OECD/CERI ICT PROGRAMME

A Case Study of ICT and School Improvement

at

St. Sheila s Primary School

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Introduction

The research for this case study was carried out in St. Sheila s Senior primary school from the 31st of January to the 2nd of February 2001. The research was carried out in accordance with the methodology outlined in pages 8 to 15 of the OECD/CERI workbook using interviews, questionnaires, classroom observations, and the collection of additional evidence from the school. The report focuses on the current school reforms and the role that ICT has played in these reforms as well as its overall use within the school.

Overview

Description of the School

St. Sheila s senior primary school is a medium sized primary school situated in an affluent city suburb. The school is surrounded by middle class housing estates and was founded in 1981 to cater for the growth in the locality as the population of the suburb expanded. The school quickly grew in size from a two-teacher school in 1977, to a 22-teacher school with a student population of 640 students, in 1990. However, since then the population has decreased considerably and the school now has a student population of 292 students and 14 teachers. All students attending St. Sheila s are from housing estates within the locality and are generally from high socio-economic backgrounds.

When established the school had two teachers, the current principal and vice principal. As the population of the school increased in the eighties the number of staff members subsequently increased. The majority of teachers currently in the school began teaching in the school in the early eighties. Therefore the staff profile is quite uniform with the majority of staff members aged between 40 and 50 years. The school is supported by an active parents association, which undertakes fundraising on behalf of the school. In addition the school has several other links with the community including running annual Christmas concerts for parents and using the local swimming pool every Saturday.

The school has a very open and caring culture. This is characterised by bright open corridors with student art and work displayed throughout the school both in corridors and throughout the classrooms.

ICT in the School

The school is currently involved in a DES sponsored SIP project and has been equipped with a network of 30 Thin-Client Network Clients in a dedicated computer room with access to normal PC Windows desktop using Citrix Metaframe. In addition to the cluster room each classroom is also equipped with a networked multimedia PC with Internet access. The special needs room contains an additional 7 computers equipped with specialist software. The high level of IT resources and infrastructure does not reflect the resources of a typical primary school. The school is known throughout the area as an IT school and students are required to pay an annual levy of £6 towards the maintenance of the computer equipment in the school.

Technical support is primarily supplied by the schools IT coordinator who maintains all elements of the computer infrastructure from individual PC problems to larger network problems. All teachers commented on the dependency they had on his skills and expertise to maintain the computer facilities in the school. External vendor supplied technical support is utilised only when serious technical problems, beyond the skills of the IT coordinator, are encountered.

All teachers interviewed believe that the current ICT resources within the school are adequate and also accept that other schools do not possess similar equipment. The school does not have any plans to further develop the IT infrastructure in the immediate future but rather aims to integrate ICT further into teaching and learning within existing subjects. The use of ICT within the school focuses on the use of ICT as an additional resource within all subject areas. This is reflected in its varied use by the majority of staff members.

The Reform

School reform in St. Sheila s is an ongoing process and is not encapsulated by any one single initiative. Although the current SIP project has raised the profile of the school both at a regional and national basis, ICT is not central to the school reform and instead is an additional resource aimed at improving learning and the learning environment in the school. The drive to constantly improve the learning environment for the students is evident from other initiatives such as the school library, which is well stocked and widely used in the school, and the strong emphasis placed on sport and other extra curricular activities. The school did not have any large scale reforms planned and aimed to continue to maintain the present environment and ethos within the school.

The Past

The original school was formed in 1977. Initially there were fifty pupils attending and the teaching staff consisted of two teachers, the current Principal and Vice Principal. For the first few years of its existence the school operated from a number of prefabricated buildings. In 1980 the school moved into the building now known as St Helen's Junior School. As the number of pupils was growing rapidly the school was divided into a Senior and Junior School. In June 1985 the school moved into its present building. Initially there were three third classes and one fourth class, consisting of sixty-four girls and sixty-four boys attending the school. In the early 1990s pupil numbers peaked at six hundred and forty. There are currently two hundred and ninety-two pupils attending the school. The teaching staff consists of fourteen teachers.

