OECD/CERI ICT PROGRAMME

A Case Study of ICT and School Improvement at

Secondary School, Graz-Webling, Austria

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Overview of the present

Webling secondary school is a school site located in the southwest of Graz, the capital of Styria. Graz is the second largest town in Austria with about 240.000 inhabitants. Graz is also famous for its urban features and its culture. But there is also important industry which is located in the nearby surroundings.
The school site itself is located in a suburban district. The social-economic status of the parents is mixed. Only a few parents have graduates in university. The percentage of foreigners is low.
This type of school can only be found in Styria. The present school site was designed and established by the staff of Webling secondary school after an agreement with the authorities. Sometimes RS Webling had been called a "private school" with an autonomous status. But the financial resources has come from the government all the time.
The development of this type of school is finished at the moment. But the development and improvement of the installed ICT will go on.
The main characteristics of the school site are:

- six instead of four grades the students have to complete
- some opportunities for the students to get familiar with professions, especially professions taken up by skilled workers
- the students can either take up a profession after the end of school or continue their education

A detailed overview of this type of school is given in the following report.

Overview of the past

The beginning of the reform process was the idea of changing the secondary school into a new type of secondary school. At that time ICT was implemented, but at a very low level. The development of the new type of school forced the developing team to include ICT to guarantee the best possible education in regard to the future profession of the students. The problems of the reform process were related to its contents, whereas the problems causes by the implementation of ICT were rather due to a lack of financial resources and the implementation team had little time to go ahead with it. The greater part of the staff did not take part in this process. And ICT-use in lessons is still not a normal procedure for the whole staff. Even nowadays a part of the staff is not familiar with this new technology.

Projection to the future

When ICT is part of a process it is not possible not to take part in the future development. The incredible speed of innovation in the field of ICT does not permit anyone to be idle. Therefore the main efforts including ICT at the moment are concerned with completing the system at the school site. The next step will be to update hard- and software in convenient intervals. To read about detailed investments please look at chapter "ICT infrastructure".

Conclusion about key hypothesis

Hypothesis 1

Technology is a strong catalyst for educational reform, especially when the World Wide Web is involved. The rival hypothesis is that where true reform is found, technology served only as an additional resource and not as a catalyst, that the forces that drove the reform also drove the application of technology to specific educational problems.

The analysis of the collected data indicates that hypothesis 1 can be verified by and large (just as in other IT schools). In the case of RS Webling the beginning point of the educational reform was the idea of the earlier principal to change his school site from a normal secondary school to a secondary school with six grades. The strong orientation towards requirements set up by future employers made it necessary to integrate information- and communication technologies at the same time. Before changing the type of school, the focus of RS Webling was technical works and creative drawing applied to crafts. Extending this focus would probably also have been the catalyst for a reform. Therefore in this case ICT has been one catalyst together with the intention of the staff to create and implement a new type of school. The goal behind the reform was to attain a type of school, which would prepare the students

more efficiently for their first step into any profession than normal secondary schools would do. Teachers expected that confronting students with needs of future jobs at an earlier moment, the students would achieve deeper knowledge about what s going on in real business life. The use of ICT in this context is one of the basic components for creating this type of school.

Hypothesis 2

The diffusion of the reform (and therefore of ICT) followed the traditional diffusion pattern for reforms and innovations, as outlined by Rogers (1995). The rival hypothesis is that technology functions differently from traditional innovations and reforms and that therefore different diffusion patterns occur.

Even in this case the diffusion of the organizational change followed the traditional diffusion pattern. ICT was one of the components of the changing process but it was not the driving force of the change at the start (just as in other IT schools). One of the first steps of some teachers interested in ICT was to get the qualifications for implementing and educating ICT at RS Webling by passing the examination for information science at the pedagogical academy. With the help of the parents' association, the first equipment for RS Webling was bought and installed. Later on even the school authorities supported the implementation of ICT.

As a special diffusion pattern the early involvement of RS Webling into the technology of the internet can be mentioned. RS Webling was the first school in Austria in 1993 to have their own Web page. This early involvement with new technology lead to special knowledge among teachers and students and enabled them to win several prices in specific competitions (for further details please visit the web site of the school, described under "characteristics of the school").

Hypothesis 3

Successful implementation of ICT depends mostly upon the technological infrastructure and student ICT competence rather than upon staff competence in the integration of ICT into instruction. The rival hypothesis is that teachers mediate such applications when they are successful, and that their academic value relates positively to teacher competence.

