

**AN ANALYSIS OF TEACHERS' USE OF ICT
IN A SELECTION OF IRISH SCHOOLS**

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1 Summary

1.1 Summary

The Government of Ireland has made a large financial investment in the field of Information and Communication Technology in the Irish educational sector. The Author was interested to discover how teachers have benefited from this investment.

A questionnaire and interview based study was conducted in a number of primary and secondary schools. This allowed for the selection of ICT interested teachers for interviews. The interviews were designed to cover the range of uses that teachers were making of the technology. This included class preparation and in class use. The interviews concluded by offering the teachers an opportunity to voice their opinions as to the future of ICT in Irish classrooms. The teachers suggested strategies that could be implemented to increase the amount of ICT usage by teachers in Irish classrooms.

This study showed that only a minority of teachers are actually making regular use of ICT for class preparation or in class with their students. However, the majority of Irish teachers have some ICT skills. Many of the interviewees believed that it was a lack of on-site support that was preventing teachers from making greater use of their technological facilities. This was due to the fact that many teachers do not have the technical knowledge needed to repair the technology if it breaks down during class.

An interesting finding of the research was that the age of the teacher appeared to have an impact on the amount of technology usage that took place. Teachers in their thirties were seen to be the group making the most use of ICT. This group of teachers should be encouraged to help the integration of ICT into all Irish classrooms. The research also

revealed differences in ICT use in primary and secondary schools, and an emerging need for professional on-line communities.

2 Introduction

2.1 ICT and Irish Education

Information and Communication Technology (hereafter ICT) has become a common part of every day life for young people in Ireland. In fact Ireland has become associated with the technology industry and many Irish jobs have been created within this sector during the last thirty years. With this in mind, the Government has invested heavily in the integration of ICT into Irish schools. They aim to equip the students with the necessary skills to live and find jobs in this age of technology. In order to be able to do this, the schools and teachers need to be equipped with the hardware and skills necessary to use it. The research presented in this thesis is to examine whether this investment in skills and resources for teachers has been successful. The Author wonders if teachers have been given the means to ensure students are sufficiently prepared to meet the demands of life in a technology based society.

This thesis shall begin by reviewing some of the background initiatives which have been put in place to achieve these goals. In particular the study presented in this thesis stems from the changes that have been put in place by two governmental responses, Schools IT 2000 (DES, 1997) and Blueprint for the Future (NCTE, 2001). The Schools IT 2000 program is of interest as it was the first initiative designed by the Government to bring the Irish education system up to date with technology. Blueprint for the Future was a continuation of the successes that had been achieved through the implementation of Schools IT 2000. It was designed to develop these positive outcomes and build on them to solidify the integration process. The Author identified these initiatives as the most important for this study as they have created the foundations upon which our educational technology infrastructure has been built. For this reason, each of these initiatives will now be explored in more detail.

The use of computers in Irish education began in the 1970s (Murray, 2004). At this time computers were large and expensive. Throughout the 1980s courses were run in ICT for teachers so that when computers became affordable there was a cohort of trained teachers who knew how to use them. However, it was not until the late 1990s that ICT began to have an impact in Irish schools. It became a Government priority as Ireland tried to catch up with its European neighbours. The Government developed a programme of action to meet this objective. The programme was known as Schools IT 2000.

2.2 Schools IT 2000

The Schools IT 2000 programme was launched in November 1997. It ran until the end of 2001. The Government committed £40 million to the program which was to be supplemented by investment from the National Partnership. Telecom Eireann (later known as Eircom) invested £10 million to ensure that every school had Internet access within two years. Ultimately the aim of Schools IT 2000 was to ensure that every student in the country had the opportunity to develop IT skills and be able to live within the information society. They also pledged to give support and training to the teachers to enable their objectives to be met. In order to meet their aims and objectives a number of structures were put in place. These included:

1. An ICT coordination unit in the Department of Education and Science (DES) to act on behalf of the Department on all matters relating to ICT,
2. The National Centre for Technology in Education (NCTE) to devise policy proposals and advice the Department on policy issues,
3. A Schools IT 2000 base in the education centres to provide regional support for the teachers.

(DES 1997: 5)

The Schools IT 2000 program was composed of three sections upon which to focus the Government and their Partners' investment. These were:

- Technology infrastructure
- Skills infrastructure
- Support infrastructure

(DES 1997: 3)

The technology infrastructure was designed to enable all schools to have the necessary equipment and an Internet connection to benefit from the educational resources available on the web. It was also hoped that it would encourage further development of relevant curriculum resources. The skills infrastructure aimed to upskill a minimum of one teacher per school in the use of ICT within the curriculum. It was planned that this would be supplemented by the development of pedagogic skills to integrate ICT into Irish classrooms. Finally the support infrastructure was seen as an essential component of the program. Systems were to be put in place to help the teachers through the implementation process. Some of the structures have been outlined above. These were to operate alongside the establishment of Scoilnet, the online portal for education recognised by the DES. The Scoilnet site was to be an arena for support, advice and multimedia resources suitable for the Irish curriculum. Another supportive strategy was the development of the School Integration Project (SIP). This project was to work on all educational aspects including policy, training models, teaching strategies and classroom resources that would ensure ICT adoption in Irish schools (DES 1997: 7).

The funding was to be divided so that 60% was directed towards the establishment of a good equipment base with the remaining 40% to be spent on training, resources and

support. This is an interesting breakdown of funding given that support was to be an essential component of the policy. Mulkeen (2004) found that equipment is only of concern when it is in short supply or out of date. Training and support are seen to be more critical factors once the infrastructure has been established. The focus of the Schools IT 2000 on infrastructure highlights how lacking in technological equipment the Irish education sector had been.

The Schools IT 2000 program has had mixed success. Every school in the country now has at least one multi-media computer and access to the Internet. This sounds very positive and implies the success of the program. However it does not consider the quality, location or usefulness of the connection. Mulkeen (2004) found that the levels of equipment in Irish schools are quite good but that funding should now be directed towards the replacement of out-of-date technology as he states that 13% of computers in use in our schools are over 6 years old (2004: 7).

Schools IT 2000 has been highly successful. Its aim was to train at least 20,000 teachers and a minimum of one teacher per school. In fact, Mulkeen (2004) found that 80% of Irish teachers rate themselves as having “some ICT skill” (2004: 18). He also found that teachers are now looking towards a change in the type of training on offer to them. They are more concerned about curriculum focused courses and maintenance skills than basic skills courses. This was also reflected in the range of courses currently on offer in the education centres (see www.ncte.ie/ICTTraining/CourseSchedule for details).