History of the Reform

In Portmarnock SNS reform is defined in terms of an ethos that is characterised by a willingness to improve and openness to innovation. It is the constant aim of the school to improve teaching and learning, to promote a caring atmosphere, and to foster a learning environment which is interesting and progressive for both pupils and teachers. This has been initiated and sustained from the inception of the school by the School Principal and vice principal. According to the School Principal, his main aim has been to make the school an extension of a happy home and to create an atmosphere conducive to learning. The Principal has provided leadership in this respect and his open friendly relationship with staff has been central to diffusion of this ethos amongst staff members. As the majority of staff members have taught in the school since its beginning there is a healthy personal relationship in existence between the various teachers. This too is acknowledged as playing a supporting role. This ethos has fostered change and improvement in different ways by different teachers. Interviewees mentioned a number of by-products of this innovative ethos. These include the school library, participation in county sports, production of school plays, music and quizzes. ICT is also mentioned in this respect. All teachers employed in Portmarnock SNS have been induced into this ethos with the help of an induction policy whereby a new teacher is paired with an existing teacher so that values and ideals might be passed on from one to another. According to the School Principal a number of student teachers who have taught in the school have commented positively on the atmosphere in existence in the school. Openness to parents, visitors and the surrounding area are also noted as characteristics of this ethos.

History of ICT

ICT is one element of school based reform whose implementation has been assisted by the willingness to innovate evident in this school. ICT implementation has been driven by the IT Specialist and facilitated by the School Principal. The first computer was introduced to the school in 1989. At this time pupil numbers were falling rapidly and aside from the possibility for innovation, ICT was recognised as a niche area that might help to bolster staff morale. Funding from the school budget (£1200) was allocated and the IT Specialist was given licence to initiate the introduction of ICT into the school. Fundraising was undertaken at this time in order to provide for additional resources. At the time it was decided that the Special Needs class might benefit most from this equipment and computer use was directed at this class.

By 1991 the school was equipped with three portable computers all of which were Acorn Archimedes A3000 type machines. Some peripherals including a printer and a modem were also purchased at this time. In 1991 students in the school participated in an email project with five other schools in Ireland and completed a multimedia project on their local area. By 1994 the original computers were upgraded and three new machines were purchased. All six machines were moved into a computer lab using the existing trolleys and tables. A computer was made available in both the principal's and the secretary's offices bringing the total number of computers in the school to eight. At this time the hard drives in some of the original machines needed upgrading. In 1995 two further machines plus nine network card were purchased. A LAN was set up in the computer room utilising one of the computers as a server. This allowed the sharing of resources and programs from this computer. At this time students in the school won an award for a multimedia project in relation to Bogs and the GLOBE project was launched in the school.

Between 1996 and 1998 the number of computers in the school increased from ten to sixteen. These machines were acquired in a number of ways: one was purchased brand new, three were purchased second hand, two were donated to the school and one was won in an Art competition. Five of these machines were added to the network whilst the sixth was placed on a trolley for classroom use as needed. The school Website was created at this time and additional software was purchased by the school. In 1999 involvement in a SIP project increased resources to an unprecedented level in the school. This required a total change in computer infrastructure. The school is now equipped with a computer lab consisting of thirty-two machines linked to a thin client server network. In addition the machines that were previously in the computer lab have been networked and placed in classrooms. Each classroom in the school is now equipped with at least one networked PC. The Special Needs classroom is equipped with seven such machines. In addition a wide range of educational software and site licences have been purchased by the school. Most recently a video-editing computer has been purchased by the school.

There are now a total of fifty-six networked computers in the school. The IT Specialist has placed a pivotal role in this implementation, providing knowledge and expertise in respect of both technical and pedagogical considerations. The provision of the new computer lab has enthused both teachers and students and both parties are aware that this resource is not typical of all schools.

Currently a high number of teachers in the school have adopted ICT for teaching and learning purposes. In general ICT was adopted initially by the male teachers. Diffusion increased gradually as time progressed and more teachers became aware of its capabilities and applications. ICT is now adopted for a variety of purposes across a wide range of subject areas. The use of educational software and open learning tools are the most prevalent uses in this setting.

The increased rates of adoption were accompanied by staff development, which has been provided on an ongoing basis over the course of the implementation. It is estimated that some teachers in this school have attended approximately six ICT based professional development courses over the past ten years. Courses have been provided both internally and externally. Internal courses have been provided by the IT Specialist and were held both in the evenings after school and during the summer holidays. Since 1992 an ICT based

course has been provided each summer. Two full evening courses consisting of ten two-hour sessions were held during 1996 and 1997. These courses focused on educational software including how it might be used and where its use is appropriate in the primary school curriculum. All but two teachers in the school attended these courses. Course provided externally, including the IT2000 Phase 1 & 2 courses, plus the Irish National Teachers Organisation (INTO) course on ICT in the Primary School Curriculum, have also been attended by teachers in this school. Currently the school staff meeting is often utilised by the IT Specialist to inform and update teachers on the latest developments in respect of ICT in the school. This normally focuses on the latest software available in the school and how it may be integrated into the school curriculum. Informal demonstrations are also often given to staff members.

