

OECD/CERI ICT Program

A Case Study of ICT and School Improvement at Kupittaa Upper Secondary School, Finland

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1 Overview

Kupittaa upper secondary school was founded in 1956. The school is located in the suburban area of the city of Turku close to the University campus and the Technology Center. The school has 356 students (aged 16-20 years); 120 (33,7 %) of them are girls, 236 (66,3 %) are boys. The staff consists of 32 teachers. 31 of them have a full-time job. The mean number of teaching hours per week per teacher is about 20-21.

The aim of Kupittaa school is to provide the students with the necessary readiness to university studies and higher vocational education. The main emphasis is on developing study motivation and co-operation. The aim is that the student to find his/her studies interesting and that they develop self-directed learners. Especially the students' all-round computer-science skills are emphasized at Kupittaa school.

Kupittaa school offers a wide spectrum of general education. Students can choose for example from a variety of foreign languages: English, Swedish, German, French and Russian. Some of the students can also practice their language skills in real life thanks to the school's international relations. The school takes part in the Comenius project together with an Irish and a Sardinian school. The school also participates in a nationwide project called KIMMOKE which aim is to develop the methods of language teaching in Finland. The school is responsible for the project's information and communication technology aspects.

Kupittaa school emphasizes the teaching of computer science and media. Thus the principal emphasize ICT skills and willingness to participate in development processes when choosing new teachers. The primary innovation in school is the IT and Media programme, which started in the fall of 2000. The aim of the ITM -programme is to provide studies for technology talented students and also produce future experts for the IT sector in the city of Turku. The ITM -studies is endorsed by the Department of Computer Science in the University of Turku, where the ITM -students can enroll along with their upper secondary school studies. The studies are also supported by a few IT sector companies in the city of Turku. Student selection for the ITM -prgramme is based on admission tests. Today there is a place for 25 students. The section offers 26 different courses, of which the students must include 16 in their curriculum.

The school offers also a wide spectrum of ICT courses for all its students. This means that all students are able to choose from ten given general ICT courses of the ITM -studies. There is

also one obligatory ICT course for all. Even though the curriculum of Kupittaa school is highly ICT orientated, the daily ICT use in teaching is not so straightforward. That's because in Finnish upper secondary schools the national matriculation examination, which does include hardly any of ICT knowledge, directs much of the school work and has remarkable effects on teaching practices.

2 The past

The history of the ICT -use

Kupittaa school has long been technology orientated and has emphasized the teaching of computer science. The school started its ICT teaching as early as 80's. In the beginning there was taught mainly Basic -programming languages, but even in the middle of 80's there was 3-4 courses of ICT, which included programming as well as word processing and spreadsheets. There was also some excursion into IT -business and courses which dealt with societal impact of ICT. Among the first teachers who used ICT in their own subject teaching - in addition to ICT teacher- were language teachers, especially Finnish language teachers. They use mainly word processing for reading and writing practices. There was also some kind of mathematics software, which was in use of few mathematics teachers. In the beginning of 80's the school had three CP/M -operating system computers for teaching and in the middle of 80's the amount was ten. There was possibility to transfer images and sounds between computers. Late 80's school acquired its first modem. In 90's the amount of computers and other hardware increased and also improved.

In the beginning of the ICT teaching and especially in the use of ICT in general there were many different kind of problems. Particularly there were only a few capable computers and other hardware, which limited the teachers' and students' use of technology. Also most teachers' ICT skills were not good enough even for the simple use of computer, not to mention pedagogically meaningful use. That was partly because software were sometimes difficult to use and they were not pedagogically usable for teaching or learning. One problem was also lack of money. There was not enough money for buying capable computers or other hardware nor practical software. It was also difficult to decide which kind of hardware to invest in or who is the one who should make the choices.

During the years those problems however decreased. Today there are no such technical problems with computers or other hardware. Either lack of money is not a problem as similar as it was earlier. That's partly because the school acquires lots of support (i.e. hardware and software) from its IT business collaborators. Also teachers' technical - and increasingly pedagogical - skills have remarkably improved since the beginning of the use of ICT.

The history of the IT and Media Section

In 1997 the principal of Kupittaa school changed and her successor planned some more distinct focus on the curriculum and teaching of the school. Because the school was already technology orientated and had a strong base on its ICT teaching it was easy to choose the focus. There was also need for such technology project in university- and business world as well as at the level of Turku region. The project might provide students places for further higher education and also produce future experts for the IT sector of Turku. That was also part of the local development strategy of the city of Turku.

