her that she had found out that the resistance to ICT was actually less than she had been led to believe since the few individuals concerned had been active in their opposition to ICT. Since then the school had received a lot of positive

publicity in the local newspaper for its use of ICT, and she would have felt it a strain if she had not been sure that she had the teaching staff on her side as far as the school's ICT efforts were concerned.

In addition, the administration and the school's ICT group implemented an intensive period of ICT skills training for pupils and teachers. She said that this was very important as a means of creating credibility for the sum invested in ICT equipment. After a while the principal noticed that more teachers had begun to attend the voluntary ICT courses that were held one afternoon a week.

The administration was concerned with the organisation of everyday life at the school, and the principal had begun to think about how she next year would divide the school year into man-years. For example, at the beginning of the school year the need for assistance in using ICT is not as great as when the pupils are about to begin work on projects. At the beginning of the school year, it is better to use resources that are best for the pupils' start-up, and it is inappropriate, for example, if the ICT coordinator uses two of his converted weekly teaching load to train teachers to use ICT, she said.

Further, it was important for the principal to cooperate with the parents in respect of ICT. She discovered this a couple of years earlier in connection with the fact that the school invested in the first computers for use by one pupil who required special education. The parents of the pupils in this class refused to accept that the boy should have a computer on his own and regarded this as a "reward for bad behaviour". This was an eye-opener for the principal, who began to cooperate with the parents in connection with the school's ICT efforts. The parents possessed a lot of expertise and together they produced the school's first hand book. Later one of the parents helped to put the whole municipal archive on the principal's computer.

Investment in human knowledge and technical equipment have been important for the administration. During the intensive period, the principal ordered the vice-principal to train the 6th grade, the music teacher to coach the 5th grade, and the school's local ICT coordinator the 4th grade.

On several occasions the principal, who asserts that the word "reform" means to change form, surprised the teachers by changing the place of action at the school. In the 1996 summer vacation, she took the initiative to move the books in the library into the middle of the room in order to make room for 12 computers at the end of the room and one computer by the librarian's office. During the Christmas break in that same year, she saw to it that the computer in the auditorium was connected to both the Internet and the school network.

The use of role models was important for the school administration. Here too, the principal herself lead the way in reviewing the use of projects as a teaching method. It was important that they followed the formula and the theory when learning the new way of working and learning. When introducing new methods in the everyday life of the school, it is important that the people who are in possession of expertise stand up and say: "I can do this, I have done this for a while, I can work in an interdisciplinary context". How on earth can we create the

role of pupil unless the teachers go forth and create some role models? In this respect, it has been a very controlling culture, said the principal.

The principal had aimed to have at least one female ICT coordinator at the school. She got the municipality to finance a period of study leave for one of the female teachers so that she could study ICT at the Oslo College with full pay on condition that she returned to the school. Another trick which the principal employed was to call a woman in the administration's secretariat as "ICT facilitator". The person in question had had ICT training during her secretarial training and she was technically-minded. It was important for the principal to publicise her co-worker's role and skills in this area. In addition, the principal had a plan for the female librarian. She had only recently taken on the position of librarian, and the plan was that as soon as she had finished registering the books in the new computer system, she would act coordinator for the pupils when they were searching for literature in the databases and on CD ROM. The principal had taught herself to use the presentation program "PowerPoint" in order to show others how beginners could to learn to use ICT.

The principal, who had experience as a county council adviser on equality issues, had also been a driving force as regards the plans to teach the girls ICT before the boys so that the girls could assist the boys and provide help during the training.

The principal was concerned that one should begin to work on the pupils' attitudes in their initial years at school. "We have to get the girls to stop decorating their papers with flowers, horses, donkeys and those sorts of things, we have to get them working. We have to get the girls to write. She would like to exploit the fact that the girls are good at languages. The pupils should primarily be curious children who are allowed to seek out their own knowledge, and in this connection, communication is essential. She believed that e-mail was an important tool in this respect.

The rules concerning the use of ICT at school are there to be used and not broken, she said. The principal felt that one of the reasons for making rules is to avoid anarchy. Many of her colleagues in the upper grades were negative to the idea of introducing ICT, and if the people who introduce ICT experience anarchical conditions, these colleagues can just claim that they were right. She herself felt that one should have a fundamental trust in a pupil and not think that the pupils would only break the equipment once it was installed. "If one equips the pupils with good attitudes and a frame of reference, perhaps one does not need too many rules," said the principal.

"It is still too early to make concrete demands on the teachers' use of ICT," said the principal. The teachers have very good word processing skills, and next year she would give each team their own spreadsheet so that they could produce their own periodised working agreements.

The teachers had received their own e-mail addresses, but only a few had the time to use it. The principal felt that it was unnatural for them to use utilities which were not available. Her dream was that all the teachers could have their own computers in their home office. The principal saw no reason to change the paper-based information system which already works

very well, especially since the computers were not located appropriately in relation to where the teachers work.

The principal had also noticed that several teachers found it somewhat threatening that some of the pupils are highly skilled at using ICT. A change of teachers' attitudes is necessary; the teachers must give the good pupils positive feedback about the things they excel in, she said. The primary school will concentrate on changing attitudes over the next three years. "A school can have as many clever people as it wants ...," said the principal. She referred to an incident at the school where a teacher had not appreciated the knowledge and skills in the use of ICT that six boys had and wanted to use in a class project.

The vice-principal

The vice-principal had been in the municipality for 3 years. He came directly from industry, where he had worked as manager of a company that developed educational software. He was educated as a general subject teacher and had a varied background from a variety of organisations that had given him experience of, among other things, ICT as an important administrative tool.

The vice-principal combined his post with work for the municipality's educational counselling service. He felt it was important to have a clear basis in a school environment in order to achieve a number of the things he would like to realise at a municipal level. He had a limited function at the primary school, and was primarily in charge of producing holistic thought about the school's ICT strategy together with the ICT group.

The vice-principal had been an important mainstay for the principal. They had complemented one another in their work on the school's ICT strategy. On the basis of this support, the principal had been able to concentrate more on content and less on technical aspects. For example, the vice-principal was in charge of buying educational software and school computers.