Barriers Which Were Overcome

Initially when ICT was introduced there was, as described by a number of interviewees, a fear and shyness regarding its use rather than direct resistance to its implementation. This fear and shyness was overcome gradually as teachers became more familiar with the technology and were shown its potential benefits and uses. The provision of ICT based professional development also helped over come this fear factor. Of the fourteen teaching staff in the school only two do not use ICT for teaching and learning. These teachers have not partaken in any ICT based professional development, either internal or external. One of these teachers identified family commitments at the initial stages of the implementation as hindering adoption of this innovation. Due to these commitments this teacher was unable to attend the courses on offer and has found it difficult to catch up since. The second teacher does not utilise ICT for teaching and learning on the basis that it is not formally required as part of the primary school curriculum. This teacher uses the computers for personal purposes, mainly emailing, on a regular basis. There has been no pressure put on these teachers to use ICT for teaching and learning and it is the norm that these teachers swap with their colleagues so that the students in their classes get the opportunity and experience of using ICT.

Prior to the installation of the new computer lab there were numerous technical problems arising to a large extent from the fact that a lot of the machines were old and second hand and thus in generally poor condition. One of the main problems arising was the lack of sufficient memory and hard disk space in a lot of these machines. Other problems mentioned include the lack of CD ROM facility in some of the machines and need for maintenance of printers. A further related problem has been the availability of funding both for the purchase of new equipment and for the repair and upgrade of existing equipment. The IT Specialist has been responsible for the day-to-day maintenance of the network. Assistance from external sources is sought only in extreme cases. However there are now much fewer problems given the installation of the new facility. The IT Specialist also cites the lack of guidelines on what to purchase, both in terms of hardware and software, as a further problem in respect of ICT implementation.

The Present

Description of the Reform

The willingness to improve and openness to innovation has facilitated a range of initiatives in this setting (both ICT and non-ICT based). There are a number of ongoing non-ICT based projects that reflect this ethos and which illustrate the progressive nature of the school.

The school is currently in its third year of involvement in an EU Commenius project which involves a variety of pupil projects and teacher visits to partner schools in Greece, Spain and Italy. It is one of a small number of schools chosen to pilot the teaching of a European language at primary school level and has been involved in a teacher visit system with a rural school. The school is currently in the second year of a teacher

exchange with another school and has participated in a system of reciprocal principal visits with a school in London. Each year the school hosts an American student teacher on behalf of the local teacher education college and participates in an exchange of students with a school in Northern Ireland.

A high level of community involvement is also evidence of the schools' openness. A swimming club organised by the Parent's Association is held each Saturday in the local swimming pool and a cake sale is hosted each Christmas to raise money for locally based charities. The school has been strongly involved in local recycling initiatives. Photo exhibitions and school plays have also helped form links with parents and the local community.

Description of ICT in the School

Each teacher and class in the school is timetabled for one third of a day in the computer lab. In addition access to networked facilities are available in each classroom. The general level of student and teacher ICT use in this setting is high. ICT is used widely across the curriculum and is integrated in a range of subject areas. Classes observed in the computer lab where ICT use was in evidence were in the areas of English, Maths, and Geography. Other classes observed involved the use of adventure and simulation software packages which promote problem solving across a range of disciplines including Maths, English, Geography and History. Other uses in evidence in the school include the use of computer based programs to produce class magazines and projects on topics in History, Geography and Religion.

The Internet has facilitated a range of activities by both teachers and students in this school. Students have been involved in an email project with foreign schools and selection of the students' creative writing, poetry and artwork are published on the school Web site. In addition the school is involved in an ongoing basis in the GLOBE Program which involves the daily sending off of weather data collected from the school weather station via the Web.

The most common use of ICT for teaching and learning are based on educational software and open learning tools. Data from both observations and interviews indicate a wide range of uses across different classes. All classes experience writing and desktop publishing using the Edit, Ovation and Textease software packages. Packages that aim to improve students' spelling and use of grammar are also used. In Maths students reinforce their learning of tables through the use of the Tables Tester software package and an open tool entitled Junior Pinpoints is utilised in the teaching of bar charts. One class observed involved students using this package to input data and to produce a bar chart representing this data. This data was initially gathered as part of a project on technology use undertaken by fifth class students in the school. ICT is also integrated across all classes in the teaching of the Irish language and of Art. Packages entitled Dazzle, Paint, ClipArt and Draw are all utilised in respect of Art.