It is in relation to supporting the teachers in the adaptation of ICT into their classrooms that Schools IT 2000 has been the least successful. It aimed to use Scoilnet as an online

support and advice centre. While Scoilnet is up and running with this information, it is not widely used by the teachers. Many schools tend to go directly to the NCTE website. Murray (2004) found that Scoilnet has not proved to be as successful as its terms of reference are too broad. He found that it contains a small amount of information on a lot of topics and subjects rather than developing the best possible resources on a smaller variety of topics. Greater effort needs to be made to promote the use of the site by teachers. While the NCTE strives to promote Scoilnet in all of its literature, it is still generally overlooked by the teachers. The teachers also need to be encouraged to publish their best practice and own curricular resources on Scoilnet so that they are easily accessible for all teachers across the country.

2.3 Blueprint for the Future

Schools IT 2000 achieved a great deal in a short space of time. Its greatest success was in the delivery of ICT skills to so many teachers. The program finished in 2001. It was replaced by a new policy, "Blueprint for the Future of ICT in Irish Education" which was launched by the then Minister for Education and Science Dr. Michael Woods just before Christmas of 2001. This policy was designed to continue on from the success of the Schools IT 2000 program. The plan was to guide the integration of ICT into our schools over the following three years. The Government pledged another €107.92 million for the enhancement of ICT in Irish education. The aims of this document were quite similar to those of Schools IT 2000.

In terms of infrastructure, the DES wished to expand the hardware that was available in schools; in particular with the technology available for making connections with the Internet. One of their principles was to develop the wiring-network infrastructure and

introduce Broadband access. They also wished to reduce the ratio between computers and pupils through the use of capitation grants.

The DES wished to continue with the training of the teachers. This time they wanted the teachers to identify their training needs. This would enable the existing support structures to design training programs to meet these highlighted needs. They wished the teachers to specifically look at the area of special needs and the benefits that could be derived from ICT for these students. They also planned that the training would begin to move away from ICT skills and instead focus on the skills needed to integrate ICT into teaching and learning. This showed that the DES was listening to the teachers in relation to their training needs.

A significant aspect of the plan was the role of the Principal. The Government recognised the importance of the Principal in achieving successful ICT integration in Irish schools. With this in mind they set about training Principals to be able to draw up an ICT plan for their own schools. The basis for this was that the Principals would then be able to direct their funding so that the school reaped the greatest benefit from the integration of ICT into each individual school.

Again the Government have achieved success with their ICT integration plan. This is evident from the results of Mulkeen's Progress Report of 2004. However, the most obvious objective that they did not achieve was the roll out of Broadband to the schools by the end of the life of the policy. All is not lost here, as Broadband is currently being delivered to the schools. The aim is to have all schools with Broadband access by the end of 2006 (www.ncte.ie/Broadband/CurrentStatus/).

2.4 The Future

Overall the DES has responded well to the challenge of bringing Ireland in line with its European neighbours in relation to ICT in education. They have worked hard and invested huge sums of money. In the National Development Plan 2000 – 2006 the Government has pledged €2.1 billion for the provision of measures in:

- Educational and training infrastructures in facilities, new equipment and information technology
- Investment at 3rd level in Research and Development (R & D) and in the technological sector.

(Government of Ireland, 1999)

This shows their on-going commitment to ensuring that Ireland continues to be a leader in the field of education. The Author hopes that it is an indicator of a commitment to ensure that the funding will be available to first and second level schools to continue to develop and up grade their educational technology.

2.5 The Study

From the review of funding initiatives above, it is evident that the Government have invested large sums of money into educational technology and the support structures needed to implement it. However, the Author had anecdotal evidence that teachers were not seen to be integrating ICT into their teaching practices and wished to investigate this issue through the study. She was interested in finding out if the investment had been successful. Were the teachers and students benefiting from the integration of ICT into our schools or was the reality different? Were the teachers using the technology that had been purchased, or was it simply gathering dust in the corner?

The Author was also interested in the aims of the policies outlined above. Had they been useful for the teachers? Did they meet their needs and help to overcome any fears or difficulties they may have had in finding ways to incorporate the technology into their daily practice? The Author was particularly keen to discover where the teachers were at. She wanted to know their opinion of the future of ICT and what they believed was needed to ensure its continued integration.

A questionnaire and interview-based study of both primary and post primary schools was conducted. This allowed for the comparison of the two educational sectors. The methodology for this study is outlined in Chapter 4 while the results are presented in Chapter 5. The study informed the Author of how the teachers employed ICT in their schools and what could be done to help them increase its use in the future. The Author hoped that this research would be useful in giving the teachers a voice. It was an opportunity for them to explain how ICT impacted on their working lives. The responses of the teachers are discussed in Chapter 6.

The Author believes that Irish education is on the cusp of successful widespread integration of ICT into the classroom. She hopes that this research will point to strategies that can be employed to reach the goal of the use of ICT being normal for Irish classrooms. Once this is accomplished, it may be easier to achieve the Government's ultimate aim of developing life long learners who participate in a constructivist discovery-based environment in Irish schools.

3 Literature Review

3.1 Introduction

Since the Organisation for Economic Co-operation and Development (hereafter OECD) began its research program into ICT and the quality of schooling in 1998, the integration of ICT into our schools has become a concern for all countries involved with the OECD. It has become important to all of these countries to ensure that their schools have computer networks available to their students with access to the Internet. The governments working within the OECD plan to support this hardware investment through the use of educational software, technical support, and ICT-competent teachers. This is a very challenging project which encompasses a number of different factors. Two key issues were seen to be significant in the success of the integration of ICT into the education system. They were:

1. The centrality of the teacher in the adoption and use of ICT.
2. The adoption of ICT is not a technical implementation, but an ongoing process of educational change.

(Mulkeen 2004: 46)

The Author agrees with these findings. She wishes to consider these issues in relation to the Irish education system as it works towards greater integration of ICT into the classroom. However she does not believe that they are two separate elements. Rather the Author believes that ICT will not be successfully used in Irish classroom unless both factors are put into play simultaneously. This review considers the interplay between these factors. The review of the current research literature shall begin by considering the area of teacher ownership and input to the change process.

3.2 Ownership of Change

Much of the research conducted in the field of ICT integration into Irish schools has found a number of common themes (Mulkeen (2004), Murray (2004)). Firstly, the teachers have to be involved if the integration process was to be successful. The teachers need to have a sense of ownership of the process if they are to be in support of the change. Eisner (2000) found that teachers need to have an involvement in the change process in order for it to be successfully implemented. Once the teachers are in agreement with the integration of ICT into the school and their classrooms, then they will be more likely to give the necessary time and effort needed to achieve this goal. They would be prepared to learn the skills and new pedagogy to ensure that the school is successful in the implementation process.