The vice-principal believed that the educational change in paradigms involving a different pupil-teacher role had altered the leaders' educational responsibility and challenges. This was something that already characterised reality and practice. Nevertheless, processes were slow between change, planning, reforms and what actually occurred at the school. This said something about the teachers' abilities to implement new things. He believed that the same sluggishness existed at the administrative level. He was a restrained optimist as regards how quickly he wished to move forward. The tools were in place and were being used, but this was a process that would take a long time. The structure of the Internet was currently too small for most schools to say that there was any great educational benefit to be had from using it, he said. NCER[15] and educational institutions should be responsible for controlling the quality of the educational resources on the Internet. They should devise pointers to content of high quality. We will experience a shift away from an approved, printed textbook to other composite educational resources. One knows that there is a professional quality, but there will perhaps be a more dynamic and more rapid updating of content than there was earlier, he said.

[15] The National Centre for Educational Resources.

The vice-principal envisaged that as the pupils qualified and attained their certificates, they would come and use the ICT equipment in the library both before and after school hours. In addition, he envisaged that the local community, companies and parents could come and use the equipment at the school provided they took part in the financing of system upgrades.

The vice-principal said that one aim is to offer the pupils proper touch-type training. According to the school's plan of action for ICT, this currently begins in the 4th grade.
The vice-principal stressed that the school's ICT plan reflected that the school wanted to use ICT as a means of communication in order to foster the pupils' growth and learning. By turning the library into a "mediacentre", ICT will become part of everyday life at the school, he said.

The vice-principal explained how the school's objective was to make sure that the pupils were capable of using ICT independent of the teachers, by qualifying for a certificate.
The vice-principal was concerned that the rules for the use of ICTs in the school were not to be looked on as school rules, and it was obvious that the teachers should have been more involved in the content making of the rules. Since they deprived the pupils of a right, that of being allowed to use the ICT equipment, for a period of time as determined by the teachers in the event of a breach of the rules, the vice-principal agreed that they could nevertheless be regarded as part of the school rules. However, the issue of who should make the rules was a question of time, he said.

The vice-principal was very concerned with content on the Internet and with "netiquette". He said that the parents were also interested in such issues. "One important question is whether the school will employ filters on the computers in order to exclude undesirable content from the Internet, or whether they should try to create mature attitudes among the pupils," he said. Censorship and the issue of who should decide what should be censored are difficult questions to answer, he said.

The vice-principal was involved in deciding which books the school should purchase in order to comply with the new curriculum and to ensure that there was a certain amount of overlapping between new and old technology. Furthermore, he envisaged that the librarian would have to be involved in the task of obtaining all types of educational resources for the school. "It is dangerous if one becomes too hung up on purchasing books in a reform that attaches less importance to books as a controlling textbook."

The vice-principal said that the teachers' use of e-mail did not work well at all because they had not had time to use it after they had been taught how to use it. The teachers had problems with things that were not part of their everyday routines. Since they had to move away from their natural place of work to another computer, start it and log on, this represented an obstacle to efficient use. E-mail only works when it has a practical significance for something one is responsible for following up. None of the teachers have come this far yet. He used e-mail himself at home in the evenings.

He said that the school focused a lot on getting the teachers to become "personal users" of ICT. He felt that the ICT skills among the teachers at the school were roughly the same as one would find in an ordinary staff room elsewhere in Norway, and that, in his opinion, the teachers' motivation for using ICT was acceptable.

The vice-principal felt that the men at school were probably more involved in ICT initiatives. The administration had spoken about this, but he felt that it was a dilemma because even if it was the school's strategy that every teacher should become personal ICT users, the female teachers were quicker to withdraw and did not follow up their group of pupils by showing them how to use ICT. "They hold back a little either because they are uncertain or because they feel they are better at other things. For this reason, it is often the people who already possess certain basic skills who take the ICT training course." He felt that teachers are concerned with security, and when they feel uncertain about ICT, it is natural for them to let others take their piece of the cake rather than pursuing the hard route and improving their skills by using ICT themselves. Female teachers are concerned with being efficient, which means that they would rather spend their time doing the things they do well, and ICT is not one of those things, at the moment at least, he said. Thus, we end up in a viscous circle where teachers improve on what they already know well. There is little freedom in using one's time less efficiently, and for this reason there is little experimentation in ICT use, which is essential if one wishes to learn something new. Perhaps this is part of the explanation as to why female teachers spend less time and apply less effort to ICT, he said.

The vice-principal had always told the teachers, whom had taught, that the pupils always would be ahead of them as far as ICT skills were concerned. "Whether teachers can manage such pressure is therefore more up to their mental attitude. The teachers job is to dare to get the pupils started, to be critical. The teacher must not abdicate. The teacher is responsible for content. As far as skills are concerned, however, the teachers have lost even before they have started, and it's important that they understand this."

The vice-principal felt that in the long term ICT would help to change the role of pupil and teacher. What will happen is that the teachers will become increasingly more like someone who arranges and advises rather than being a supplier of information. He felt that if one took the section of the new curriculum on theme/project work seriously throughout the whole school, the role of teacher would change. Thus, pupils who are capable of using the technical ICT framework will become strong because they are able to master new opportunities. They would still not have the critical, moral-ethical basis for selecting the content. One condition for using ICT is, of course, the teacher as a supplier of premises and the school's overriding system of values, he said.

The school's local ICT co-ordinator

The school's local ICT co-ordinator used two teaching periods from his weekly teaching load to help the teachers with technical ICT problems. In the 1996–97 school year, he was one of two class teachers in the 3rd grade, and was in charge of teaching ICT to the pupils in the 3rd grade during the intensive period after Christmas.

He has been ICT co-ordinator at the primary school ever since the school was built. He was educated as a general subject teacher and several years ago he also took a computing course (One year course at night school). That was before multimedia computers appeared, and he had learned programming. Before he began to work at the primary school, he had taught in another municipality for six years.

He told us in his interview that he felt that the administration's programme, of teaching the pupils and the teachers to be personal ICT users, was an ambitious programme. He was therefore pleased that several people were responsible for implementing the training scheme, not only himself.

The school's local ICT co-ordinator felt that using two teaching periods a week to help his colleagues with ICT was nowhere near sufficient. Either he was allocated more hours to do the job, or else more people should work on this. His job was to maintain the computers and provide technical assistance whenever his colleagues encountered problems. He was supposed to repair computers, keep the diskettes virus-free, and maintain printers that stopped working and also assist the teachers who constantly required help. There were no work instructions for his job.

He regarded the rules concerning ICT use as part of the school rules. He said that he did not know that the pupils were concerned with the rules and that they had not discussed the regulations with the pupils.

He also said that the teachers' enthusiasm as regards ICT use varied. The teachers see that it takes a long time and that it takes time to make progress with ICT use. They have to see the benefits of using ICT, e.g. that it takes no longer to use a word processing program to write a text than it does to write the same thing longhand, he said. He felt that at all levels there were teachers who had some ICT skills, so not everybody required the same amount of training.