Students in third and fourth classes utilise a range of mainly Maths based software. Maths Circus and Table Aliens packages focus on tables, shapes and angles, and take a game type format. Granny's Garden and Molly Mole aim to develop logic, reading and memory skills. A package entitled Talking Clocks is utilised to reinforce teaching of the time. In one class observed, a group of fourth class students were using these packages at a single computer in the corner of the room whilst the teacher was teaching the remainder of the students in a whole class context. Some Geography based software is also used with these classes, including Kingfisher Micropedia, the Egyptians and Eire. In one class observed students were required to find the answers to a worksheet based on earth science using the Kingfisher Micropedia software package.

Fifth and sixth class students experience a broad range of ICT based activities. Classes observed included the use of problem solving adventure type software, namely Spy Catcher and Crystal Rain Forest. Students

in these classes have also used a multimedia creation package called Magpie, and have participated in email projects with students in other countries. Sixth class students have also been involved in the maintenance and updating of the school Web site.

In the Special Needs class Starspell is used to reinforce the teaching of words and spellings. In this case a word is displayed on screen and the student is required to type this word. A 'well done' message is displayed after each correct spelling. Table Aliens is used to reinforce the teaching of tables. Here students are required to link the sum to the correct answer using the mouse. In addition to these drill and practice type activities some open tools including Textease and Stylus are also utilised with this class. These packages allow students to create short stories and to add pictures to the text. In the class observed, normal class teaching was heavily interspersed with ICT based activities. It is acknowledged that Special Needs students have benefited immensely from the application of ICT based activities. Improvements in terms of phonics and motor skills are mentioned specifically.

Impacts of ICT

The integration of ICT has impacted on all parties involved, including the IT Specialist and both teachers and students. As part of the SIP project the IT Specialist has now been allocated two days per week out of class to allow for the planning, implementation and maintenance of the hardware and software used in the school. Responsibility for staff training, the creation and monitoring of pupils email accounts and report keeping on the progress of the project are also included as part of this time allocation. As a result the IT Specialist finds that there is greater commitment required in terms of the number of hours spent in the school, and that his workload is heavier than it was prior to undertaking this responsibility. The IT Specialist also finds that a lot more days are spent away from the school, given its high profile in respect of ICT use.

A high number of teachers have been impacted by becoming involved and in undertaking staff development in respect of ICT. Considerable time has been donated by these teachers, of their own accord, outside of school hours. Other than use in respect of teaching and learning, teachers have also utilised computers for administrative and planning purposes including the creation of worksheets, certificates and the maintenance of pupil records.

The use of ICT has provided a greater range of learning activities for all students in the school. It is felt that students benefit from the lifelong learning aspect of ICT use and that they are better prepared to assess and use information both in their schoolwork and for the future. Apart from Special Needs students, it is felt that girls have also particularly benefited from ICT use. Initially it was found that boys were inclined to dominate ICT use. However as the technology has been used more and more, it is found that girls are now equally as comfortable with its use. It is felt that girls may consider technology options more favourably in the future given this experience.

A further impact has been in relation to the schools' links with local businesses and parents, which have been fostered through the schools' need for both resources and expertise. A number of local companies have donated out dated equipment to the school and one parent and local businessman has been particularly involved in assisting the IT Specialist on an informal basis.

There are no expansions in terms of ICT resources planned in the short term, other than to update the software and the software licences available in the school. However ongoing staff training in relation to new software, and the new digital video facility, is planned. The IT Specialist believes there is need for a new whole school plan in relation to ICT which will take into account the progress made in recent years. The need for technical support and maintenance is also mentioned in terms of sustaining current provision and facilitating progress in respect of ICT in the school.

Hypotheses 1-5

Hypothesis 1

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

Evidence in support of Hypothesis 1:

The use of ICT has facilitated a change in approach for a high percentage of teachers in this setting. Here the emphasis is on the integration of ICT into the curriculum and use is prevalent in a range of subject areas including English, Irish, Maths, History and Geography. This innovation has been reliant more on the use of educational software and open learning tools, than on use of the World Wide Web.

The use of technology has facilitated a range of student outputs including a survey of technology use and a magazine consisting of stories written by students. Project work completed by students has been compiled electronically and is on display in the schools corridors. Whilst these activities may have been possible previously, the use of technology has added a further dimension to this work. This too is consistent with the policy of integrating ICT where possible into all teaching and learning activities.

The integration of ICT has allowed students to experience a range of computer based activities, from basic applications and skills to the use of different software packages in various subjects areas. Students have also been enabled to communicate on a global basis and to partake in a worldwide project. This variety has provided a motivational aspect for the students and has helped increase their interest in learning. Classroom observations and data from student interviews indicate that students enjoy and are highly engaged in ICT based learning activities.