Although Kupittaa school started its ICT teaching as early as 80's and tried also to appeal for an ICT orientated curriculum, the actual idea of IT and Media Section brought out particularly with change of the school principal in 1997. Though the whole school was involved in creating new innovation, the new principal was actually the one who made the idea come true.

The development of ITM -section started in spring 1999. Though the school principal was - and still is - the one who led the whole project, there was also a group of teachers who were in essential role of the project development. The project's teacher-group has still major role in ITM -studies' development and enhancement along with the school principal. According to the school principal the enhancement and the development of ITM -section requires continuous activity from the teacher-group and the school principal but also commitment of the whole school.

The IT and Media programme started properly in the fall of 2000 when the programme received its first students. According to the school principal there were no actual problems or other major barriers in the beginning of ITM -studies. The only major problem was and still is lack of space in the school building. There was room only for a few computer classrooms which was not enough for the school needs. However there came out some problems during the ITM -studies. For example it turned out quite difficult to fit students' practical training and university lectures in the curriculum and their other lessons. The other problem was and still is lack of pedagogically meaningful digital teaching and learning material.

3 The present

The use of technology in Kupittaa school

The technical resources

The school has nowadays good technical resources. There are 100 computers from which 93 are multimedia computers. Computers are located in five computer classrooms and separately in other classrooms. Almost all (95) computers have Internet access through the local network. Four computers are located in the staff room and they are exclusive for teacher use.

Those 100 computers are also for the use of students of Kupittaa lower secondary school, which has about 350 students. Despite of that the student-computer ratio is still quite good: one computer per seven students. Noteworthy is that those computers are more often used by upper secondary than lower secondary school students so the actual student-computer ratio in Kupittaa school (upper secondary) might be even lower than seven. However this amount of computer is still very good as against other upper secondary schools in Finland. In 1997 the student-computer ratio in upper secondary schools (which has over 250 students) was about one computer per 18 students (Sinko & Lehtinen 1999).

Kupittaa school has one digital video camera and facility for video editing. There is also other technical resources like scanners, laser printers, video projectors, CD-Rs etc. In teachers' and students' use there is some computerized teaching and learning material for subject such as mathematics, foreign languages, geography, technical subjects and computer science.

ICT in teachers' own work

Almost all of the teachers of Kupittaa school use ICT in some way in their own work and about third of them use ICT regularly. According to the results of Teacher ICT Practices Survey (see Appendix B), teachers are most comfortable with using word processing, sending and receiving e-mail and searching for information on the Web. Those are also the skills which they thought are most important for their own teaching. Most uncomfortable teachers are with programming, creating Web pages and developing a database. They also thought those are not useful skills for their own work. Teachers rated their ability to use computer on average fair. Teachers' ICT skills are, indeed, quite heterogeneous: some of them have advanced skills while some knows nothing much about computers. However, most of the teachers are somewhere between.

Students' ICT use

In Kupittaa upper secondary school students use ICT quite often, particularly ITM -programme students. One teacher estimated that all students use ICT in some way approximately 60 minutes per school day depending on their teachers and subjects topics. According to school principal and interviewed teachers students ICT skills are quite good on average, though there is also students who knows hardly anything about computers. A case apart are of course ITM students, who have very extensive knowledge about computers. Overall most of the students use computers fairly independent way and they also help one another during lessons. Some teachers estimated that about 2/3 of students have computer at home or at least they have good chance to use computer outside the school.

The question of difference between boys and girls came out during some interviews. One teacher mentioned that there is difference of motivation between boys and girls in using ICT in learning. Teacher thought that girls might prefer more working traditional ways and this make also differences in ICT skills. One ICT teacher said too that all that time she has been teacher (since 80's) boys have had much better skills and they have been more interested in computers than girls. This is even girls are today becoming much more interested in ICT than before.

Difference between low and high ability students as users of ICT is rather complicated. According to some interviewed teachers students with better academic skills might learn better in anyway, besides they might adopt ICT skills better and quicker than low ability students. However this is not so straightforward. Using ICT in teaching and learning might motivate low ability students even more, but a problem is if they have ability to use computers in appropriate way. One teachers said, that sometimes it takes for some students too much time to learn how to use computer or some special software. Also the huge amount of information in WWW is problem for some students, especially for those who has low information processing skills.