In addition, he said that the certification was originally intended to include the teachers. When the Municipality started to offer a ICT courses one afternoon a week, it was a little "too much" to train the teachers at the school as well. He otherwise felt that the teachers who failed to acquire a certain minimum of ICT skills disqualified themselves from a number of jobs at the school. He did not say which jobs.

He said he seen unexpected, educational gains from the use of educational programs, e.g. in the learning of the times-table. He also found that some of the educational software had a very motivational effect on the pupils. In addition, he cited the example that pupils who found it easy to learn sat side by side with pupils who had problems learning, and this appeared to have a favourable effect on both groups. Some of the pupils with learning difficulties felt that educational software was something they mastered. And since the school had such a variety of different educational software, it was also easier to differentiate on several different levels. It is more difficult to do this in the classroom, as it would require that one produced differentiated assignments, he said.

The librarian
The librarian had recently graduated from the Norwegian College of Library and Information Science in Oslo when she began work at the primary school two years ago. At college she had studied information technology and had worked with ICT in both mandatory and elective subjects. During both years at the college she had used the Internet. The students had learned to search databases and also about structuring. Her position as librarian was a 50–60 % post. In addition, she worked in the school's leisure-time scheme.

The school library used Mikromarc[16]. While we conducted our interview, the school had just received the search machine and the librarian was in he process of installing the system.

As the first person at the school, she began the task of re-organising the library. Previously, a teacher had worked in the library 6 teaching periods per week.

She looked forward to using the Internet more. She considered that one of her duties was to teach the pupils to use the library systematically, and she felt that this was an exciting challenge. She would make a start at this once she had completed the registration process on the new computer system.

The school librarian also regarded it as part of her job to offer the pupils courses in how to use Mikromarc. However, she doubted whether she was the right person to advise the pupils on the use of source material.

The school's objective is that the pupils may be able to borrow books from the library whenever they please. Today they are not able to borrow books after 2 p.m., but the room is often open after that time and the pupils therefore drop in to return books, she explained. The girls were the keenest readers in their free time, and some girls popped in almost every day to borrow books. They borrowed fiction. The boys borrowed more non-fiction: books about technology, dinosaurs etc., but they borrowed fiction, too. The girls and the boys were approximately equally good at borrowing books that they used for school work, she said.

The librarian regarded the use of CD ROM and the Internet as important in the work of the school. She was interested in becoming qualified to use these utilities as soon as possible. Works of reference on CD ROM are clear competitors to books, which has led to new interaction between multimedia and the library. However, she had not been involved in the school's ICT initiative so far. When the pupils worked on their projects, she was only able to help them to find information from books. She would consider it as natural that she participated more in locating Internet addresses for the pupils, but she would require more time and advance warning to be able to do this. She would also like to follow more courses to keep abreast of new ICT developments. She said that there had been discussions about including the library more in the teaching in connection with project work.

Teachers S., AG., SU. and AS.
We interviewed the teachers collectively.

[16] An electronic library system.

S. was a 5th grade class teacher. She had followed her class the whole time and taught among others Norwegian and English. She had no special ICT skills apart from a little knowledge of word processing, which she had learned through work and some courses at school. In the beginning of April, she had learned how to send e-mail, but that didn't mean that she had been on the Internet recently, she said.

AG. taught mathematics and general knowledge subjects. In addition, she took over as class teacher in one of the 5th grade classes a year ago. She had learned to "start" a computer a year ago because she took part in a 8–10 hour course on word processing and a course on educational software for use in mathematics teaching. When we interviewed her, she had also attended a one-evening course to learn about the Internet. She felt that she did not know as much as her pupils.

S. and **AG.** did not always have time to attend the municipal course that was held two hours one afternoon a week, and **AG.** said that she therefore did not practise what she had learned between each course session. **AG.** said that she felt that trying to help the pupils to use ICT was frightening because she thought she did not know as much as them, and because things happened more quickly on the screen than she was able to follow.

S. felt that they were dependent on having a teacher in their team who knew more about ICT than the pupils. **AS.** was someone whom they could ask for help; if they didn't do, things just ground to a halt, she said. **S.** felt that ICT was fun, but frustrating when she felt inadequate.

SU. was also a novice when it came to ICT but she felt that using ICT as a tool was "great fun". She also enjoyed the weekly course, "time flew by" while she was there. **SU.** did not feel that it was frustrating to get started on the interdisciplinary project even though she did not know much about ICT. **AG.** did not feel she got anything out of the voluntary courses because she didn't have enough time to practise between each course session. For this reason, she "stood in one spot", as she put it.

SU. taught pupils who required specially-adapted teaching resources and tuition. She often used the computers in the group rooms together with her pupils. Nevertheless, she pointed out that she was a relatively new ICT user. In the space of the school year, she had attended the courses the school had offered its teachers. She had also purchased a computer which she could practise on at home. She said that she learned a lot together with her pupils. She had just sent her first e-mail message to her country of birth, which she thought was very exciting.

AS. was in charge of training the pupils in grades 4 and 5 during the intensive period. He was stationed in the library during the implementation of the interdisciplinary project that the 5th grade was involved in during April. He was the music teacher. **AS.** had been assigned responsibility for the implementation of the intensive period, and for certification of the 4th and 5th grade pupils. He had learned to use ICT by himself, but he had attended the same once-weekly Internet courses as his colleagues.

AS. had had a Macintosh at home for seven years. He had learned to use it for word processing and page layout and he also used some music software.

Nevertheless **SU.** felt it a little frustrating trying to find a working method in the interdisciplinary project. They had never "let the pupils loose" on the computers in the library in this way before. As the days passed, however, the pupils understood that it was not just a matter of sitting down in front of a computer. They also had to use them in a rational way.

It was cramped in the library around the computers and quiet in the classrooms at the beginning of the project period. **AS.** thought this was due to the fact that working on the project and the Internet was something new for the pupils. With little basic knowledge about the medium, they spent longer than the teachers had reckoned on. **S.** felt that there were also too few teachers in relation to the number of pupils at the computers. **AS.** had the impression that the pupils felt that they had a greater right to directly copy the information they found on the Internet than if they had found the information in books. The pupils were used to having to rewrite in their own words the information they found in books. The information they found on the Internet, on the other hand, was something they had found themselves and was thus more "their own material" which they could use as they liked. He added that for some pupils it would be good training for them to copy directly from the Internet because they needed typing practice. He claimed that the pupils were extra impatient when they were searching the Internet compared to when they were looking for information in books. This was because they knew that it took a long time to search for information in books, whereas with the Internet they expected everything to come to them immediately, complete and ready to be used. If things took a long time, they became impatient and asked the teacher for help. Nevertheless, **AS.** felt that it should not really be a problem that only one teacher was together with the pupils working on as many as 12 computers at a time.