Evidence in support of the rival Hypothesis:

ICT is identified as one of a number of elements which taken together contribute to the positive climate evident in the school. Other elements identified include the participation of the school in various sports, talent competitions including a school play, music events and quizzes. In this respect ICT is an element and contributing factor to general innovation and improvement rather than a strong catalyst.

The general climate of innovation and improvement evident in the school is attributed to the open mindset which exists amongst the school staff, and the style of leadership exercised by the school principal. This style of leadership is characterised by an openness to change and a willingness to take on board staff suggestions. The application of ICT in the school is an example of this. The willingness to innovate in general and openness to change, lead to the introduction of computers to the school setting, on the basis of suggestions put forward by an individual teacher in the school. This teacher has since become the IT Specialist in the school. The same mindset which lead to innovation in respect of discipline and administration, has too led to the introduction of technology in this setting. The wide range of uses of technology in evidence is also a result of this open and innovative mindset.

On balance there is more evidence to support the rival hypothesis at this school.

Hypothesis 2

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

Evidence in support of the Hypothesis:

The introduction of ICT has been driven by the IT Specialist with the co-operation of the school principal. In Rogers' terms these two people can be regarded as the innovators. The school principal has been supportive and open to this innovation from the start. In the early days, the allocation of funding from the school budget to support the purchase of computer hardware and software clearly signalled support for both the innovator and the innovation. The IT Specialist has been the main driving force in respect of ICT in this setting: he initiated the implementation and is currently responsible for the planning, implementation and maintenance of hardware and software in the school. The IT Specialist has also provided professional development for other teachers in the school and has encouraged and facilitated its application to a range of subject areas.

Data from the teachers questionnaire and in school observations indicate that there are some teachers (although relatively few) who are not comfortable in carrying out a range of computer based tasks and who thus are reluctant to use ICT for teaching and learning purposes. In terms of Rogers' theory the majority of others in the school may be categorised as early adopters and early majority adopters. This suggests that the school staff includes the various categories of adopters as outlined by Rogers.

The IT Specialist has provided professional development for teachers through internal courses and has adopted the approach of demonstrating possible uses to teachers both informally and at staff meetings. This has aided the diffusion process and is consistent with Rogers' assertion that the rate of adoption by potential adopters is dependent on the perceived relative advantage to be gained from adoption of the innovation. At the very start diffusion was hindered by externally provided training which related negatively to the complexity of the innovation. This too is consistent with Rogers' theory in relation to the rate of diffusion the innovation.

Although each class is timetable in the computer lab for the equivalent of one third of a day (1.5 hrs) per week, some teachers do not take up this time or swap with another teacher so that they do not have to teach in this location. This too is indicative of a small number of laggards within the school staff.

Evidence in support of the rival Hypothesis:

As each class is timetabled in the computer lab for the equivalent of one third of a day (1.5 hrs) per week it may be argued that this exerted a certain pressure on staff to use the computer lab during this time, irrespective of their personal preference. This may also help explain the high number of early and early majority adopters present in the school. In the case of one class observed, the teacher in question had been working on a substitute basis in the school for a period of only five weeks. Although present in the school for this relatively short period of time, this teacher had already adopted ICT for teaching and learning purposes. Pressure from students may also be a factor in this early adoption.

In summary the diffusion pattern observed in the school closely followed Roger (1995) diffusion pattern

Hypothesis 3

1. *Successful implementation of ICT depends mostly upon staff competence in the integration of ICT into instruction and learning. This hypothesis assumes that teachers mediate ICT applications when they are successful, and that ICT s academic value relates positively to teacher competence. The rival hypothesis is that the school technological infrastructure and student ICT competence rather than staff competence determine ICT implementation outcomes.*

Evidence in support of the Hypothesis:

The knowledge and experience of the IT Specialist has been instrumental not only in initiating the implementation, but also in the day to day maintenance and upkeep of the network. The IT Specialist has also been involved in providing ICT based professional development for the other teachers in the school and in advising teachers in relation to possible software integration in various subject areas. In respect of maintenance the IT Specialists' technical knowledge is key to the upkeep of the network and in maintaining its academic value (by providing on the spot technical assistance) on an ongoing basis. The competence of the IT Specialist is the main factor in respect of ICT planning, implementation and maintenance in this setting.