The OECD and Centre for Educational Research and Innovation (hereafter CERI) carried out a case study of ICT and School Improvement in 2001 (Gleeson et al, 2001). One of their schools was chosen as a result of the local town winning a national communications competition. The school became one of a number of pilot schools for the use of ICT in education. The study found that the teachers in the school felt pressured to use ICT in their teaching practices. Initially the teachers believed that they had no choice but to get on board and integrate ICT into their classrooms. They were of the opinion that it was simply expected of them by both the parents and the government following all the investment of ICT resources into their community. This pressure added to the implementation barriers. The teachers felt that they had to take on yet another aspect to their teaching day. However, the Gleeson review found that with the help and support of a number of interested colleagues, all of the staff were trained and are now willing participants.

3.2.1 Supportive Leadership

It is clear from this example that a critical factor came into play which resulted in the teachers being in favour of the change. The Author believes that this critical factor is support. Firstly the Principal was in favour of the ICT implementation in the school. She wanted the investment to be successful. With this in mind, she ensured that all the staff received training in basic ICT skills. Secondly the Principal in the OECD/CERI case study school appointed an ICT specialist amongst the staff. This meant that the staff always had access to help and support as they implemented the changes in their teaching methodologies. The Principal also arranged to have a resource teacher take the ICT coordinator's class for an hour a week to give her the time to support and mentor the other staff members. Finally as the staff improved their ICT skills, there were a small group of staff who gave their help, guidance and support to the others to ensure the success of the implementation (Gleeson et al, 2001).

Pelgrum and Anderson (2001) found that Principal support is an essential factor if ICT integration is to be successful. This was also found to be critical factor in Irish schools (NCTE, 2001). The Author believes that schools who are trying to integrate ICT must have the backing of the Principal. They are responsible for setting the mission and vision of the school. They are involved in coordinating the ICT plan for the school. The Principal is the person who shall be the driving force to ensure all the necessary steps are taken to ensure that implementation process works. It is the Principal who can coordinate the training, funding, hardware and support as they are required. Therefore it is essential that the Principal sees the value in the investment being made. The staff will not come on board and take ownership of the change if the Principal is not supporting them.

Hennessy and Deaney (2004) researched the area of Sustainability and Evolution of ICT-Supported Classroom Practice in secondary schools in the UK. They found that heads of departments were pivotal in moving ICT integration into the norms of practice for a particular department. Once again this study shows the importance of supportive leadership. Here department heads are working with all members of their team to bring about successful implementation of ICT into their subject. They were able to create situations which allowed for a sharing of information and ideas. By encouraging teachers to help each other, the heads were able to develop safe learning environments for their colleagues. The Author is of the opinion that it is this combination of the supportive leadership and the collective ownership of the change that made the study so successful. In fact, the teachers were found to have further developed their ICT initiatives three years after the study, despite not knowing that a follow up study would ensue.

3.2.2 Teachers

The Author considers that the implementation process in the OECD/CERI case study school was successful for a second reason. Once the teachers came on board with the idea of ICT integration they felt that they had ownership of the change. They were involved in all of the planning stages. The Author believes that the teachers will be more likely to embrace a change, in this case ICT integration, if they are involved in designing the change themselves. In the case study school, the staff decided as a group where and how the computers were going to be located in the school. They were also involved in designing their own curriculum and timetable for the computer room. Fullan (2001) points out how the change process rarely works out exactly as planned. This is due to the fact that teachers make changes to the implementation so that it best suits them and their classroom activities. In the case study described here, the staff continued to work

together and share ideas to ensure that the ICT programme was of ongoing benefit to their pupils.

The example of the case study schools could easily be achieved in Ireland. The Author is of the opinion that this is an area where other Irish schools can learn from the success of the case study. She believes that all the staff needs to work together as a group including the Principal. This is their opportunity to take ownership of the implementation process and their curriculum. Barnett (2001) found that a new implementation will only be effective when all stakeholders have the opportunity to have an input into the goals of the plan. This is what makes ICT implementation in secondary schools more difficult than at primary level. The segregated nature of the second level timetable makes it more difficult to integrate ICT as there are both time and access limitations to be taken into account. Primary schools have the benefit of a single teacher per class which allows for greater flexibility during the school day.

3.2.3 Curriculum

Davis (2001) reviewed the “National Grid for Learning” (NGfL) in the UK. She found that the barriers between teachers in both their classrooms and subject areas are being broken down by the NGfL. The use of technology has resulted in a more project and themed based curriculum rather than a subject specific one. The Author believes that such a themed curriculum allows the teachers to have a greater sense of ownership of the curriculum. This is seen in the new Primary Curriculum for Irish Primary Schools.

The curriculum envisages an integrated learning experience for children. In order to achieve this, strong emphasis is placed on planning. Within the framework of the curriculum schools are afforded flexibility to plan a programme that is appropriate to the individual school’s circumstances and to the needs, aptitudes and interests of the children

(Primary School Curriculum, 1999: 10)

This is not yet the case in Irish second level schools as they are still taught on a subject specific basis. The Author believes that if ICT is to be as successfully integrated into the post primary education system as it has been in the primary sector then fundamental changes will have to be made to the post primary system. The system will have to accommodate cross subject curricula. The NCCA have begun to design a Leaving Certificate Program which would allow for this. One of the principles of the program is to allow individual schools flexibility to design programs that best suit the needs of their students and the school (NCCA, 2005). The Author believes that this greater flexibility, and hence ownership of the curriculum, will encourage teachers to become more creative and innovative in their use of ICT in their classrooms. It should allow for a more project based, cross curricular approach to be taken. However, the current Minister for Education and Science, Mary Hanafin, has opposed greater use of project work especially when considering plagiarism and outside help (Flynn, 2005). A more flexible, themed curriculum could promote the desired outcome of greater ICT use in second level schools. Once again, the Author wishes to point out that it would be essential to have the support of the teachers before such a programme could be a success. She believes that it would be a step in the right direction to encourage life long learning and the development of useful, creative ICT literacy for all of our students.

3.3 Training

In this section of the literature review the Author wishes to consider the impact of training on teachers use of ICT. She will now focus specifically on the literature discussing the subject of teacher professional development and training in ICT.