AS. thought that the boys occupied the computers during the first days of the project because the more cautious girls did what their teacher had told them and wrote things in rough on paper before they began to "write things up" using a word processing program. If the computers were occupied when they wanted to search for information, they were supposed to look elsewhere, e.g. in books. **S.** felt that the boys more easily overstepped the boundaries for what was allowed than the girls. The boys are not so afraid to try things out, but the girls gradually became bolder. The girls were most persevering, while many of the boys, who were very keen to begin with, lost interest. They had "sort of" finished the project after one week. **AS.** said that they had organised a "sheltered area" consisting of three computers outside the teachers' study area. Many girls wanted to sit there because they had been dominated by many of the boys in the library. The boys had been so active and aggressive that the girls felt slightly "threatened", and they had been able to sit peacefully by the teachers' offices.

S. said that they had organised things so that there were four strong girls among the six group leaders who made up the editorial group for the project. The group leaders had been told in advance to keep an eye on which pupils used the computers and which pupils did not because the teachers wanted to ensure that those pupils, who had not used ICT to any great extent earlier, should also be allowed to try it during the course of the project.

***Mailbox comment**: Here there is a difference between the teachers who have a computer at home and those who do not have access to a computer at home. Their time at school is too short to allow them time to sit for a continuous period of time and teach themselves ICT, as the principal and the vice-principal have also pointed out. It is obvious that there are individual differences too, and it would be going too far to say that having access to a computer at home is what gives **SU.** the confidence that it is all right that her pupils teach her something and that she shows her pupils that she knows less about ICT than they do. We would nevertheless like to point out that teachers' access to ICT at home may be the only way for them to be sure of the tool, secure enough to think that the pupils will always be more technically skilled and more up to date with the Internet, and be able to concentrate on the didactics of the training. Self-confidence is crucial if ICT is to be a teaching tool.*

All the teachers agreed that the rules regarding Internet use at the school should have been discussed with the pupils before they came into force. **AS.** added that the pupils had already signed and accepted that they had understood a lot of the content in the rules when they received certificate number 1, but that the rules should have been discussed in the pupils' council[17]. **AS.** felt that the challenge lay in creating an attitude that the Internet shall be used as a learning resource and not as a toy. The school had defined ICT as a right which may be taken away from the pupils. The curriculum, which would come into force in the autumn of 1997, introduces ICT as a statutory right and which may not, in principal, be taken away from a pupil. **AS.** said that he had not taken part in a discussion of the problems of rights as far as Internet use was concerned.

One of the challenges of project work is to relate to an objective and a framework, and there are limitations which mean that the pupils see that they are unable to search for absolutely everything on the Internet, the teachers said. One of the reasons why the pupils were unable to surf the Internet as they wanted was that this resulted in long queues of other pupils waiting to use the computers.

AS. regarded the long queues in front of the printer as a problem. There were often queues of 10 pupils around the printer, and they would have to wait for a long time for their printouts. This caused a lot of noise and unrest. The pupils gradually learned from this that they could not print out everything and that they would have to wait their turn.

During the periods of the project where the teachers had decided that the pupils would not work on the Internet, the pupils used the computers for word processing. During these periods, the work on the assignments was more individually based.

S. said that the pupils, who were used to special education, did not have the same ability as other pupils to work on the project and they had been used to the fact that the computers in the group rooms had been accessible for them all the time. Now they were to be used for all the pupils. These pupils were therefore a little frustrated during the project period. The

[17] Through the pupils council the pupils are supposed to be ensured a formal voice in cases about class- and school milieu.

teachers had decided in advance that the pupils who required remedial teaching would take part in the project on an equal footing with the other pupils, with the exception that they would be given a little extra supervision.

During the period that the project lasted, **SU.** was responsible for all pupils in the same way as the other teachers. She said that it was frustrating because she could see that "her" pupils could have needed the help she usually gave them. She therefore tried to give them a little extra attention whenever she had time. She saw that some of these pupils were not getting as much out of the project as the other pupils. On the other hand, she found that "her" pupils became better acquainted with the other pupils during the course of the project. One of her pupils, who had dyslexia but good word-processing skills, had each letter dictated to him by a fellow pupil. "This was a cooperative situation which would certainly never have arisen had they not been working on the project," said **SU.** The teachers had planned that the pupils who needed special education should be the first people in 5th grade, together with the girls, to receive basic training and certificate number 1 for ICT use. Because **AS.** had been off sick during an important period, the plans were changed slightly so that the girls were not trained before the boys. Instead the substitute teacher, for the sake of simplicity, had trained the pupils who already had more knowledge and skills in using ICTs as the first groups. They needed a lot more practice in using computers and should preferably have had access to ICT at home, **SU** said referring to "her" pupils. **S.** said that it was encouraging for these pupils to receive ICT training as the first pupils in their grade. It was good that they had something which the others did not have, for a change.

Once the pupils had received training, the teachers no longer regarded it as necessary to distribute the pupils with most experience evenly among the groups. They regarded the pupils' ICT skills as being equal after the basic skill training. Though the teachers did not consider that the pupils knew the same about ICT. One problem, however, was that several pupils overestimated their level of skills and tried to help fellow pupils without really knowing what they were doing.

Neither **AS.** nor **AG.** believed that the differences in the pupils' ICT skills would be completely evened out if the school systematically followed up the pupils, since some of the pupils always would have access to equipment and competence outside of school.

SU. believed it was important that they had an interdisciplinary project before they began to integrate ICT in the subject teaching because they could then see how this worked and it would be easier to be positive to a pupil who wanted to go to the library to se ICT on her/his own.

SU. also wanted to use the Internet more to find information for her own use. **AG.,** on the other hand, would sit on the sideline for a while. She felt it was difficult to orient herself on the Internet.

AS. felt that they should have had theme-based teaching, a sort of "S lesson". **AG.** interjected, and said that it was important to have a guide/adviser to help her at school because she has spent time alone at home and not understood a thing.

S. believed it was motivating for the pupils that they were responsible for different tasks in the group and that they had to co-operate and ask one another instead of approaching the teacher. It was also good that they could move between rooms and not have to sit in one place the whole time.