There has been a high attendance by teachers in this school at ICT based professional development courses over the period of implementation. It is estimated that most teachers have attended six such courses over the past ten years. This may be linked to the high level of integration of ICT by teachers in this school. Teachers have attended course both internally, provided by the IT Specialist, and externally, provided by the Government as part of the IT2000 policy. It is felt that this training has given the teachers the confidence to use ICT for teaching and learning, and that teachers must be shown the benefits of its use. In addition training in respect of ICT is given to all new teachers employed in the school.

The small number of teachers who have not been involved in the integration of ICT have not attended ICT based professional development courses on the basis that they take place outside of school time and involve no financial remuneration. This again emphasises the link between teacher competence and integration of ICT. Teachers who have not developed the required confidence will shy away from its use.

The school has recently benefited in terms of resources by its involvement in a SIP project. As a result the school is equipped with a new computer lab and the machines that were originally located in the lab have been networked in individual classrooms. The new facility has enthused both teachers and students. The presence of an existing infrastructure in the school, in terms of staff training, knowledge and use, prior to this introduction has been a major contributing factor in ensuring that this served to further increase the level of integration in this setting.

It is acknowledged that students categorised as Special Needs have benefited extensively from the increased emphasis on ICT in the school. The competence of both the IT Specialist and the Special Needs teacher (who is currently completing postgraduate study in this area) in selecting and implementing appropriate software has been a key factor in respect of improvement in this area.

Evidence in support of the rival Hypothesis:

It is acknowledged that some of the sixth class students are more competent in the use of computers than the teachers themselves. Some of the teachers interviewed mentioned that on occasion if a problem developed

in class they might call on a particularly able student to rectify the problem. It was also mentioned that the high level of student computer literacy might be an off putting factor for some teachers, as they fear being shown what to do by students. In one class observed, students were grouped in pairs consisting of one weaker and one more able student, the intention being that the more able student might support the weaker.

Students are taught basic IT applications on a progressive basis from third through to sixth class and are shown how to use various ICT peripherals including scanners and digital cameras. Students are often called upon to put these skills into practice for various purposes including project presentation and the formulation of multimedia presentations. Student ICT competence and the technological infrastructure present are key to determining implementation outcomes in these cases. In one class observed a group of three students were working at a computer whilst the teacher was teaching Irish to the class group. Here the teachers' only intervention was to ensure that the rota in place in respect of computer use was adhered too. Student competence again determines implementation outcomes in this case.

It is acknowledged that Special Needs students benefits from the use of software which allows them to work unaided, and to perform repetitive tasks in a non-threatening, non-judgemental way. Here the students' ability to manipulate and use the software is key to determining the implementation outcomes. As students are working independently it is necessary that they are proficient in use of the software for positive learning outcomes to occur.

Hypothesis 4

1. *Gaps in academic performance between high and low poverty students will not increase when all students have equal access to ICT. The rival hypothesis is that equal access to ICT will lead to more advantaged students increasing the performance gap with disadvantaged (high poverty) students.*

Evidence in support of the Hypothesis/ rival Hypothesis:

In examining the evidence it is important to note that the majority of students attending the school were from middle class homes. A survey carried out by students in the school revealed that 98% of the students had access to a PC at home therefore this hypothesis cannot be adequately tested within the context of this particular school. Nonetheless many interviewees commented that ICTs benefited all students within the school regardless of ability but highlighted that students of high and low abilities were impacted in different ways. It was felt that high ability students could quickly learn how to use the technology and reap the full benefits of its use, whereas students of lower ability tended to benefit from improved presentation of work, which had a strong motivational force.

Teachers commented especially on the benefits of ICT with special needs students, although bearing no relationship on socio-economic background, there was clear evidence that this disadvantaged group greatly benefited from the use of ICTs. These benefits have reduced the gap between these and other students.

A number of interviewees felt that girls benefited greatly from the recent IT investment. In the past when students were exposed to computers teachers noted that boys would tend to dominate the use of the computer. However with increased competence this gap in use is no longer evident.

A recent student survey revealed that 98% of the students within the school had access to ICT facilities in the home. This statistic was not surprising as the school was located in a middle class suburb. Students attending the school were not from mixed socio economic backgrounds it was therefore difficult to unearth evidence to support this hypothesis or the rival hypothesis.

Hypothesis 5

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.*

Evidence in support of the Hypothesis:

Although the World Wide Web is used in student project work, the predominant use of the computer equipment was with educational CD ROMs (crystal rainforest, spycatcher, map detectives) and open tools such as Textease. The effective use of this type of software, particularly open software, is dependent on teacher expertise and competence and is not dependent on the quality of the software used.