ICT in education

When considering the ICT use in Finnish upper secondary schools in general, there are couple of factors we must take into account. One thing that have a remarkable effect on the actual school routines and teaching practices in upper secondary school is *the importance of the national matriculation examination*. Matriculation examination is the graduation examination which all the students have to pass in order to graduate from the Finnish upper secondary school. The matriculation examination directs much of the school work, and unfortunately sometimes in Finland it feels like the matriculation examination and students' good achievement in them are the only aims in upper secondary school. Because the matriculation examination does include hardly any of ICT knowledge there's a tendency in upper secondary schools to stress the contents of the matriculation examination in every day teaching, and not development of ICT skills or other more general cognitive abilities. It can also be seen that the integration of ICT into every school subject doesn't seem to be important thing for students or even for teachers, since they cannot see the link between the ICT use and the achievement in the matriculation examination.

According to the teacher interviews, other main reasons why not to use ICT in teaching is that they feel they don't have enough time to design computer assisted learning environments nor to enrich their teaching with the use of technology. That's partly because the school year is divided into five time periods, and the amount of studied content in each period is quite huge. Both of these above mentioned factors, the emphasis on the matriculation examination and the shortage of time, can be regarded as the characteristic features of the Finnish upper secondary school.

According to interviewed teachers they tend to use ICT if they consider its as sensible and convenient for their teaching and learning aims. From teachers' interviews and ICT survey (see Appendix B) there came out several common ways in which ICT is used in education:

1. *as a learning content*. This is naturally the most common ways to use ICT in education especially when it comes to ITM -studies. Also all the students of Kupittaa school must take one compulsory ICT course in their first year. Some of non-ITM students take as well other optional ICT courses.
2. *as a tool for information processing*, which includes writing, information searching, data calculation etc. Especially information searching on the WWW is quite widely used in education (maybe the most common way). Use of WWW has decreased compared to previous years, although according to one interviewed teachers it's sometimes extremely difficult - for both teachers and especially for students - to find there appropriate materials and documents. Also word processing software are often used for writing different reports and essays.
3. *presentation and illustration*. Many teachers use different kind of presentation programs (e.g. PowerPoint) for information representation. According to one teacher this would be more widely used if there would be video projectors in every classrooms. Now the use of presentation programs depends on if teacher have video projectors in usage or not.
4. *computer assisted learning*. This is mainly used in foreign language learning, where they have different kind of computer programs and CD-ROMs for language teaching and learning. Such programs are also used to certain degree in some science topics, for example in geography, where teacher use special digital learning material and programs with his students.

The ITM -studies

The description of the ITM -studies

The ITM -studies in Kupittaa school consist of 26 courses, which cover different areas of computing, information and communications technology, media and contents production. All the courses last about 7-8 weeks, i.e. one school period, and there are always five lesson of each course per one school week. The last week of each period is so called "examination week", when there are examinations of all the different courses of that particular period. So there is somewhere around 30-35 lessons and one examination of one course per period.

The ITM -courses deal with the themes like programming, digital communication, media criticism, graphics and image editing, and electronics. Though every ITM -course is not linked directly to computer technology, the one of the main aims is to integrate the use of ICT into all kinds different themes in the ITM -studies (e.g. in media criticism students become familiar with the contents found in World Wide Web or in TV; in the course of creative writing the students use word processing programs; or in newspaper course they get acquainted with the ICT as a tool of journalist).

Part of the courses are offered by the teachers of the Department of the Computer science at University of Turku. The students in the actual ITM -programme have to take ten compulsory courses out of those 26, and furthermore they choose six or more according to their own interests (minimum 16 ITM -courses). Also all the students of school can take the courses as much as they want, but only the ITM -students participate in work training and visits in the IT companies. Instead of that both the ITM and non-ITM -students can receive credits in studies of computer science at the University of Turku. The ITM -students will take the normal upper secondary school courses in addition to ITM -courses, so their school-leaving certificate is somewhat bigger than non-ITM -students' certificate.