In fact, the rival hypothesis can be observed with the situation regarding the use of ICT just as in other IT schools. As figured out in hypothesis 2, a group of teachers had to get prepared for dealing with ICT. In case of RS Webling the group of teachers had to choose and install the required equipment by themselves.
Generally spoken, teachers of RS Webling confirmed, the more the staff is familiar and comfortable with using ICT, the more they will use ICT both for preparing their teaching and for their actual teaching. Without the necessary technical knowledge of the teaching staff the mediation of applications cannot be successful (just as in other IT schools). Moreover

professional development plays a very important role. Due to the very strong involvement of the IT specialists in any questions of ICT this staff also organized internal further education for the rest of the teachers, and this was about the only organized educational training the staff got in this field. Only in exceptional cases the courses of the pedagogical institute (PI) were attended. Most of the staff, apart from the teachers of ICT, got their knowledge about ICT by internal training, asking colleagues or learning by doing, driven by their own interest.

The teachers imparting special ICT skills to the students are all qualified teachers for information science and therefore well trained. Besides these special lessons, at RS Webling ICT is also used in other classes e.g. languages or mathematics . The above mentioned internal training was offered especially to this group of teachers, who are normally not so comfortable with using ICT for teaching purposes.

As in other IT schools the main fear of many teachers was that the students could have more technical expertise than themselves. A further change must take place a change in their own view. In this case teamwork is the magic word. Students and teachers have to constitute a team and then the process of learning can take place based on partnership.

Hypothesis 4

Gaps in performance between high and low poverty students will be enlarged rather than diminished where all students have equal access to ICT. The rival hypothesis is that equal access to ICT will lead to high poverty students closing the gap with low poverty students.

The analysis of the collected data shows nearly the same result as the survey in other schools. In the case of equal access to ICT the performance of the students depends on their personal interest and involvement. On the one hand, equal access to ICT can be guaranteed during the lessons, but on the other hand the same cannot be guaranteed at home where students may use ICT for their homework or other practical work which may have to be done, especially up to the fourth class. Therefore the teachers try to create a balance between students with computer access at home and those who have no access by educating them in teams, where the better ones help the less skilled students.

Hypothesis 5

Successful implementation of ICT will lead to the same or higher academic standards in spite of the low quality of many ICT materials. Academic standards are a function of teacher and school expectations and not of the standards of textbooks, ICT materials, and the like. The alternative hypothesis is that ICT use will lead to a lowering of academic standards as students spend more time on marginally beneficial searches and in browsing poor quality Web and courseware content.

In fact academic standards are a result of both the teachers' and schools' expectations (just as in other IT schools). The teachers decide which teaching material will be used during the lessons. The task of the teachers is to select the material, which is beneficial for the students. If the teachers make a selection of the profitable ICT-teaching materials then ICT will not lead to a lowering of academic standards. At Webling secondary school the budget for ICT materials like learning software on CD-ROM s is not very high. So the purchased material must be carefully chosen, especially as there might be a lot of material with low academic standard.

The mostly used ICT source is the Web. However, if the teachers allow their students to browse in the Web without any restrictions and without any selection of special web sites then one expects too much from students. The students are not able to understand all kind of information, which they find in the Web.

In contrast to the other school sites included in this study, the students are of a higher age. Students between 14 and 16 years are already able to differentiate between profitable and useless information they get from the web. The teachers of this age group try to teach their students how to compare several sources of information from the web and to assess the accuracy of this information. The students are even taught to use several sources, i.e. different web sites.

Characteristics of the school

Name of school site	Haupt- und Realschule Graz-Webling
Address	A-8053 Graz, Unterer Bründlweg 19
Phone / Fax	+43-316/283563
Web site	http://www.rs-graz.asn-graz.ac.at/
E-mail address school site	rs-graz@rs-graz.asn-graz.ac.at
E-mail address - principal	direktion@rs-graz.asn-graz.ac.at
E-mail address - webmaster	webmaster@rs-graz.asn-graz.ac.at
Leadership	Principal: Mrs. Veronika Luidolt
Number of classes	11 classes
Number of students	262
Number of teachers	26
Kind of school	Secondary school for students between 10-16 years
Characteristics of school autonomy:	
School experiment	"Realschule" with six classes ending with a final examination "mittlere Reife", education especially for students who like to become skilled workers