One of the reasons why they had not used e-mail in the project was that the pupils actually needed more time to practise using the word processing program first, **AS**. said.

The pupils
Since there were 58 pupils in the 5th grade, it was difficult to decide which pupils to interview. During the course of the observation period, however, I managed to form an impression of the ICT skills of some of the pupils, and I wanted a group of pupils whose ICT experience varied. I decided to interview the girls and boys separately, because I did not want the boys to dominate the conversation. The pupils I interviewed were selected on this basis.

Looking back, I can say that I had found six resourceful girls. Four of the girls were editors/leaders of their project groups. One of the boys was class representative in the pupils council. All of the boys had computers at home, while two of the girls did not.

The girls B., C., D., F., G. and H.

B. had hardly used a computer earlier. She did not have a computer at home.

C. had "used" computers a lot at her mother and father's place of work, and they had a computer at home. She liked to play games and to write. Their "computer at home was almost full of games," she said. She liked to play Solitaire. Her brother usually installed new games each month on the home computer. She had to battle with her two brothers to be allowed to use the home computer. Her family had had a computer at home since she was two-years-old. Her father had taught her to start the computer, but she herself had learned to "navigate the games".

D. had also "used" computers a lot at home and at her mother's place of work. She had several games at home, including "Gameboy", "Nintendo" and "Supernintendo". She had been given a lot of games by her neighbour and he had taught her to "get started" on the computer. For the most part, she had learned to use the computer on her own.

F. had access to a computer at her mother's and at her father's home. When she was at her mother's place of work she could sit and work on the computer, draw/paint and have fun. She said that she did not like "fighting games". Her brother had a lot of those types of games. She liked to play games such as "Bugs Bunny" and "Mario". "It's no fun fighting against somebody. It's far more fun competing with a computer," she said. Her brother generally used the computer all day because he worked on his homework. He often had his friends round and they would sit and play "fighting games where 'orcs' and people fought each other". Her father was the person who had generally taught her how to "get started" on the computer at home.

G. had a computer at home. They had just installed Windows 95 and she was in the process of learning about the program and testing her ability to use it. Her family had just got access to the Internet at home. She had to play a lot of "fighting games" when she visited her cousin, because he only had that type of game. "But it wasn't as much fun as the other games". At home, they had "pinball games", "fighting games", "Tetris" and "games where you have to wander around and find answers to riddles," she said.

H. did not have a computer at home. She had played games at her friends' houses, however.

"We haven't done any projects before, but we want more of them," was the unanimous verdict of the six girls we interviewed. We are working on the second certificate, it was fun starting with certificates, they said

In the course of the project they learned to work together, to collect information from the Internet, keep things in order and to produce a newspaper, they said in unison. Using a word processing program meant that things looked nicer, one of the girls said.

Everyone except **B.** had access to ICT outside of school, and everyone except her had played "Nintendo" earlier. "It's fun, but we soon get bored," said one of the girls. **G.** had a computer in her room and had learned a lot herself. She had begun one year ago to learn to touch-type by remembering where all the keys were located on the keyboard.

"The fact that I have a certificate means that I am not completely helpless and just sit in front of the screen and don't know what to do," said **B.** said that she had used the Internet and searched for pop bands like "Spice Girls" and had found pictures and text about them.

C. had used the Internet to download an article on football. She felt it was fun to use the Internet because then "you could go wherever you wanted, whereas with word processing you just sat there looking at your own screen".

D. had downloaded information on Switzerland, Austria, football, skiing and food.

F. said that she had not used the Internet during project week because she was an editor. Instead she let other group members have a chance. She felt that it was very good that the school taught the pupils to use ICT, she did not think that there were many other schools in Norway that had done the same thing. In her editorial team, they had found the text and images for their newspaper on the Internet. The texts that they had found on the Internet was their rough text; they have to rewrite it in their own words.

G. had used the Internet to find pictures and information on sports in Italy. She had also used computers for word processing. In addition to her own text, she had also typed in something that a boy had written in rough, because he had asked her to do it.

H. had used the Internet to search for information about food and a pop band in France.

D. said that being an editor was a little hectic because the pupils in her group shouted at her from all sides and she had a lot to do. It was also annoying that some group members demonstrated that they had not heard her at the morning meetings. The boys in particular sat in a special way, which demonstrated that they were not paying attention. For example, one of them said that they were unable to read a text because it was in Danish (which is very similar to Norwegian), and then throw the book down without even trying. **F.** explained that some of the pupils dropped a pile of information down on her desk, and she had to tell them that it was not her job to finish their work. **B.** said that pupils in her group ran around shouting and askin when it was their turn to use the computers, and **C.** could confirm that the same was the case in her group. **C.** said that the boys in particular only wanted to write about sports and if they were not allowed to do so, they got "really annoyed". There were two boys who made the most noise, but they had not told this to the teachers, they said. They thought that the boys also liked working on projects. Nevertheless, the boys would say: "do I have to do this?" said **G. D.** said that two people had been found out by their teachers, after they had visited Internet pages that they were not allowed to visit, and that they had both lost their certificates. One boy had visited the homepage of a pop band, which had nothing to do with the assignment he had been given. The other incident (see observations) concerned a girl who was supposed to find information on a pop group from one country, but who instead had begun to print out pages on another group from a different country. The editor in her group, a boy, had gone to the teacher and told him what had happened. He had already tried to tell her several times that she was not supposed to do that.

The girls agreed that they had not spent as much time as the boys on the computers in the library. The girls hardly get to write a thing because the boys say that they will do that, said **D.** The boys think they are so tough, said **C.** They think they own the computers and that they are quicker and better at typing. Then they just sit in front of the computer, babbling and chatting, she said. When the girls come over and ask if they can use the computers when they are finished, the boys say that they still have a lot left to do, but they have hardly written a thing since the last time. That really is not fair, said **D.** She felt that they should have decided in advance how long the people who are most skilled at using a computer, should be allowed to access a computer. They have discussed this at a meeting with all the editors. The teachers did not think they could have a rule like that, however.

It's not that the boys know more than the girls. There are even some girls who know more about computing than the boys, said **D.** They are just being tough and tell their editor that they just have to finish writing about football, and then they have to finish something else. Sometimes they haven't even written a thing, said **G.** The girls felt that it was unfair and had decided to say so to their teachers.

All the girls wanted to use ICT more in connection with their school work from now on. They felt it was much more fun typing on a computer than writing things longhand. They said that they were tired of having to sharpen pencils and erase things all the time. Things also looked a lot better when they were printed from a computer, it was also easier to edit text.