The ITM -programme is now on its first actual year, and there are 25 ITM -students selected via the admission tests. The gender distribution of ITM -students is strongly unbalanced, because only two of the students are girls. That's partly due the initial emphasis of school innovation was on IT and computing, and the school is now investing more on media and contents production in the next year's admission tests. There is a little fear in Kupittaa school that all the students in the ITM -programme are boys and computer specialist (so called nerds or computer freaks), and the school wants also female ITM -students to the programme. In the future (year 2002) the amount of enrollment in ITM -studies will be doubled to 50.

Experiences about the ITM -studies

Because ITM studies is just on its beginning there weren't much experiences about it. However, all interviewed teachers, principal and students have mainly positive opinions about ITM -studies. Even those teachers who don't use ICT themselves, thought that ITM studies and ICT use in general has its own important place at school curriculum. Especially teachers and principal emphasize the importance of co-operations with business and university world, which they mentioned to be very significant for both school and students. They also thought that due to ITM studies all students could get better ICT skills for their future needs.

However, in the beginning of ITM studies there was little fear that ITM students might build up their own separate group and then there would be two groups of students: the 'better' ITM students and the 'average' non-ITM students. The tendency was this for a while, but today there is no such groups or other sorting by students or teachers.

Overall interviewed ITM students were satisfied with ITM studies and their school selection. They also have positive expectations about the effects of ITM studies on their prospects for future education and career. Especially students prefer the way which ITM studies are carried out compared to general upper secondary school lessons. That's because of quite widely used collaborative and project-based working methods and sociable atmosphere in ITM lessons. Anyhow, they hoped for better organization and guidance in practical study matters. According to the students the only real disappointment was the lack of summer jobs via ITM practical training, contrary to what was promised.

4 Main hypothesis: Conclusions about each

1. Is technology a strong catalyst for educational innovation and improvement or does it serve only as an additional resource for improvement.

In the beginning of the school reform, technology could be seen as a strong catalyst for efforts to improve of Kupittaa school. Especially at the school level the aim was - and still is - to raise the profile and academic standards of Kupittaa school with the technology emphasized curriculum. At the level of Turku region the aim of the Kupittaa school's IT and media emphasizing is to provide technology talented students with better opportunities to continue higher education in ICT and to get future jobs at IT sector. Naturally the teaching of computer science follows quite closely the development of ICT, and the trends in the field of computing affect strongly to the teaching. Also the associate companies have their own impacts on the teaching of IT and media when they provide training, equipment and practice jobs to the ITM -students. However, the answer is not so unequivocal, since the whole school innovation is not so technology-biased when we look at the actual teaching and learning practices.

At the level of individual teacher and student school practices the development is not so technology-led, because many of teachers use computers in their teaching in an innovative and pedagogically meaningful way (e.g. Project-based and collaborative working with computers; students producing own web pages or programming relating different projects and subjects etc.). Interviewed teachers pointed out that technology should be used on terms of students' learning. They consider technology as a tool or resource which can help to achieve teaching and learning goals, but not as essential by itself. They also added technology have to bring some additional value to the teaching, otherwise teaching can be done without the use of technology. Right now the emphasize on school is moving from the teachers' technical skills to think the use of computers in their own teaching in a pedagogically meaningful way, i.e. there is a shift going on from technology-led development to a more pedagogical-led one. At the moment the teachers' technical skills and the school's computer resources are up to date, so in near future there is a good chance to develop new pedagogical ideas and teaching practices in using of technology in every subject.

To summarize the role of technology in school improvement, it's difficult to separate technology and the whole school innovation process from each others. There may not be found any single innovative pedagogical force that drove the school reform, but the school's IT and media emphasizing can be seen as a key to improve the school's academic standards and reputation. School's ITM-studies is expected to interest academically better and talented students in attending to Kupittaa school. There may also be intentions to bring the standards of teaching and subject content in Kupittaa school closer to the university level, and this is thought to accomplish with technology oriented curriculum and close collaboration with the Department of computer science in the University of Turku. In all, at the school level the technology can be seen as a catalyst of the school improvement.

2. Did the diffusion of use of ICT in teaching followed the traditional diffusion pattern (as outlined by Rogers 1995) or did different diffusion patterns occurred.

Quite clearly the diffusion of the use of ICT among teachers in Kupittaa school has followed the traditional diffusion pattern. The actual ICT use is not evenly occurring throughout the school, and there are even big differences in ICT use between different teachers and subject matters. Although almost every teacher is using ICT in a way or other in their work, the overall rate of actual teaching use of ICT is something like 50 - 50, so half of the teachers do use ICT in their classrooms regularly and other half use seldom or very little. There can also be identified the groups of early adopters, late adopters and resisters as proposed in the traditional diffusion pattern.