Extraordinary features	Information and communication technologies: IT is taught in all six years for two lessons a week. From the fifth class on special features are offered to the students in order to give them a qualified education for further jobs: - commercial economical studies - technical studies - social and human studies - applied information and communication technologies Participation in projects like: - Comenius project - EU-project within "cyberschool" - museum online and more
Special features of the school site:	
3 Computer Labs	41 PC s, 1 Web-server, Win95 + Win2000, Office 97 + 2000; several software packages 2 laser printers, 3 inkjet-printers, 1 scanner, 1 digital camera, 1 Web-cam
Internet connection	standing wire connection to the Web
Sport and playing fields	soccer, basket ball, athletics

Evaluation of change

Diffusion patterns

The idea to create a new type of school arose in a discussion between the earlier principal with leading business people who complained about the poor qualifications any secondary school would provide for its students what their skills as future skilled workers were concerned. This discussion confirmed the principal in his idea to change the organization of his school together with his teachers. At last a team of teachers from different school types designed the model of a new secondary school, called Realschule , with the goal to give students a better start into professional life.

A small group of teachers watched the fast development in the field of information science and its use in industry. These teachers suggested to establish the application of information and communication technologies as a main focus of the curriculum for the new school model. They believed that ICT knowledge is one of the key qualification of skilled workers of the future.

Supported by the principal this small group of teachers first improved their knowledge about information science and ICT by passing examinations at the pedagogical academy. There they

got the basic information for planning and setting up the first equipment for their school. With financial support by the parents' association, at first five computers were bought and installed by the teachers themselves. Earning money by teaching courses in information science for the Volkshochschule (i.e. open university) and winning prices in competitions for schools provided them with the necessary means for buying more computers.

When the amount of computers had increased at Webling secondary school, students did not only use the computer in specific ICT lessons, but they also got further access to computers in other subjects apart from information science.

Up to now it has been almost always the same group of teachers who have kept the ICT-system running. Especially two teachers have become IT specialists and organized expansion, support and internal further education for the staff. Its mainly their credit that ICT is running at Webling secondary school.

Staff development & involvement

In no other subject the need for fundamental knowledge is as high as in information science. The number of children using computers at home is increasing and at the same time their age decreases. Its almost normal for children at the age of three or four years to play on the computers of their parents, if there is one at home. This means a very early contact with this medium.
On the other hand, teachers with no ICT experience so far are forced, also by the authorities, to get that till the end of 2002. They meet children who are not afraid to deal with ICT. The education of students will change from teaching into a kind of working together in an atmosphere of partnership.
What kind of further education can teachers acquire?
At Webling secondary school the team who teaches ICT skills directly is well trained by the standards of the teaching profession. This team is automatically trained by their daily involvement in ICT use at the school site together with solving any occurring problems. This team consists of four or five people, the IT specialists included.
Usually further education for teachers using ICT in addition to their usual classes consists of taking part in internal trainings, organized by the two IT specialists. Apart from introducing all the innovations of the schools' equipment training these specialists offer courses to examine the ECDL. Further training courses are also offered at the PI (pedagogical institute) or VHS (open university), but the staff does not very often take part in them because very often neither contents nor schedule meet the requirements.

It is not possible to attend any other IT courses offered as there is no money reserved in the school budget for such purposes. The financial resources are negligible if we look at the needs and wish of both the staff members and students to use ICT effectively at their school site.

Role of leadership

AT Webling secondary school the same pattern can be seen as in other IT schools, where a small team of teachers occupied themselves with the development in the field of computer technologies. The beginning of the development started at a time, where Webling secondary school was a normal secondary school for children from 10 14 years. The team of teachers thought about integrating information technologies into the school curriculum at the end of the 80 s. A small computer net of five computers was established first, sponsored by the parents' association. The experiences with this experiment were discussed with the principal and the staff at that time. A few years later the change of this secondary school into new type of secondary school started. Now nearly the whole staff stood behind the development of this focus and supported the team laying in mind the connection between both trends. The personal commitment of the IT team led to an additional income for the school site by educating adults in the evening or winning prices in competitions for schools. This team has been responsible for the implementation and development of ICT at Webling secondary school till now.

ICT-Reform Connections

The chapter about the role of leadership showed the close connection between the development of the new type of secondary school and the implementation of ICT at RS Webling. Both trends can not be separated any more, because of the very strong orientation towards the future professional life of the students. Teachers of RS Webling secondary school mentioned in their interviews a 1:1 relationship.