"More teachers should know how to use ICT so that there would be less waiting for help when we get stuck," the girls said. Sometimes they had to wait for five minutes before they

got help from the teacher. “You never finish anything when you have to wait that long, we should have had two teachers,” said **G.**

During the time the girls worked on their project, they had not used their textbooks while they were surfing the Internet. They used books they had borrowed from the municipal library, and encyclopaedias and books about the different European countries. **G.** said that it was a lot quicker for them to fetch information from the Internet. The information is more recent as well, said **C.** She was supposed to find information about Italian fashion and found quite a lot of new pages on this subject on the Internet. “New things appear as they develop on the Internet.”

The girls did not think it was difficult to read the information they found on the Internet that was in English. “It’s just a matter of using a dictionary and translating. If you know some English, then it’s OK,” said **F. D.** thought that it was easy to proof-read an article written by a member of her group because they had a spellchecker on the computer. “The text is then underlined with a squiggly red line.” **B.** felt it was difficult to correct the mistakes when she didn’t understand the content. **G.** said that a boy in her group had downloaded three pages from the Internet that were in English. However, since he couldn’t understand the content, he didn’t know what he could use it for. **D.** told us about two boys in her group who had printed out ten pages about a brand of beer and given it directly to her. She asked them what it was for, but they answered that she could think of something. She replied that there was no way that she would do that. They didn’t know what they could use it for. **C.** said that the teacher got pretty angry with the pupils when they printed out things that they don’t need.

The girls felt that the rules regarding ICT use were reasonable. They wished they could be allowed to do more on their own and that the school could buy more computers. “one on each desk,” said **C.** She felt that half of the computers could be connected to the Internet and the rest could be used for word processing, and **D.** agreed with her.

The girls all thought that they would have their own computer at home by the time they were grown up, and that it wouldn’t be long before they got their own computer. They were afraid that they would use ICT less at lower secondary school, in two years.

The girls felt that they should be allowed to play more computer games at school. They should be permitted to play “Solitaire and Minesweeper”, they said.

The girls would like to take part in creating the school’s homepage. And they would like to have a few regular pen-pals from other schools and countries with whom they could correspond via e-mail.

The boys J., K., N., O., P. and T.

J. had had a computer at home for a while now and he used it to play games and to access the Internet. At home both his mother and his father had taught him to use the computer, although most of what he had learned he had taught himself.

K. didn't know how long he had had access to a computer at home because the computer was at his father's home while he lived with his mother. He used the Internet often, he said. To a certain extent, his father had taught him to use the computer, but most of what he had learned, he had learned on his own. **K.** said that he used the computer when he wanted to have some fun.

N. had a computer at home and liked to play games. His father and his brother had taught him to use the computer at home.

O. had had a computer for a while, but not access to the Internet. He had taught himself to use the computer.

P. had a computer at home. They had had the Internet for about six months. He liked to play "Nintendo". He also liked to play strategic computer games, such as ones about extraterrestrial beings who attack the earth, and "Settler". He had taught himself to use the computer at home. He had also learned a lot from a friend who used to read computing magazines. **P.** had e-mail at home but he didn't use it.

T. had a computer, but not access to the Internet, at home. He used it for playing games, and liked to play "Nintendo". His father taught him to use the computer at home.

The boys who had access to the Internet at home were not allowed to use it as often as they themselves would have liked. They all wrote their homework longhand.

They wanted to learn to use the keyboard better. When they played games, they learned to use the arrow keys, and that wasn't the same as typing quickly, one of the told us.

The boys felt that having a certificate was "fun and cool". They were working on certificate number 2 when we interviewed them. When they attained certificate number 2, they would use it to work on the computers without having to have a teacher present.

During their project work all the boys had tried using the Internet. They did not play, they were serious, they said. **P.** had searched for information on a footballer, **T.** for information on "Ferrari", and **N.** for a list of movies. **T.** had not found anything on "Ferrari" in the school library and he admitted that it was difficult to find these pages on the Internet. He said that reading the text in English was not a problem. **P.** had managed to translate the information he found about the German footballer. **N.** had searched to see how Norwegian newspapers had rated the film "Star Wars". In addition, he had downloaded images from the "Star Wars" homepage.

The boys felt it would have been an advantage if they had discussed the rules regarding use of ICT through the pupils' council and with them in class council beforehand.

O. said that he had found information on various things, including football, on the Internet.

J. had found information about child abuse in Belgium and 20 pages on German politics on the Internet on his home computer. He stressed that he had not received any help in finding this information. He had started by browsing to the newspaper "Aftenposten". **P.** had downloaded two pages on a pop singer.

The boys thought they would use computers were doing more writing the next school year, particularly in Norwegian and English because they wrote most in these subjects. **P.** thought they would use "Kidlink" in their English classes. They did a lot of projects in Norwegian class, in addition to using mathematics games.

They believed that they would use ICT a lot when they were grown up. One of them wanted to study computing. Another boy wanted to be an estate agent, but he was not sure whether he would use computers in that job, which the others protested against. One of the boys suggested that it would be possible to buy houses on the Internet and book showings etc.

They said that, apart from two of the boys, the other pupils in the class were not particularly good at using ICT. "The girls aren't very good," said a couple of the boys. **K.** said that the girls were interested in the Internet and that they visited "Spice Girls" and "No Doubt" pages. "The girls search for pop groups and the boys look for football teams and cars," he said.

The boys said that the girls either didn't have a computer at home or else they didn't have very good equipment. "The girls probably have computers at home," said one of the boys. The boys said that they didn't help the girls with the computers, "only sometimes," said **T.** "They don't know anything," said **P.**. "They're not very interested in computing."

They said that it was the boys who had "surfed" the Internet during the project. "The girls are forced out," said **K.** "The girls surf, too, but they do most of the writing, long hand." **P.** said that the girls felt it was a lot easier to write with a pen than to type on the computer. "The girls write it in rough and we type it on the computer," said **K.** The boys felt that they were much better than the girls at typing quickly.

N. felt that the pupils should be allowed to use computer games and to look at whatever they wanted to on the Internet. He felt that there was too much control. Others felt it was not certain then that they would learn what they were supposed to.

P. felt that they should have learned how to use e-mail. He said that they were going towork with "Kidlink" the week after. **T.** felt that the school should have more computer games, and **P.** felt that they could learn a lot of English from using it. **P.** felt that if the pupils continued to sit in groups it would be nice if they had a least one computer for each group.