All ICT use was integrated within particular subject areas and was therefore seen as a tool or additional resource by the teachers concerned. As with all other resources available to the teacher, ICT played a small but important role in enhancing and improving teaching and learning. Therefore the effectiveness of the resources used was not dependent on the quality of software but on the skills and competence of the teacher and their ability to successfully integrate its use into teaching and learning.

Use of the Web within the school was closely monitored. The school had a clear policy on the use of the web and no student could access the web without the supervision of a teacher. Use of the Web also tended to be specific, for example, students would access the Web to search for relevant material for a project or assignment. Therefore all use of the Web was targeted towards a specific focus, which prevents students from aimlessly browsing irrelevant content.

Evidence in support of the rival Hypothesis:

The IT coordinator is assigned time during the week to evaluate and select relevant software for use in the school. Given this investment in time software is seen as a key factor in determining the success of the integration of ICTs. The IT coordinator also commented that the majority of educational software available to schools was of a very poor standard.

In examining the evidence presented it is difficult to determine whether the quality of the ICT materials have had an impact on the quality of use and effectiveness of the integration. Several types of educational CD ROMs were used by students of all ages. On the other hand, teachers also used open software such as Textease. However there is more evidence to suggest that the hypothesis holds in this case.

Projections to the Future

Sustainability

The open and progressive ethos in the school suggests that the school will remain receptive to new reforms. Reform was recognised by all teachers interviewed as an ongoing process aimed at improving the learning environment. The use of ICT will remain a central reform in the school and the addition of the new resources will help broaden the use in more subject areas and by more members of staff. Further reform in the area of ICT was not mentioned by many teachers as the present focus in the school aims to fully utilise the current resources. Nonetheless the vision of the school principal and the IT coordinator and the active participation of the teaching staff will ensure that the school remains up to date with ICT.

Transferability

The current levels of integration of ICT in teaching and learning could not be easily transferred to other schools for a number of reasons. The open and progressive culture developed by the principal and staff since the founding of the school has facilitated change within the school. This open culture is not easily transferable to other schools as it requires support from all staff members. The school also had a highly skilled IT coordinator that was recognised by all teachers as the main driving force behind IT use in the school. His IT skills were essential in maintaining and developing current levels of usage and supporting other teachers use of ICT. As part of the Schools IT2000 initiative the IT coordinator was also given time off his teaching duties to maintain the computers in the school. Without the skills and expertise of the IT coordinator and the support of the principal and staff the present levels of ICT use would not be possible.

The above factors have all played important roles in achieving the current level and usage of ICTs within the school. This level of integration could not be achieved within other schools without the existence of the above factors.

Appendix A

All fieldwork was undertaken during January/February 2001.

Teacher Interviews

Principal interview (Dr. Jim Gleeson) (90 minutes approx.)

IT Specialist interview (Dr. Jim Gleeson) (1hr approx.)

Special Needs teacher (Dr. Jim Gleeson) (1hr approx.)

Vice Principal interview (Oliver McGarr) (45 minutes approx.)

Teacher 1 interview (David O Grady) (45 minutes approx.)

Teacher 2 interview (David O Grady) (45 minutes approx.)

Teacher 3 interview (Keith Johnston) (45 minutes approx.)

Teacher 4 interview (Keith Johnston) (45 minutes approx.)

Teacher 5 interview (Keith Johnston) (45 minutes approx.)

Teacher 6 interview (Oliver McGarr) (45 minutes approx.)

Parent Interviews

Parent interview 1 (David O Grady) (30 minutes approx.)
Parent interview 2 (Oliver McGarr) (30 minutes approx.)
Parent interview 3 (Oliver McGarr) (30 minutes approx.)
Parent interview 4 (Keith Johnston) (30 minutes approx.)

Student interviews

Student interview 1: Sixth Class Group (Oliver McGarr) (40 minutes approx.)
Student interview 2: Third Class Group (David O Grady) (40 minutes approx.)

Classroom Observations

Class	Subject	Teacher	Location	Observer
3rd	Geography	Class teacher	Computer Lab	Keith Johnston
3rd	English/Geography	Class teacher	Computer Lab	Keith Johnston
4th	English writing	Class teacher	Computer Lab	David O Grady
5th	Environmental Studies	Class teacher	Computer Lab	David O Grady
5th	Using Spycatcher	IT Specialist	Computer Lab	Oliver McGarr
5th	Maths/English	Class teacher	Computer Lab	Oliver McGarr
5th	English writing	Class teacher	Computer Lab	Oliver McGarr
5th	Maths/Graphs	Class teacher	Computer Lab	Keith Johnston
6th	Using software	Class teacher	Computer Lab	Oliver McGarr
4th	As resource	Class teacher	Room13	Keith Johnston
6th	English	Class teacher	Room 6	David O Grady
SEN	As resource	SEN teacher	Room 27	Keith Johnston

Outside-of-Classroom Observations

Keith Johnston and Oliver McGarr

Appendix B

Questionnaire distributed to all staff members (13) with 13 responses.