Outcomes

ICT Infrastructure

The following ICT infrastructure is situated at Webling secondary modern school:

1. Hardware
   The computers of Webling secondary school are located in the following rooms: Three computer labs, conference room, principal s office and in the hall. A total number of 47 PC s are in use at the moment. The equipment of the PC s is shown in the following table:

Location	Number	Equipment Equipment
Computer Lab 1	15	Pentium III, 64 MB RAM, 700 MHz, CD-ROM, 17 Monitor each, one PC is equipped with a CD-writer
	1	Pentium II, 64 MB RAM, 233 MHz, CD-ROM, CD-writer, 17 Monitor each
Computer Lab 2	15	Pentium II, 16 MB RAM, 150 MHz, 15 Monitor each, one PC is equipped with a CD-ROM, another one with a ZIP-Drive
Computer Lab 3	11	486, 8-16 MB RAM, 66 MHz and less, 15 Monitor each, two PC s are equipped with a CD-ROM
Principal s office	1	Pentium II, 16 MB RAM, 233 MHz, CD-ROM, ZIP-Drive, 17 Monitor
Conference room	1	Pentium II, 16 MB RAM, 233 MHz, CD-ROM, 17 Monitor
Hall	3	486, 8-16 MB RAM, 66 MHz and less, 15 Monitor, uses as Internet terminals for students

Additional equipment: two laser printers, three inkjet-printers, one scanner, one digital camera and one Web cam.

Most of the PC s are multimedia ready and connected to the Internet. At the moment of the inquiry additional PC s (486, 16 MB RAM, 66 MHz and less, 15 Monitor each) were handed over by a sponsor but not yet installed. There are provisions for the installation of two equipments each in the eleven classrooms and five special rooms to make internet access possible on the spot.

1. Software

Installed software: Windows 95 and Windows 2000, MS Office 97 and 2000, AutoCAD Light, MS FrontPage 98 and 2000, Visual Basic 6.0, MS Publisher, Corel Draw 4.0, Shareware for graphic applications.
Learning software for: Typing (shareware), Physics and Chemistry, Biology and Creative Work.

1. Internet and Provider

Internet access is managed by a Linux Server (Pentium II, 166 MHz). The school site is equipped with a permanent connection to the Web. Webling secondary school has its own domain and is a member of several school networks, for example Webnetz Schulen or Schulweb-Ring .
Students have access to the Web during lessons or by using the three terminals installed in the hall. Free access to the Web in the labs outside the lessons is not permitted for students because of the legal supervision. In lessons calling up unwelcome web sites is prevented on one hand by the teachers present, on the other hand by locking the access to certain web sites, mainly of pornographic or violent contents.

1. Support

   Two teachers, called Kustoden , the IT specialists of the school, guarantee support for the teachers and are authorized to change or repair any hardware by themselves. Software support is even managed by them. By being involved in any bigger or smaller problems in using ICT at Webling secondary school, the two teachers got a wide knowledge of ICT. For the problems they cannot solve, they contact colleagues or their friends. When working with external companies rather more problems occurred and help was not often provided because of the special needs caused by ICT at a school.

The burden of the two IT specialists is enormous. Both are working as full time teachers. They are just paid for three hours a week for ICT support between the two of them. In order to improve support for teachers and hardware, at least more than half of their weekly teaching commitment would have to be changed into support hours at the school, where these specialists are the only responsible people for support.

1. E-mail

   Three official school e-mail accounts exist for this school site (see details on the chapter characteristics of the school). One for the principal, one for the webmaster of the school and an official e-mail account for the school. Each teacher at Webling secondary school has the opportunity to create his own web site and receive an official email account by request. Most of the staff is using this official account. But also free e-mail accounts or accounts from private providers are used. But this is not the same for students. They get a free e-mail account under the guidance of the IT teachers. A private e-mail account however is advantageous when they leave the school site, so they can keep their address.

1. Use of ICT

Teachers and students use ICT for typing, for projects, spreadsheet analysis, word processing, preparing and giving presentations, programming (logo), creating and maintaining web pages, drawing pictures or diagrams and searching for information. Learning software is used in special subjects e.g. German, English, Physics, Biology or Creative Work.

1. Future perspectives

One of the next steps to enlarge the ICT equipment of this school site is to invest in a Windows 2000 terminal server. This investment enables the users to handle the older PC s as clients, where the latest software releases can be used. The IT specialists hope to finish this enlargement till the end of 2000.
Another project is the implementation and networking of the sponsored computers into classrooms and special rooms. The ground for this project was prepared during vacation by laying the network wires to each room. After testing, repairing and configuring the sponsored PC s, installation and connection to the Web will be finished at the end of the school year 2000/2001. To practice the foreign languages, a language laboratory equipment will be established soon in one of the three computer labs.