The teachers who belong to early adopters and/or innovators are characterized as peoples who are dynamic, venturesome, willing to develop themselves and their teaching practices, and not afraid of change, just like hypothesized in the theory of Rogers (1995). Usually they are also younger teachers. Interesting is that teachers' previous technological or computer skills could not be seen as important factor to explain adoption of ICT. Many of early adopters didn't have any better technological skills than teachers who adopted ICT later. The group of teachers who started later or are currently little by little starting to use ICT (late adopters) were mainly older ones, and common to them is the tendency to hold on the teaching routines they have accustomed to. By participating in different ICT training and getting support from their fellow teachers the group of late adopters is now starting to use ICT different ways and more often. Now the school's aim is to integrate the use of ICT in every day teaching in every subject.

At Kupittaa school there can be found only two teachers (mathematics and religious education/philosophy teachers) who can be identified as resisters (so the ratio of resisters is much smaller than suggested in Rogers' (1995) model. Nevertheless the resistance of these teachers is not in any way active, and both of them have even participated in some of school own ICT training sessions. Other resister has a little skeptical view about ICT and she has expressed arguments against school's ICT orientation and has questioned the meaning of school's ICT innovations. Common to both of them is the fact that they don't use computers in their teaching in any way, but they haven't felt any pressures on the part of other school staff or administrators to use technology. The main reason why teachers don't use ICT or use it very little in their teaching is the shortage of time. They complained they don't have enough time to use computers in classrooms, because upper secondary school courses are scheduled so tight and there is so much content in each course to go through.

3. Has the successful ICT implementation depended mostly on staff competence in integrating ICT into instruction and learning or has the school's technological infrastructure and students' ICT competence determined outcomes more than staff competence.

First of all, staff and students' ICT competence and technological infrastructure are all very important factors in successful ICT implementation, and it's very difficult, even impossible to compare their effects on teaching and learning processes. In fact, successful ICT implementation in schools depends on all of those above mentioned factors.

In a case of Kupittaa school the school's infrastructure may have strong effects on successful ICT implementation, because technological resources made it possible to use technology in teaching. Because school have so many computers and computer classrooms (labs) teachers could integrate the use of computers in many subjects, not only in teaching of computer science. But when teachers started to use computers in teaching their own ICT skills as well as their students' skills too developed. And by using ICT more than before teachers could also develop their so called educational technology skills (i.e. skills and knowledge about using ICT in a pedagogical way) and they started to think new ways to integrate ICT in their own teaching. Of course students' ICT competence is also an important factor, but if teacher is skillful enough he/she can guide and support every student development in his/her own level paying attention to the student's ICT skills. To summarize, both hypotheses are true; the successful ICT implementation needs *staff and student ICT competence* to get things going, *technological resources* to enable teachers to use computers, *teachers' integrating skills* to use computers in a way that supports students' learning. One thing that have not brought out yet is the quality of computerized learning materials, which may also affect on success of ICT implementation.

4. Will the gaps in academic performance between high and low poverty (more advantaged and disadvantaged) students increase or not when all students have equal access to ICT.

It's very difficult to conclude how ICT impacts on academic performance of students having different socioeconomic background, because there have not been any measured tests of ICT impacts on learning in Kupittaa school. The interviews supports the supposition that better and more skillful and advantaged students will always learn more and better than disadvantaged students no matter which teaching methods or learning material/media is used in. The gaps between advantaged and disadvantaged students will probably remain the same or they might even little narrow, but it's unlikely that the gaps will increase if the students have equal access to use ICT in school. The reason why ICT may narrow the performance gaps is the extra motivation and inspiring force computers bring in teaching and learning situations. The use of computer in classroom brings variety in normal school work that may attract particularly more disadvantaged students and may make them work more on learning task (i.e. increased task-orientation).

According to the principal and teacher interviews the socioeconomic background of students is not so important factor, because all the motivated students will always find a suitable place to use ICT and work with it. The key factor is students' motivation and desire to learn, not the social or economic background.

5. Does the successful implementation of ICT lead to the same or higher academic standards in spite of the low quality of many ICT materials or does ICT use lead to a lowering academic standards as students spend more time on marginally beneficial ICT materials.