They didn't like reading books, it was "boring" because there was no information in them, said **J.** He only liked books where there was action all the time. Things stand still the whole time, said **K.**

V The school's ICT efforts seen in relation to the objectives and intentions of the Action Plan for IT in education

The Action Plan for IT in Education is based on two primary strategies:[18]
1) Pupils and teachers shall learn IT to be able to use it as an integral part of all subjects and contexts wherever this is natural. 2) Pupils and teachers shall use IT, in connection with subject teaching and learning in the school, in order to learn.

Our observations of the primary school have revealed that the school is working in line with these two primary strategies for IT in the Plan of Action. The school has drawn up its own plan of action for ICT, which includes a strategy to ensure that as many of its staff members and pupils as possible will become personal computer users, which is also the aim of the national plan.

In addition, the administration has drawn up a questionnaire in order to assess the teachers' skills and motivation for using ICT. The school has not assessed the pupils' ICT skills and motivation in the same way. The interview with the teachers revealed that at that time the school had a vague idea about the pupils' skills, experience and attitudes, the extent of ICT use at home, use of software, and games and the Internet. In an area that has undergone such strong developments, it is important to relate to the skills that pupils have acquired from home. The teachers thought that fewer pupils had computer experience from home than was generally the case.

The school initiated an intensive training scheme for teachers and pupils in the early months of 1997. In practice, this meant that the teachers and pupils began learning at the same time and received training in the use of ICT simultaneously. Can a programme that exposes so directly the teaching staff's lack of ICT skills have unforeseen or unfortunate consequences for the pupils' opinion of their teachers' skills and status? If so, does the school have any strategy to get pupils to see that the new teaching role presupposes cooperation and learning based on whatever each individual can contribute in the light of their existing experience and skills? A number of pupils said in the interviews that their teachers should have known more about ICT so that they could provide assistance, and that the teachers' skills represented a bottle-neck as far as the practical work was concerned.

The school had a well-founded view of gender equality and of the fact that pupils requiring specially-adapted tuition should be given priority as far as ICT training was concerned. The question is whether the school nevertheless showed enough consideration to the pupils' educational needs since every pupil received the same amount of ICT training and the content of their ICT use was the same regardless of their capabilities and previous experience. In particular, we are thinking of the 5th grade project where Internet use was controlled by the pupils themselves, and where practice was based on the "first-come-first-served" principle.

[18] The Ministry of Education, Research and Church Affairs: *IT in Norwegian education*. Plan for 1996–99. (http://odin.dep.no/kuf/publ/it-plan/eng/)

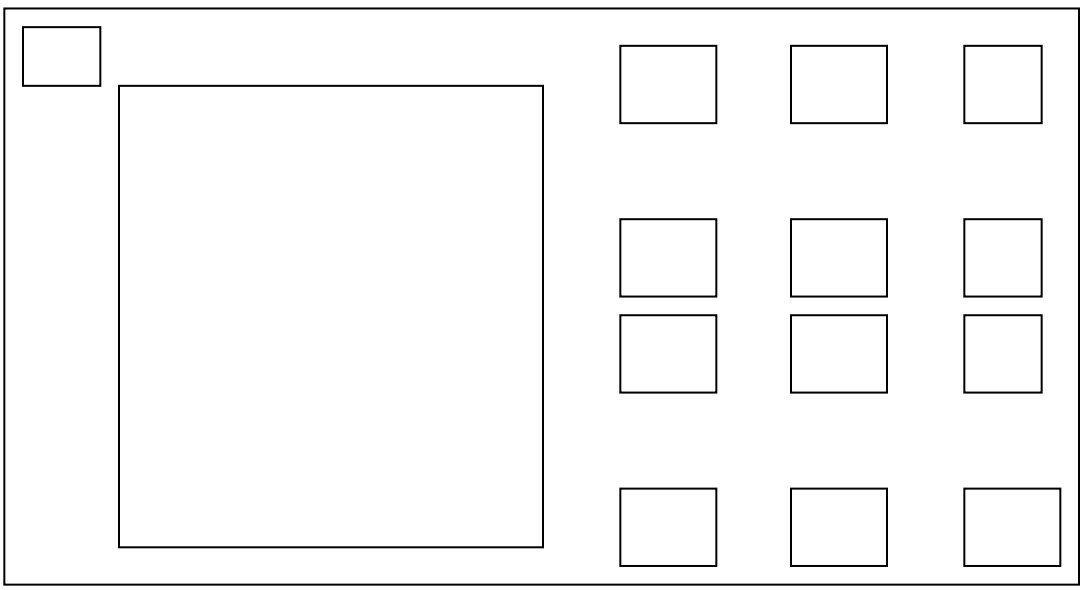
Our observations discovered that the primary school had devised an exciting solution to the placement of equipment and the link between the auditorium, where ICT could be demonstrated, and the library, where ICT was practised. In addition, the library consisted of a library section and a loft that offered the pupils the opportunity to use audio-books or to read books. Conditions were in place for an exciting mix of different media and sources of information.

Appendix 1

The school library.