Change is a progressive process. So too is the integration of ICT into schools. Initially it is championed by a few enthusiastic teachers who have a personal interest in the use of ICT. With practice, these teachers become increasingly successful in their use of the new technology. As the news of their success spreads, their colleagues become more interested in this new methodology. They begin to attempt some ICT use in class for themselves. Gradually, as the new variation of their teaching style is seen to be of benefit, increasing numbers of teachers will be prepared to make the change and incorporate ICT into their teaching repertoire (Hennessy and Deaney, 2004). OECD expect that

As ICT gains acceptance in schools, it may become both the driver and facilitator of change

(OECD 2001: 35)

As ICT is accepted in the schools, further teacher training will be required. This training should be designed to meet the range of needs of all teachers as they progress through the different stages of their careers. The national survey of ICT in school in Ireland found that there was a connection between ICT integration and training (Mulkeen, 2000). The NCCA (2004) found that

If ICT is to be available to *all students* then *all teachers* at both pre-service and in-service must have appropriate training.

(NCCA 2004: 16)

The Author believes that at the moment, the training needs to be broken down into three separate types. In her opinion, the Department of Education and Science will need to provide training for:

1. Pre-service teachers who are learning the skills that will allow them be successful in the classroom.
2. In-service training for the ICT competent teachers.

3. In-service training for the teachers new to ICT.

3.3.1 *Pre-service Training*

ICT was not a prominent factor in Irish education policies until the late 1990s (Gleeson et al, 2001). However, since this time ICT training in relation to education has been offered as a module of the pre-service training program for all teachers in Ireland. It is a compulsory module in some but not all of the colleges. Quicker integration would be better encouraged if ICT were to become a compulsory module in all of the teacher training colleges. The UK had planned to make ICT a compulsory component of initial teacher training by 2001 (ILO, 2000). A study carried out in the US in 1999 found that

...in general, teacher-training programs do not provide future teachers with the kinds of experiences necessary to prepare them to use technology effectively in their classrooms.

(Milken Exchange study, cited in Lonergan 2001: 2)

This study recommended that that the student teachers should receive ICT training that is incorporated into their entire training program, rather than as a separate ICT module. The Author would like the same style of training to occur in the Irish education system. This model would ensure that the teachers would learn the skills of how to integrate technology into their teaching practices, rather than just ICT skills. The Author believes that this style of training would have the added benefit of giving the teachers greater confidence in relation to their handling of ICT. Therefore the new teachers would be able to incorporate new equipment as technology advances without the need for a significant amount of further training.

The arrival of the European Computer Drivers Licence (ECDL) should also have an impact on the style of ICT training required. The ECDL was launched in 1996 and its

foundation was set up in Dublin in 1997. The ECDL is a certificate of competence in a suite of ICT skills which is recognised across Europe. It has achieved great popularity and is often required as a basic qualification by employers. Many schools in Ireland are now offering the opportunity to acquire ECDL certification to their Transition Year students. As these students progress through the education system and into pre-service training for teachers, the need to teach basic ICT skills will decline.

The Author believes that student teachers will embrace technology quicker if they are led by example. She is of the opinion that teachers in the education departments must be seen to incorporate ICT into their daily lives. They must be able to show their students the benefits and rewards for incorporating ICT into their teaching repertoire. They should be teaching through constructivist, discovery learning methods which integrate ICT into their daily practices. This is especially true for the teachers involved in the subject specific methodology classes. These are the teachers who have been selected as they are examples of best practice and innovation. It is important for pre-service teachers to associate ICT with best practice if they are to value it, and want to strive to incorporate it into their classroom activities. The Author is aware that this is the case for many of the teachers involved with teacher education, but it must become the norm for all of them.

3.3.2 In-service Training for the ICT Competent Teachers

In-service training will be affected as the numbers of recently trained teachers embarking on their teaching career increases and older members of staff retire. Lonergan (2001) found that teachers who grew up with technology were more likely to use it in their methodologies than the teachers for whom it was a new resource. Both of these facts should see the training move away from the delivery of ICT skills. Instead it will consist

more of an upgrading of skills. This was one of the findings of the OECD report into ICT in schools (OECD, 2001). Not only do the teachers need to have the necessary skills to use ICT, these skills need to be kept up to date as further advances are made with the technology.

The Author is of the opinion that the training should also include integration modules. This will help teachers to see the benefits of using ICT. This is what is beginning to happen in much of the recent subject specific in-service being offered to both primary and secondary teachers. Mulkeen (2001) reviewed a number of strategies to encourage ICT integration in the Irish school system. One of the factors that he discussed was the courses offered to teachers. He found that

...courses that build a vision for the use of ICT [are] more likely to bear fruit than a focus on short and purely technical courses.

(Mulkeen 2001: 9)

The Author believes that these are the type of in-service courses that need to become more widely available to Irish teachers to ensure greater integration of ICT. ICT literate teachers know how to use the technology. They simply need more ideas on when to use it. However it is important that these courses also highlight the benefits to both the teachers and the students that will come from making the change. The change process initially takes time and effort. The teachers need to know that their efforts will be rewarded in the classroom. The ICT aspects of in-service days need to be given careful consideration. It is important that no assumptions are made about the teachers' levels of competence in relation to ICT. The Author believes that it would be best to divide the teachers into groups based on their ICT skills. If this is not possible it would be best to give demonstrations of what can be done and offer tutorials for those who require them. This would help to ensure that time is not wasted at the in-service, which can be

very frustrating. The Author believes that if school had technicians on site then they could support the in-service team with the delivery of such tutorials. The need for technical support shall be discussed later in section 3.4.

Currently the NCTE offers a number of training modules. These are listed on the NCTE website (www.ncte.ie/ICTTraining/CourseSchedule). These range from introductory courses to pedagogically oriented courses. The aim of the NCTE is that teachers would progress through the different levels of courses as they become more ICT competent. The NCTE actively seeks feedback from those attending their training courses. They also try to seek out what the teachers feel they need from the training. This reads very well on paper. However the Author does not believe that the NCTE has been very successful at meeting all of these aims. This is particularly so for second level teachers. While teachers may be aware of the existence of these courses there are few teachers who actively progress through the range of courses on offer. The Author is aware that the NCTE does its best to advertise the courses. However she believes that this is another area that requires the support of the Principal in order to have the greatest effect. The Principal needs to promote and support teachers in their on-going professional development, particularly in the field of ICT integration.

The government has invested greatly in ICT for education (NCTE, 2001). This investment has included both equipment and finances. They now need to ensure that their investment reaps the expected rewards and that teachers actively use the equipment. The Author believes that in order for this to happen, the government needs to consider what benefits or incentives they can offer to teachers who progress to the NCTE's higher order courses. Prof. Zhu Zhiting (2003) reviewed ICT in teacher education in China. He

recommended that policies needed to be developed to ensure that teacher development strategies were put into action. As part of this, he recommended that teachers were awarded when they used technology in an innovative way after their training had been completed. The Author believes that same strategies could be created here in Ireland. These incentives may not be required for an extended period of time. The Author is of the opinion that the incentives would merely be a catalyst to encourage teachers to take the initial steps to integrate ICT in to the classroom.