In a case of Kupittaa the school can be seen to get in cycle of positive development as a result of school's ICT emphasizing. As a result of IT and media -programme the profile and esteem of Kupittaa school have become better in the eyes of students, parents and teachers. The self-esteem and work motivation of teachers have improved, which may affect positively on their teaching practices. The risen reputation of school is also affecting on the level of student applying for a Kupittaa school, because more academically talented - especially IT gifted - students are now interested in to get in this particular school. As a result of this school's better reputation, the incoming students are now better motivated for school work and learning than before. This affects also on the academic standards of Kupittaa school. At the level of the whole school the implementation of ICT has led at least to the same academic standards, but it's likely that the ICT use has even lifted up the standards.

In general, in Finland the ICT is used in schools more like a tool than in delivering instruction (e.g. CAI) or presenting different kinds of learning materials. It can be concluded that the relationship between the teachers and the learning material is not so strong in Finnish schools, so the Finnish teachers are not so depending on the learning materials and the quality of them.

5 Projection to the future: will the innovation remain?

The possible main reason not to continue ITM -studies in future is that the present principal would leave the school and his successor wouldn't support the innovation. In this case teachers who has used ICT for a while would surely continue to do so, but the proper ITM -studies might end. Also some other key persons like ICT teachers might leave the school. According to one

of the ICT teachers "it would be hard to stay to mourn in ruins".

Anyhow, such a course of events is not likely to happen in foreseeable future. Meanwhile it is very likely that ITM -studies will continue and develop in Kupittaa school. The arguments for the continuing ITM -studies are as follows:

1. school has long been technology orientated and it has a strong base on its ICT teaching. The school has have ICT teaching as early as 80's. Accordingly it is very likely that school will continue this tendency also in the future.
2. -section is just on its beginning and there is strong need for it both in university world and IT business sector of Turku. There is also growing need for students direction. Students could profit from ITM -studies as well as the use of ICT in general and acquire all-round computer-science skills for the future.
3. school has many key personnel, especially the principal and the project's teacher-group, who are strongly committed to ITM -studies and have understanding about the present situation. They have many new visions for the future and also skills to carry out those visions.
4. school has many close ties with their collaborators. ITM -studies is supported by a few IT sector companies of Turku and the school is in strong co-ordination with them. The school has also many collaborators in the University of Turku and ITM -studies is endorsed by the Department of Computer Science.
5. are strongly committed to ITM -studies and the use of ICT in general. Even if there are also teachers who don't use ICT so regularly or at all, there are no disagreement over ITM -studies or use of technology as a whole. Teachers understand the benefits of the project and its pedagogical ideas. The school also supports the teachers' use of ICT, but don't force to use it.

Overall, it is evident that there is - and will be - quite clear trend at Kupittaa school to distinguish from other upper secondary schools and to have its own special focus on curriculum and teaching. With ITM -studies and ICT orientation the school will raise its profile and also academic standards, which might increase its famousness.

Some possible problems in the future

Kupittaa school intend to increase amount of ITM -section students in the future. Even this is essential for the development of ITM -studies, it might cause some kind of problems in acquiring places for students practical training. The main problem is not as having more collaborators much finding places for practical training near the school region. That is because students couldn't spend too much time in travelling from other place to another during the school day.

Extension to other schools

This kind of innovation is firmly dependent on co-operations with university as well as business world. Because of this it would be quite difficult to arrange especially in small cities if there's not enough IT sector business or even university. According to Kupittaa school's principal even in the city of Turku (which is one of the largest cities of Finland) it would be quite difficult to have another exactly identical project.

Further innovations of this kind would need person/s, who want strongly commit to the innovation and have ability to make and maintain connections to the possible co-operators. It would also need both ICT and media experts and other motivated innovators, who want to develop the innovation. But most it would need up-to-date technology resources, teachers training and consultation as well as continuous pedagogical and technical support. In this case all the ideas of innovations are possible extend any other school.

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Appendix A: Methodology

The data collection was carried out by means of:

- *with key personnel*

(includes 5 teachers, two of them was technical specialist teacher, the principal and three students of ITM section)

- *of classroom*

(includes ITM section lessons and ICT and languages lessons)

- *practices survey (n=9)*

The first contact for this case study with Kupittaa Upper Secondary School was made, in the form of a site visit and appointment with the school principal, on January 2001. The actual data collection took place between January and March 2001. The total amount of visits in the school was 15 and they were carried out by two researchers. Some interviews were also augmented by e-mail. In order to increase the reliability of the interpretations made on the basis of the data collected, the study and the conclusions were discussed with other Finnish OECD case study researchers.