How comfortable are you with using a computer to do each of the following?
Choices are:
1. Very comfortable
2. Comfortable
3. Somewhat comfortable
4. Not at all comfortable

	1	2	3	4
1.Write a paper	6	1	3	3
2.Search for information on the World Wide Web WWW	7	3	2	1
3.Create and maintain web pages	2	2	1	8
4.Use a data base	3	3	1	5
5.Develop a data base	3	1	2	7
6.Send and receive e-mail	7	2	2	2
7.Write a programme	3	0	0	10
8.Draw a picture or diagram	5	1	2	2
9.Present information (e.g., use PowerPoint or equivalent	4	2	1	5

How important is each of the following computer-related skills for your teaching?
Choices are:

1. Very important,
2. Important,
3. So-so, and

1. Not important at all

	1	2	3	4
10.Write a paper with a word processor	3	3	2	5
11.Search for information on the WWW	2	7	2	2
12.Create web pages	0	1	3	8
13.Use a data base	3	3	3	4
14.Develop a data base	1	0	5	7
15.Send and receive e-mail	2	8	0	3
16.Write a programme	0	0	2	11
17.Draw a picture or diagram with a graphing/drawing application	2	5	1	5
18.Present information (e.g., use PowerPoint or equivalent)	2	2	4	5

During the past school year, how often did your students on average do the following for the work you assigned? Choices are:
1. Several times each week
2. Several times each month,
3. A few times
Never

	1	2	3	4
19.use the World Wide Web	0	3	8	1
20.create web pages	0	0	3	9
21.send or receive e-mail	2	1	5	4
22. use a word processing program	3	5	3	1
23. use a computer to play games	0	4	5	2
24. use a spreadsheet	0	0	0	12
25. use a graphics program	1	3	1	7
26. join in an on-line forum or chat room	0	0	0	12
27. use a presentation program (e.g., PowerPoint)	1	0	1	10
28. use an instructional program (including simulations)	1	4	3	4

29. other computer uses (specify)				

30. How would you rate your ability to use a computer?
<u>Choices are</u>: *(Please tick appropriate box)*

Good	<u>5</u>
Fair	<u>5</u>
Poor	<u>3</u>

Answer questions 31-38 based on experiences or policies from the last school year.

31. Was student computer use ever evaluated for grading?
(Please tick appropriate box)

Yes	0	No	11

32. If you assigned World Wide Web searching, how much freedom did you allow students in locating sites to visit?

(Please tick appropriate box)

no restrictions	0	some restrictions	1	designated sites only	9

33.Did you create or modify a Web site with any of the classes that you taught?
(Please tick appropriate box)

Yes	3	No	9

34.What portion of the computer use in your classes was directly related to the course content?
(Please tick appropriate box)

all	3	most	4	some	2	very little	2

35.What portion of the computer use that you assigned was done by students individually?
(Please tick appropriate box)

all	2	most	4	some	3	very little	3

36. If you have a computer at home, how often did you use it for preparing for teaching?

(Please tick appropriate box)

Several times a week	2	Several times a month	4
A few times	2	Never	3
No computer	2		

37. Did you participate as a student or instructor in a virtual course through the Internet/World Wide Web?

(Please tick appropriate box)

Yes	1	No	10

38. Did you involve your students in collaborative learning over the Internet/World Wide Web with students from other classes?

(Please tick appropriate box)

Yes	4	No	8

39. Are you currently using technology to collaborate with other teachers (professional chat rooms, forums, or the like)?

(Please tick appropriate box)

Yes	3	No	10

40. How many e-mail messages do you send each week on average?

(Please tick appropriate box)

More than 12	2	6-11	0
1-5	7	None	4

How many of the following have you ever done?

41.Made changes to a computer s hardware
(Please tick appropriate box)

Yes	1	No	12

42. Updated an application program (word processor, graphics program, etc.)

(Please tick appropriate box)

Yes	1	No	12

43. Recovered a damaged file
(Please tick appropriate box)

Yes	1	No	12

44. Created a web site
(Please tick appropriate box)

Yes	1	No	12

45. Developed a data base

(Please tick appropriate box)

Yes	3	No	10