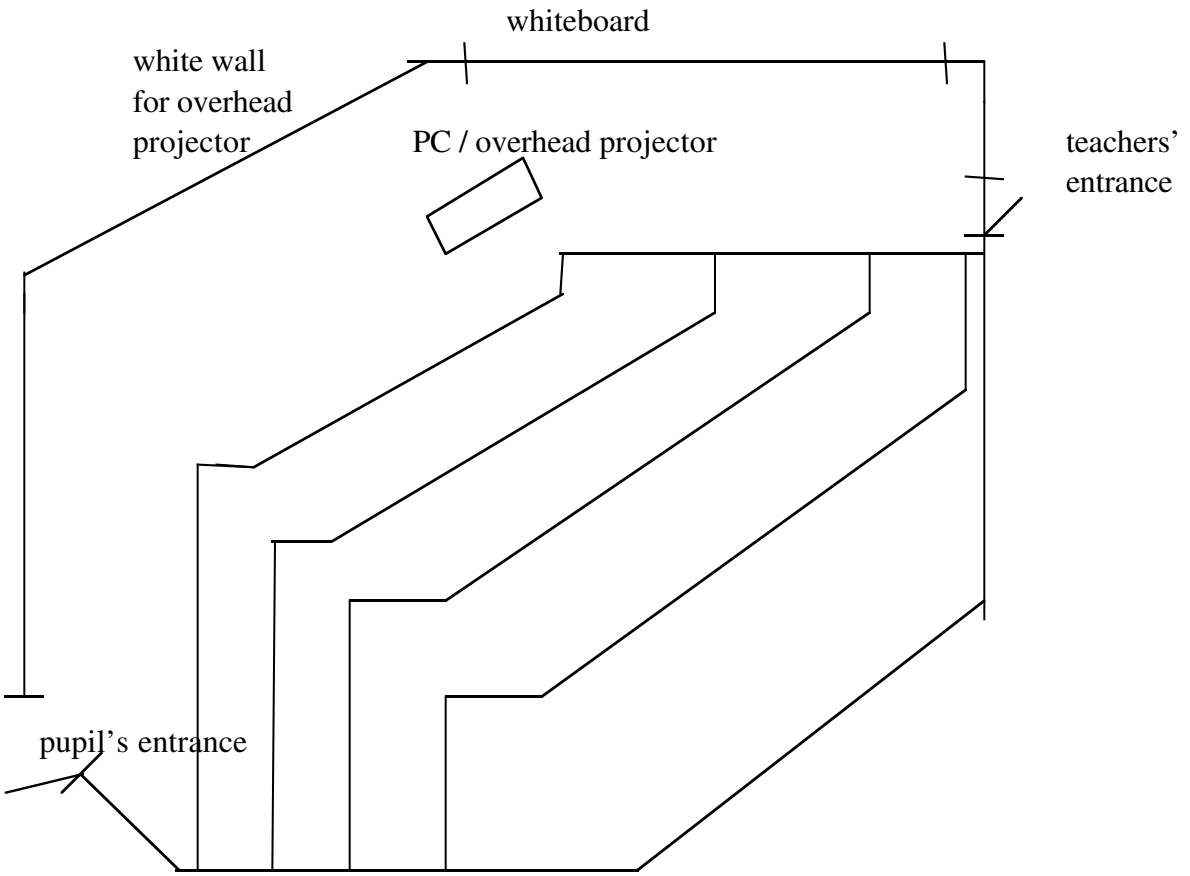
Area for books
The librarian's computer

Area for computers



Appendix 2

The auditorium.



Checklist for ICT-certificate 1, **Appendix 3**

The primary School

Name:_____ Grade:____

Basic knowledge and skills in the use of Windows

#	*Skill*	*Date, pupil-OK!*	*Approved, date/teacher*
1	Switch on the machine(Powerswitch for monitor and PC).		
2	Log on to the network with username (-and if necessary password) Why password?		
3	Open window for group of software. Close the group of software (window).		
4	Be able to use icon for minimising and maximising on the screen.		
5	Find and open the program Solitaire.		
6	Click, double click, pull-drop and other mouse skills in the Solitaire game.		
7	End the Solitaire game, close the group of programs.		
8	Log off the net after work.		
9	End Windows.		
10	Start Windows from DOS (the win-command).		

Basic use of Works word-processing.

#	*Skill*	*Date, pupil-OK!*	*Approved date/teacher*
11	Find the icon for starting Works and start the program. Start word-processing.		
12	Write a short text using the keyboard.		
13	Use mouse to mark individual words and paragraphs.		
14	Change size, type of letters, style (bold, italics, underlining) and centre.		
15	Write new text within the existing paragraph. (Insert bookmarks).		
16	Cut and paste paragraph of text.		
17	Use keys to delete text. Be able to use the key regret.		
18	Rules for naming documents (Up to 8 letters, no distances, full stops etc.).		
19	Save document on (A:) or on your own area at the server (H:).		
20	Close document. Open existing document from diskette or server.		
21	Change a text and save again using the “save as” function.		
22	Print out document.		
23	End the program Works and close the group of software.		

Rules for the use of computers at the Primary school.

#	*Rule*	*Date,*	*Approved*

		pupil-OK!	*date/teacher*
24	Everybody working without a teacher present must have a certificate.		
25	Everybody has to log on to the network with personal name/class user name and password.		
26	Documents must always be saved at area H on the hard disk or on personal diskette.		
27	Everybody must log off the network when they are finished with the work.		
28	The computers shall not be switched off during the day.		
29	Food and beverages shall not be close to a PC.		
30	The parameters given for the use of the machine are not to be changed.		
31	Technical problems shall be reported to the class teacher.		
32	Breaking the rules may lead to confiscation of the ICT certificate.		

Checklist for ICT-certificate 2, **Appendix 4**
The Primary School

Name:_____ Grade:____

Downloading information from the Internet: World Wide Web (www).

#	*Skill*		*Date, pupil-OK!*	*Approved, date/teacher*
1	Start program to read "www", Internet Explorer.			
2	Log on to ISDN. Problem-solving. Why is there not always access? Capacity.			
3	Use links. (Click on words in the text that opens new web pages).			
4	Use "bookmarks" (list of important web-pages).			
5	Go back and forth on web pages using navigator buttons. Go to home page.			
6	Use Kvasir or other search engines/indexes to find information. (Search for keywords in the whole www).			
7	Use Alta Vista to find information. (Keyword search engine for the whole World).			
8	Go directly to a well known web page. (e.g. http://sol.no).			
9	Copy text from a www-page and paste it into Works or another word processor.			
10	Use Alt-TAB to switch between active programs in Windows.			

Use electronic mail on the Internet: Eudora.

#	*Skill*		*Date, pupil-OK!*	*Approved date/teacher*
11	Electronic addresses. Sender and receiver. Responsibility for what we send.			
12	Start Eudora. Make address-book with e-mail addresses.			
13	Make a new electronically letter. How to write the address of the receiver.			
14	Copy for others than the main receiver with the CC function (Carbon Copy).			
15	Title of the letter. Why is it important with a good title?			
16	Write the text of the letter.			
17	Send mail. Log on with personal user name and password for e-mail.			

18	Search for new mail.			
19	To use Out-, In-, Sent- and Trash-folders. Make new folders.			
20	To transfer sent and received mail for different folders for saving (filing).			
21	To compress folders to make more space.			
22	Throw away mail that is already moved to the trash folder.			
23	Print out e-mail.			

Rules for the use of the Internet at the Primary school.

#	*Rule*	*Date, pupil-OK!*	*Approved date/teacher*
24	Pupils using Internet at the primary school has to sign a special contract.		
25	Internet at school is supposed to be used as a resource for learning by agreement with the class teacher.		
26	Good web pages being found are supposed to be registered as bookmarks.		
27	Pages that are downloaded must always contain a reference to a http-address.		
28	Pictures and video shall not be copied to diskette/hard-disc without agreement with the class teacher.		
29	Publishing of www-pages can only take place after agreement with the teacher and ICT co-ordinator.		
30	Breaking the rules can lead to confiscation of ICT-certificate 2.		