Effectiveness

One teacher commented during the interview on the situation of schools changing to intensive ICT-use: Mit der IKT bleibt kein Stein auf dem anderen , that means: With ICT there will be no stone left on top of the others . Huge changes for Webling secondary school have arisen since the first computers were installed. The changes do not only concern the staff. Even lessons and the schools' equipment had to be adapted. During these exciting years, no staff member asked for transfer to another school site because of ICT implementation. Newcomers were asked about their interest in ICT to guarantee integration without any difficulties.

What are the positive and negative aspects of ICT at Webling secondary school?

Positive aspects:
+ the possibilities of communication enlarged by e-mail
+ increased access to information
+ shyness of students to get in touch with ICT is decreasing, even if there is no access to ICT at home
+ ICT makes work much easier
+ receptiveness to schools abroad, other countries or data bases have increased by using the Web or
e-mail

Negative aspects:

- due to the access to ICT personal relations are reduced
- teachers have to receive a lot of the information students receive from the Web. Everybody believes the information gained from the Web is correct in the beginning.
- students are not supervised, especially at home, what they are doing with ICT. Web sites with unwelcome contents or games including violent scenes are called up.
- students spend a lot of time with ICT at home. Physical exercise declines to a minimum. Teachers of physical education watch a decreasing capacity of the students during the lessons.
- privacy is limited by ICT, when private data are sighted illegally or permanent response of people is expected (for example via mobile phone)

Besides these aspects, ICT also influences the social structure of the school. Only 4 teachers are involved intensively in ICT. They are responsible for imparting the main skills related to ICT. A very close relationship among them is the consequence. Another group of teachers have integrated ICT in their subjects like German, English, Biology and so on. They maintain a close relationship to the IT teachers to obtain information about news or help when problems arise. The last group consists of those teachers, who are not or have not yet been involved in ICT use on this school site. On the one hand, the reason could be, that there is no connection between ICT and their subject. On the other hand they may be afraid of using ICT together with

students, because of the possible knowledge they might already have. If this group does not get familiar with ICT in the near future, the gap between this group and the rest of the teachers will increase and influence the structure in a negative way.

Another topic is the access to computer equipment at home, both for teachers and students. Teachers prepare their lessons most of the time at home. Intensive use of ICT when preparing lessons forces them to have a computer equipment at home. But in Austria no extra income is given to them to buy or maintain at home their private equipment they use for their jobs. Nevertheless, 80% of the teachers have some computer equipment at home. The number of students who have computers at home is about 40% and the share is increasing, the older the students are. Nearly every student from the fourth grade on has access to computer equipment at home. This is almost a necessity for them in order to do their studying.

Academic rigor

ICT is an important part of the school program of Webling secondary school. The central idea of RS Webling is the best possible preparation for future professions. Skills in ICT harmonize closely with this idea. A better view of the important role of ICT shows the academic schedule of the fifth and sixth grade in Appendix C. This schedule also shows the total number of classes per week the students of the fifth and sixth grade attend. Together with the daily homework and the time spent on the computer at home for school the students feel like working up to 90 hours per week. Often they feel exhausted. The use of ICT during lessons depends on the classes the students attend. From first to third grade they have a weekly access on an average of 1 3 hours. The hours per week grow up from the fourth class on to a number of 4 10 classes. The block of information technologies takes up about 20 hours a week. What applications are used? Most of the time during the lessons students work with word processing, spread sheet, presentation software, graphic software, data bank programs, visual basic and word training. They are also taught about hardware configuration and operating systems like DOS or WINDOWS.

Equity

Like in other IT schools the greatest difference which can be discovered among the students depends on the access of students to ICT at home. Students with a computer at home are better skilled because of a greater amount of practice. The teachers said once more, that owing a PC depends on the profession, interest and attitude of the parents. But several other studies in Austria show that low income families have significantly fewer PC s at home than families with higher incomes. In case of gender the access to ICT is nearly the same. The difference is, that boys are technically oriented, while girls use ICT more as a communication platform.

Another topic is the use of ICT by high or low ability students. High ability students use computers more as a tool, while low ability students like to see the computer as a play station. Differences can also be seen in the access of these two groups. High ability students build up their access of use on solid base. The increase of learning is therefore much higher as seen with low ability students, whose base is only fragmentary.