3.3.3 In-service Training for the Teachers new to ICT

Unfortunately, there will still be members of staff who choose not to use ICT. There may be a selection of reasons for their choice. Firstly, some teachers may not be competent in their use of ICT. They may have never even turned on a computer. Thankfully the likelihood of this is reducing with the passage of time. However these teachers still exist in every school and should not be forgotten about. This is especially true when the administration and communication processes like reporting to parents become more technology based.

Mulkeen (2004) found that in the 2000 census on “Use of ICT in the Classroom”, approximately 70% of teachers had attended at least one ICT training course. However that left 30% of the teachers who had not attended such courses. The Author believes that it is critical for appropriate training to be designed and offered to these teachers so that they do not feel left behind or abandoned in this increasingly technological society. This training will have to be very imaginative and motivational if it is to persuade this group of teachers of the benefits of ICT. It is also important that the teachers do not feel

pressured into attending such courses. We have already seen from the OECD/CERI case study schools that pressure is simply another barrier against the use of ICT.

A second notable factor that influences teachers' choice in the use of ICT is fear. The teachers may be afraid to use the technology as they do not understand it. They know that their current classroom practices produce the desired results and may worry that introducing a new ICT-based teaching method will not be as successful. This is especially true for the teachers of senior exam classes in second level schools.

The teachers may not feel comfortable using a skill in class when they believe that the pupils are more expert in the skill than they are. The teacher may feel embarrassed if something goes wrong with the technology which they do not know how to fix. They may feel undermined as the pupils take on a leadership role in the classroom. The OECD (2001) found that technology impacts on the role of the teacher and alters it. They believe that the teachers will have to adapt to the fact that their pupils may be more knowledgeable about the technology than they are. The Author believes that this can be addressed in the integration based training as this should take account of the changing dynamic within the classroom.

Finally sufficient time needs to be given. It is well known that ICT based training initially takes longer than more traditional methods. O'Briain (2004) found that

ICT is changing teaching learning approaches in many classrooms where the use of the ICT facilities is available for a substantial amount of time to the teacher.

(O'Briain 2004: 1)

Over time, as the teachers ICT skills improve, the computer actually speeds up the process. Integration of ICT into the classroom also requires greater preparation time than traditional pedagogy. The teachers need to spend time reviewing the software or websites that are going to be used. Technology training needs to include ample time for practice and integration. Barnett (2001) believes that training should include time for teachers to decide how the new software or methodology will fit in with their existing programs. She also found that

The most effective staff development programs deliver to teachers when they need it, at their school, and on their own equipment.

(Barnett 2001: 3)

Mulkeen (2002) found that where more than one teacher from a school attended training, higher success rates were seen. This was due to the fact that the teachers developed support groups amongst themselves as they had a shared experience. The Author believes that sufficient teachers need to be given enough time off to attend training courses and practice their skills in class after the course. They need time to familiarise themselves with the equipment or software and have time to simply “play” with the technology. The teachers should also have access to support after the training program so that they can get help as they need it. That is, when they are actually implementing the changes into their classrooms.

3.4 Technicians

One of the most frequently mentioned barriers to ICT integration cited by teachers is support and maintenance (McInerney and O'Donnell, 2003). Many teachers feel that they do not have the technical knowledge needed to maintain all the technology that is in Irish schools. They simply do not know what to do when the computer breaks down.

Mulkeen's Progress Report of 2004 found that basic troubleshooting training was being requested by over 90% of teachers in both the primary and post primary schools.

To overcome this problem, many schools have appointed one teacher as the ICT coordinator in the school. This is usually the teacher with a personal interest in technology who may have been involved in setting up the school system. This teacher inevitably ends up being responsible for the day to day maintenance of the computers and the network within the school. They tend to give up their free time to ensure that the computers are working. They are often called upon to help out the other teachers when there is a problem. Gleeson et al (2001) found that there was a need for a strong innovator if ICT was to be successfully integrated into their case study schools. They also found that this person needed to have high standing in the school, act as a motivator for the staff and provide technical support. However this teacher had to face other difficulties too. There were problems about leaving their own class to help teachers in difficulty. It is of concern to the Author to note that the teacher felt under pressure to be constantly available to offer the support that the teachers needed (Gleeson et al, 2001). This element of placing a teacher under additional pressure underlines the need for ICT technicians in Irish schools.

All of the above duties mean that the post is mainly taken up with maintenance rather than support. It also does not allow the coordinator much time for the higher level aspects of their job. There is little time left for review of new software or curriculum development. Mulkeen's (2004) summary of the OECD findings found that this problem of technical support is common across all the countries in the OECD review. The findings went so far as to say that unless suitable and sufficient technical support is

provided for the schools, it will be unfair to expect the teachers to base their classes on ICT. The Author believes this is another area to which the government needs to give serious consideration. As mentioned already, they have invested huge sums of money in educational technology. They need to ensure that the necessary technical and development support systems are put into place in order to help teachers make the most of their investment.

3.5 Age of Teachers and ICT

The Author has an interest in finding out if the age of the teacher is having an impact on ICT integration. The average age of the teacher in the Irish education system is over forty years of age (Coolahan, 2002). Ireland is not unique in this. England too has an aging teaching population. In fact in the next ten years, 50% of their current teachers will have retired (Chevalier and Dalton, 2004). The aging teacher population is of concern, since the current teaching force is the one that has received the ICT training. Mulkeen (2001) found that the older teachers had slightly higher levels of ICT skills than their younger colleagues. If Ireland progresses along the same path as England then will we end up with a greater number of ICT illiterate teachers?

In opposition to this, Hennessy and Deaney (2004) found that in their study the younger teachers were seen to be “natural and innovative users of ICT” (2004: 6). If all the predictions are correct, we may lose a significant proportion of the teachers trained through the Schools IT 2000 initiative. In contrast to this, it looks like we may gain teachers who are instinctively creative with ICT. Further study would be useful, as Hennessy and Deaney do not explain where this instinctive ability seen in younger teachers. However, this ability may reduce, once again, the need for extensive training

for new teachers. It may also give rise to a host of new ideas on how to make the most effective use of ICT for teaching and learning. Perhaps in the next decade the government will not be looking at training modules. Instead the Author hopes that they will be directing their efforts to create opportunities for teachers to develop on-line professional communities to share knowledge and expertise in all areas of teaching.