Appendix B: Teachers' responses to the ICT survey

Table 1: The teachers' self-reports regarding different ICT practices (N=9)

| How comfortable are you with using a computer to do each of the following? | Very comfortable | Comfortable | Somewhat comfortable | Not at all comfortable |
|---|-------------------------|--------------------|-----------------------------|-------------------------------|
| <i>write a paper</i> | 7 | - | - | 2 |
| <i>search for information on the WWW</i> | 5 | 2 | - | 2 |
| <i>create and maintain web pages</i> | 2 | 2 | 1 | 4 |
| <i>use a data base</i> | 4 | 3 | - | 2 |
| <i>develop a data base</i> | 2 | 2 | 3 | 2 |
| <i>send and receive e-mail</i> | 6 | 2 | 1 | - |
| <i>write a program</i> | 1 | 1 | 3 | 4 |
| <i>draw a picture or diagram</i> | 3 | 1 | 3 | 2 |
| <i>present information (e.g., use PowerPoint or equivalent)</i> | 3 | 1 | 3 | 2 |

Table 2: The teachers' self-reports regarding different computer-related skills in their teaching (N=9)

| How important is each of the following computer-related skills for your teaching? | Very important | Important | So-so | Not important at all |
|--|-----------------------|------------------|--------------|-----------------------------|
| <i>write a paper with a word processor</i> | 4 | - | 3 | 2 |
| <i>search for information on the WWW</i> | 3 | 2 | 1 | 3 |
| <i>create web pages</i> | 1 | 1 | 3 | 4 |
| <i>use a data base</i> | - | 3 | 3 | 3 |
| <i>develop a data base</i> | - | 1 | 4 | 4 |
| <i>send and receive e-mail</i> | 2 | 3 | 1 | 3 |
| <i>write a program</i> | 1 | 1 | - | 7 |
| <i>draw a picture or diagram</i> | 1 | 1 | 2 | 5 |
| <i>present information (e.g., use PowerPoint or equivalent)</i> | 1 | 2 | 2 | 4 |

Table 3: The teachers' self-reports of the ICT activities in education (N=9)

| <i>On average, how often do your students do the following for the work you assign?</i> | <i>Several times each week</i> | <i>Several times each month</i> | <i>A few times in a year</i> | <i>Never</i> |
|--|---------------------------------------|--|-------------------------------------|---------------------|
| <i>use the World Wide Web</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>3</i> |
| <i>create web pages</i> | <i>-</i> | <i>1</i> | <i>1</i> | <i>7</i> |
| <i>send or receive e-mail</i> | <i>2</i> | <i>-</i> | <i>2</i> | <i>5</i> |
| <i>use a word processing program</i> | <i>2</i> | <i>2</i> | <i>2</i> | <i>3</i> |
| <i>use a computer to play games</i> | <i>-</i> | <i>-</i> | <i>1</i> | <i>8</i> |
| <i>use a spreadsheet</i> | <i>-</i> | <i>1</i> | <i>1</i> | <i>7</i> |
| <i>use a graphics program</i> | <i>2</i> | <i>1</i> | <i>-</i> | <i>6</i> |
| <i>join in an on-line forum or chat room</i> | <i>-</i> | <i>-</i> | <i>1</i> | <i>8</i> |
| <i>use a presentation program (e.g., PowerPoint)</i> | <i>1</i> | <i>-</i> | <i>1</i> | <i>7</i> |
| <i>use an instructional program (including simulations)</i> | <i>-</i> | <i>-</i> | <i>4</i> | <i>5</i> |
| <i>other computer uses</i> | <i>3</i> | <i>-</i> | <i>3</i> | <i>3</i> |

Appendix C: Informative WWW-sites

WWW-site of Kupittaa school <http://www.tkukoulu.fi/~kupittaa/>

Students' products on the Web

School magazine <http://www.tkukoulu.fi/~kupittaa/moykky/>

Open English learning environment <http://www.tkukoulu.fi/~english/en10/>

WWW-site of ITM-section <http://www.tkukoulu.fi/~kupittaa/itm/> (under construction)