Projections

Sustainability

To maintain the school site was not a question at Webling. In contrast to other school sites RS Webling does not worry about decreasing numbers of students. The staff rather worry about the maintenance of the school type with its equipment on ICT and the improvement of both. In order to educate the students to deal with the equipment in a responsible way, the teachers function as models, set up rules of behavior, prohibit dangerous things and tell the students why this is done. To develop both the use of ICT and of the school type, four points were worked out as the key factors:

- financial resources
- well trained staff and interested newcomers
- effective praise and appreciation the principal can give to his staff
- responsibility of a team or work group for developing the school site. That can t be a question of one or two people only.

Especially what ICT is regarded the system itself takes care of its improvement. Differently to traditional subjects in ICT lessons the teachers are faced with a real challenges by the students. Their interest is that high that the teachers are forced to improve their knowledge and lessons all the time. At last the responsibility for improving the school system in Austria and its branches lies with the authorities. If there are more restrictions for the school sites than support, the motivation of the staff in improving education work is decreasing rapidly. One example for such restrictions is the so called § 61. Teachers with additional hours don t get their money for these hours, if they are absent on that day the should have been held. It does not matter, if the teacher was ill, made excursions with the students or took place in further education for example. You may say, the teachers were punished in case for activities outside the school building. A similar situation can be seen what the IT specialists are concerned: at RS Webling the two specialists were only paid for three hours a week, regardless there is a lot of work or none at all. One teacher explained this situation aptly "exploitation of idealists".

Scalability

As a result of the above statements, Webling secondary school is the best equipped school site at the end of the year 2000/2001 of the school sites taken into consideration for this study. Nevertheless, at RS Webling full implementation of ICT only will occur, when all wishes about a convenient expandation will be granted. All responsible people are aware of the efforts that have to be made to keep the equipment up to date. Only small steps can be done in future to enlarge the equipment of these days.

Appendix A

Methodology

Description of the volume and type of data collected

Activity	**Annotation**	**Amount**
Verbal Interviews (approximately 45-60 minutes each)		
Nomination Form for a School Site	Principal	1
Administrator Interview	Principal	1
Parents/Guardian Interview	representative of parents club 1 mother at school 1 mother interviewed at home 1 father interviewed at home	4
Technology Specialist Interview	both IT specialists are full-time teachers the interview was taken together	2
Student Interview	1 group with 4 students (sixth year) 1 group with 5 students (fourth year)	2
Teacher Interview		8
Questionnaire		

ICT Use Survey of Teachers	Teacher	18
Observing in Labs	(at the time of visiting this school site no computers could be find in the class rooms)	
Global communication	sixth class	1
Geometricy	third class, group a	1
Geometricy	third class, group b	1
German	fourth class (use of ICT to gain material about poets)	1
Physics	fourth class (subject energy)	1
Creative Work	first class (make a sketch with Deluxe Paint)	1
Collecting additional materials		
Web-site-presentation	http://www.rs-graz.asn-graz.ac.at/	
Booklet	Thermo-Profit: A project for energy saving inside the school building of Webling secondary modern school	
2 school magazines	Second edition February 2000 and seventh edition June2000	
Calendar 2000	including students paintings	
New Visions and projects	Connecting all classes to the web by installing 2 computers each till the end of 2000. Installing a Terminal-server to use the PC s with low frequency as terminals in order to guarantee problem-free access to office 2000 software.	

Appendix B

ICT Use Survey for Teachers

18 teachers filled out this questionnaire (n = 18).
The results are represented in percentage (100 %).

- How comfortable are you with using a computer to do each of the following? (Choices

are: very comfortable, comfortable, somewhat comfortable, not at all comfortable)

		very com-fortable	com-fortable	somewhat com-fortable	not at all com-fortable
1.	write a paper	72.2	16.7	11.1	-
2.	search for information on the World Wide Web	22.2	33.3	38.9	5.6
3.	create and maintain web pages	5.6	5.6	38.9	50.0
4.	use a data base	16.7	16.7	33.3	33.3
5.	send or receive e-mail	52.9	41.2	5.9	-
6.	programming (e.g. writing a program in Visual BASIC or Java)	-	16.7	16.7	66.7
7.	draw a picture or diagram	17.6	17.6	29.4	35.3
8.	present information (e.g. use PowerPoint or equivalent	22.2	16.7	11.1	50.0

" During the past school year, how often did your students on average do the following for the work you assigned? (Choices are: several times each week, several times each month, a few times, never)

		several times each week	several times each month	a few times	never
<div					