3.6 Feminisation of the Teaching Profession

The number of females taking up careers in the teaching profession has been steadily increasing since the 1980s (Wylie, 2000). The current statistics show that females entering primary teaching make up about 90% of all applicants, while at post primary level they account for 80% of the pre-service teachers (Coolahan, 2003). A recent study into this imbalance found that there are a number of reasons why this situation exists and continues. Drudy et al (2002) (cited in Coolahan 2003: 26) found that there are many cultural and economic reasons involved. However they stated that men felt that there was a lack of support for them when they expressed an interest in primary teaching. This was especially so from the people who mattered most – parents.

This imbalance of gender is not seen throughout the profession. While the majority of the workforce is female, the majority of the senior positions like principalships and vice-principalships are filled by men. Stinebrickner (2001) found that women were more likely to leave teaching than men. This may be related to family and child rearing issues as teaching is often seen as a more flexible career in relation to these other aspects of life. While this may mean a greater turnover in the staff in the school it need not necessarily have a negative effect on students or schools. It will bring greater teacher variety, experience and talents to the school.

Coolahan (2002) found that the number of alternative opportunities for women is opening up. He wonders if in fact the gender imbalance will reduce in time as fewer women choose to become teachers, having many other career choices available to them. The Author wonders if this feminisation is having an effect on the integration of ICT into classrooms in Irish schools. This is of interest when research has found that boys tend to be more attracted to computers than girls. Studies have also found that boys tend rate themselves higher than girls do when asked to appraise their ICT capabilities (Volman & van Eck 2001, cited in Heemskerk et al 2005: 8). The Author wonders if this means that female teachers may require more ICT training than their male colleagues. Will it affect the interest the teachers might have in using ICT? In 1998 and 2000 there were national surveys of teachers in Ireland, reviewing ICT in schools. Interestingly, Mulkeen's analysis of these surveys found that gender had very little impact on Irish teachers ICT skills (Mulkeen, 2001). The Author was interested to see if gender would have an effect on the questionnaire data from the schools in this study and this will be explored further in Sections 5.2.9 and 5.3.9.

3.7 Professional Communities

Since the 1995 White Paper on Education "Charting our Education Future" lifelong learning has been one of the aims and objectives of the education system in Ireland. Coughlan (2001) found that if ICT is used appropriately, "it can make a significant contribution to meeting the challenges relating to the development of lifelong and lifewide learning..." (2001: 85). The Author is of the opinion that developing on-line professional communities for teachers should be part of this plan.

Leask and Younie (2001) define effective on-line communities as

...those perceived to be of value to the teachers and of sufficient value to ensure that teachers return and use the resource regularly whether for their professional development or for purposes directly related to their classroom practice.

(Leask and Younie 2001: 224)

The Author believes that the on-line communities could help the teachers in finding ways to continue their own learning journey. Teachers would be able to learn from each others' classroom experiences. Secondly, communities would provide a bank of ideas and suggestions from other teachers. As these recommendations are being given by other teachers it gives them greater credibility. Such resources would be particularly useful as new curricula or programs of study are introduced. The community would also be a form of support for the teachers especially as they try out new teaching strategies or technologies.

These professional communities could be the opportunity to allow teachers change their use of the computer. It would no longer be used primarily to create resources or for reinforcement of previously taught material, but instead it would be a device which would allow greater active and discovery learning for both the teachers and the students. The technology is best at allowing students learn by themselves (Bruntlett, 2001). This would allow a constructivist learning approach take place in the classroom. A constructivist approach allows the teachers and students to gradually build on their previous knowledge as they continue to learn through practice in the classroom. It is about teachers providing the scaffolding that helps their students discover knowledge for themselves (Papert, 1993). This is a very different style of teaching to that of simply transmitting knowledge. Therefore it will be necessary to provide training and exemplars for the teachers to follow. This is another area where the on-line communities could support the continual professional development of teachers.

It is important to note that on-line communities are only of value to those with good ICT skills. Those involved in the community need to be competent in the use of the Internet and correspondence across the web. They must also be prepared to commit to part-taking regularly with the community if it to be of benefit to all concerned. On the other hand if these teacher-centred communities were set up they could offer further choice when looking at training strategies. This could, in time, save on funding which could be redirected and in turn be of greater benefit to the education system.

3.8 Conclusion

Through this review of the current research the Author has considered a number of key points affecting teachers' use of ICT in their teaching. The first of these is support.

Support comes in many different forms and from many different people. The research has shown that Principal support is critical for the successful implementation of ICT into the classroom. It has also shown that Principal support needs the backing of strong, motivational individuals who are in agreement with the proposed change. Together these members of staff should be able to carry the rest of their colleagues through the difficult process of implementing a change in school towards the integration of ICT. If the schools work together as a group of interested individuals they should have ownership of the change process and hence it should be more successful.

Another area of support which is critical to successful ICT integration is that of technical support. The teachers frequently state that a technical problem with the equipment is a barrier to frequent and inclusive use. The teachers are requesting technical knowledge in-service days so that they will be able to rectify difficulties as they arise. The Author believes that it would be more beneficial to have technicians. A technician would be able

to maintain the equipment but they could deliver training modules on site as they are required. A third aspect of the technician's job would be to work with the teachers to help develop their curricula to make the most of the information technology available to them in the school. These new curricula could be based on themed ideas rather than simply subject specific syllabi.

Much of the research has pointed to a third essential aspect of ICT integration. This is the whole area of training. This is a critical area to implement correctly. It needs to meet the identified gaps in the knowledge and skills of the teachers, but it must meet those needs exactly in order for it to be motivational and inspirational. This is a very difficult task as teachers range across the full spectrum of ICT competencies. The presence of a technician in the school would allow more time for the delivery of tutorials to small groups of teachers of the same competency level. This would allow for the delivery of training when teachers are ready for it at the different stages of their career. It would address the issue of time as well. If the teachers were being trained on site then they would have greater access to the technology so that they could practice before using it in class.

Finally the Author considered some of the characteristics of the teaching staff in Ireland. She reviewed the fact that teaching is becoming more and more feminised. The research has shown that initially males have a greater interest in ICT than females. It has also shown that females are interested in computers for different reasons than males. They prefer the social interaction and greater communication facilitated by the computer rather than the more mechanical aspects favoured by males. This may have an impact on the

use of computers in the classroom for our students as more women enter the profession than men.

Teaching is also made up of an aging population. This too may have an effect on the integration of ICT into the classroom. Research has shown that it is our more senior teachers who have received ICT training. They are also the individuals who have been involved in setting up the computers and networks within our schools. When these members of staff retire, their jobs will be taken by younger members of the teaching profession. The Author wishes to know if these new teachers will have the same interest and drive in ensuring that the integration of ICT will continue perhaps towards the creation of on-line communities for the professional development of teachers.

With these questions in mind, the Author began her own research. She was also interested in knowing how the teachers were using the technology that has been provided for each school both at primary and post primary level. The following chapters will give a detailed account of this research and any conclusions or further developments that can be drawn from the data. This will begin with an account of how the research was conducted and the reasons behind the decisions that were taken.

4 Methodology

4.1 Introduction

As been discussed in the preceding chapter, the Government has provided significant levels of investment to integrate ICT into Irish classrooms. The Author wished to carry out a case study in a small selection of Irish schools to see the impact of this investment. This study would investigate the current use of ICT in these schools by the teachers. It was also planned to investigate whether teachers could indicate what further investment or provision would be required to ensure the successful integration of ICT by all of the teaching profession.

4.2 School Selection

The Author selected six schools, three at primary level and three at post-primary level. At each level there was a boys school, a girls school and a co-educational school. All the schools were in the same general geographical area and their close proximity was a factor in their selection. The schools were chosen in this manner as it would make it easier to travel to each school from the Author's own school. She would also see if there was the possibility of a localised effect on her results. However this was not expected as it is not a designated disadvantaged locality.

4.2.1 Post Primary Schools

The three post-primary schools are fee paying schools. The boys' school and co-educational school have boarding as well as day pupils. The girls' school was a boarding school in the past but has been a day school for the past 10 years. The Author is aware of the perception that fee paying schools are better equipped than those in the public sector. In 2004, Mulkeen found that schools in designated disadvantaged areas were slightly better equipped, in terms of ICT equipment, than schools in other areas at both levels of the education system. The Author wished to investigate the use of ICT in the fee paying

sector as she teaches in a fee paying school. By ensuring that the three post primary schools were fee paying schools the Author felt that she had a standard across which the schools could be compared.

4.2.2 Primary Schools

In the primary sector the single sex schools were both National schools, while the co-educational school belongs to the Educate Together Umbrella of schools. The boys' National school has been open since 1965 and has two classes in each year group. They are well resourced and supported by the parents of their pupils. The girls' National school was built in the 1960s. It too has two classes in each year group and enjoys the support of the parents. The Educate Together School only took possession of their premises in September 2004. The school is still in the process of becoming fully equipped and only has classes up to 3rd class. They have very strong parental support. One parent recently provided and installed their computer network - a computer per classroom and six computers for the library. At present, all access to the Internet is through the office computer but there are plans to increase the access in the school with the rollout of broadband connectivity to the Internet.

The Author was aware that her primary schools were not fee paying. However a choice had to be made between ease of access to the schools and having all the schools as similar as possible for as many factors as possible. It was decided to prioritise ease of access because of time constraints for this study. The choice of the schools was also opportunistic. The Author had family and friends working in most of the schools she chose to survey. She hoped that her connections to the schools would increase her success rate for both access to the schools and return of her questionnaires.

4.3 Questionnaires

The Author began her research by getting the Principals' permission for the school to participate in her study. This involved visiting the schools and meeting with the Principal or their representatives. Once this permission had been received, the Author was free to proceed with the distribution of her questionnaires. All of the teaching staff in each school received a simple, short questionnaire (see appendix). The questionnaires were designed to take approximately a minute to complete. The Author felt that if the questionnaires were relatively general in nature and simple to fill in, then the teachers would be more likely to give the time needed to answer them. She also hoped that this would make them more agreeable to part take in the next stage of her research process.

Although not all of these questionnaires were returned, there was an excellent return rate of about forty-eight percent at post-primary level and seventy-two percent at primary level, giving an average return of sixty percent. The Author believes that the difference in the return rate between the two education sectors was due to the closer connections she had with members of the staff in the majority of her primary schools.

This high return rate provided enough information to be able to extract a number of trends from the data. These trends are reviewed in the next chapter. The questionnaires also allowed the Author to determine which of teachers had the highest ICT use in each of those schools.

4.4 Interviews

4.4.1 Teacher Selection

After the analysis of the questionnaires was completed, a letter was sent to one teacher in each school. This teacher helped to co-ordinate a group interview with a selection of

teachers in their school. The interviewees were chosen by the Author from the results of the questionnaires. These teachers were chosen as they were all frequent ICT users. Unfortunately, this was not very successful. Unless the contact teacher was known to the Author, they tended to ignore the letter. Eventually it became clear that the research could not be continued in all six schools. The Author had two post primary schools that were agreeable to the interview process. There was only one primary school involved and so another one was approached. This would mean that there would be a smaller interview cohort than originally planned, but there would be similar numbers of teachers interviewed from each of the education sectors.

4.4.2 Additional Primary School

The new primary school was approached in a similar manner to the existing schools in the study. This time it was not necessary for the Author to meet with the Principal. The teacher contact with the school had approached the Principal and had obtained his consent prior to offering her school to the Author for her research. This school has been established since 1978. It is similar to the other primary schools in that it has good parental support through its Parents' Council. The school is well equipped with at least one computer in every classroom. Some of the senior classrooms have more computers than this.

The teachers of the school were surveyed and their results combined with the previous questionnaires. The interest of this school was evident in the hundred percent returns of the questionnaires. While there were minor differences in individual responses, data from these questionnaires broadly concurred with the findings from the other primary schools. The main difference was that there were more men included in the survey in this

school. This gave a broader picture in terms of gender effects. However the Author is aware that the actual number of men in the survey is still extremely small and therefore may have an influence on any conclusions drawn from the data.

Once the decision had been made to include the new primary school in the study, one of the original schools agreed to part-take in the interview process. The Author decided to go ahead with all three primary schools as it would simply provide her with a greater amount of data to support her research.

4.4.3 Interview Questions

A list of interview questions was compiled to act as guide to ensure all relevant areas of interest to the research were included. Two sets of questions were designed, one for the post primary teachers and another for the primary teachers (see appendix). The Author was aware that the differences between two sectors may have been a reason for some of the results she obtained through the questionnaires. She hoped that by having slightly different interviews she would be able to fully probe each sector to find answers to support her research questions.

4.4.4 Interview Format

The interview format chosen was that of group interviews, which were held in each school. There were four or five teachers from the school present. Originally it was planned to meet with the ICT coordinator separately. However, in the event, the coordinators were present at each interview, having been selected by the contact teachers if not already selected by the Author. Therefore the coordinators were able to give all relevant information at the one interview.

The interview lasted approximately thirty minutes. It was designed to take the teachers through their use of ICT in a gradual process. The interview began with the computer based preparation that the teachers are involved in and moved on to investigate their use of ICT in their classrooms. The interview ended with a much broader focus. At this stage the Author was trying to find school and system effects that could have accounted for the results seen in the questionnaires. She also wanted to give the teachers an opportunity to include any other information that they felt was relevant to her research that had not been previously discussed.

4.4.5 Recording Issues

The Author had planned to record the interviews using a digital mini disk player. She hoped that this would allow for easy conversions of the audio files to allow her to include copies of the interviews with her thesis. Unfortunately the recording equipment was very unreliable and only successfully recorded one of the interviews. The Author had taken her own notes of the main points of each response. Thus she was able to use these notes to process the interviews soon as possible after they had taken place.

4.4.6 Methodological Decisions

While the interviews had some difficulties concerning the recording equipment they provided much rich data in terms of content. However, despite many attempts to organise an interview with the group of teachers in the boys' post primary school, all the teachers did not turn up on any of the days selected. Finally due to a shortage of dates, the interview was conducted with only two members of staff. These two members were the most frequent users of ICT with their classes in the school.

When designing her research proposal the Author had planned to have interviews with the school Principals as their support has been identified as a critical factor in the successful integration of ICT. However this plan had to be abandoned. The Author experienced some difficulty in making contact with the Principals in some of the schools. She felt it was very important to maintain a positive relationship with the schools as she would be returning to conduct her surveys and interviews. Therefore it was decided not to pursue the Principal interviews to ensure access to the teachers.

Through the course of the interviews it became clear to the Author that all of her case study schools enjoyed good Principal support for ICT. This was demonstrated in the levels of equipment and future planning arrangements discussed by the teachers at the interviews. While this data would have been more valid if the interviews with the Principals had taken place, the Author felt that she had sufficient evidence to support the research discussed in the literature review. The results of the questionnaires and interviews shall be presented and discussed in the following chapters.

5 Research Results

5.1 Introduction

In this chapter the Author will present the results of the questionnaires and teacher interviews. The questionnaires for each sector were not identical. Thus the post primary results shall be presented first.

5.2 Post Primary Questionnaires

5.2.1 Return Rates

Approximately 150 questionnaires were sent out to the teachers in three post primary schools. 73 questionnaires were returned with varying degrees of success from each school as displayed in the table below. This gave an average return rate of 48%.

	Girls' School	Boys' School	Co-educational School
Sent Out	48	50	60
Returned	37	24	12
% Returned	77	48	20

Table 1 Numbers of Questionnaires returned from each Post Primary School

In the analysis of the questionnaires the teachers were grouped according to their age. The age bands were as follows: 20-29, 30-39, 40-49 and 50+. The Author was curious whether the age of the teacher had an impact on the choices made by the teachers in relation to the use of ICT in post primary schools. As there were differences in the actual numbers of teachers in each of the age cohorts (see Table 2), all the results displayed in each of the graphs are given as percentages.

Age Cohort	20-29	30-39	40-49	50+
Number of Questionnaires returned	24	23	6	20

Table 2 Number of Teachers who Returned Questionnaires within each Age Grouping at Post Primary Level

5.2.2 Subject Effects

It was not possible to tell from the results of the questionnaires if there were any subject related differences in the use of computers in post primary schools. In one of the schools, the only teachers who replied to the questionnaires were those who worked within the science department or with science related subjects. This was not the case for the other two post primary schools. In another school, it was obvious from the questionnaires that the language teachers had access to computers. These teachers were returning negative answers for the use of computers for class preparation but they all used computers on a weekly basis with all of their classes, including their exam classes. It was planned by the Author to investigate this area further through the use of group interviews.

5.2.3 Use of Home Computer

The first question was to investigate if there was a relationship between ease of access to computers and teachers tendency to make use of them. The Author wanted to know the percentage of teachers who had a computer at home and made use of it. The results of this question are shown below in Figure 1.

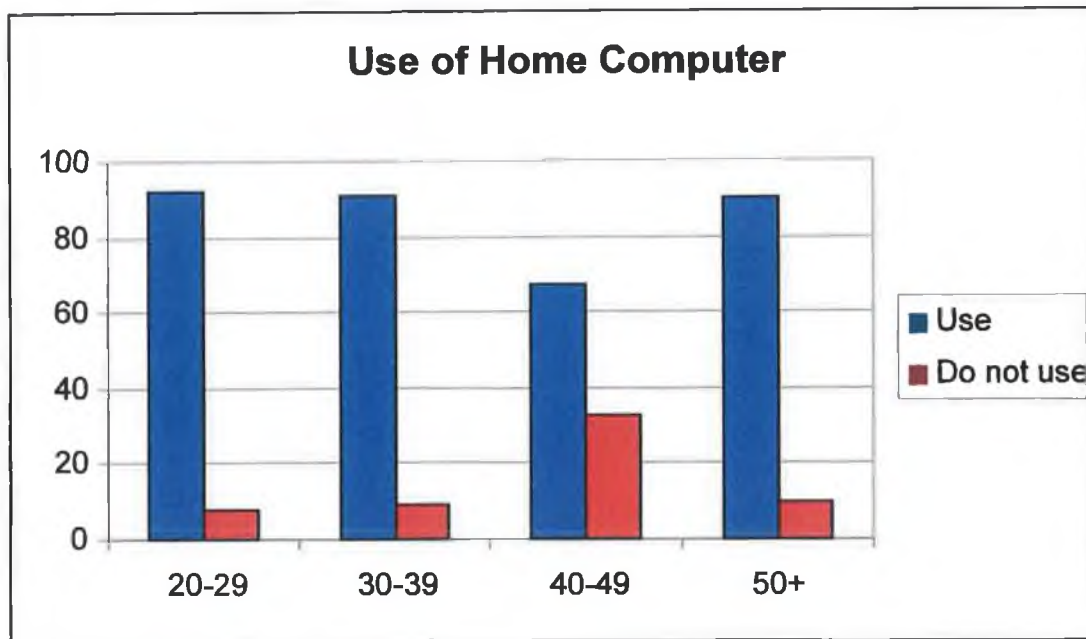


Figure 1 Percentage Use of Home Computers by Post Primary Teachers

Of the teachers surveyed, only five did not possess a computer at home. This equates to 6% of the sample size. Assessing this information a little further, it can be seen from this graph that the majority of the teachers (approximately 90%) used their home computers. This was seen to be the case across almost all of the teacher age categories. The only group that did not follow the same trend was in the 40-49 age groups. While more teachers in this group used the computer than did not, the percentage use was not as high as in the other teacher age groups (67%). In addition, this age group had a noticeably higher percentage group of non-users than any of the other groups (33%).

5.2.4 Home Internet Access

Following on from this, the Author wanted to know if teachers had access to the Internet from their home computers. She was interested to find out if this was an influencing

factor for teachers when considering whether or not to make use of the Internet in relation to their work.

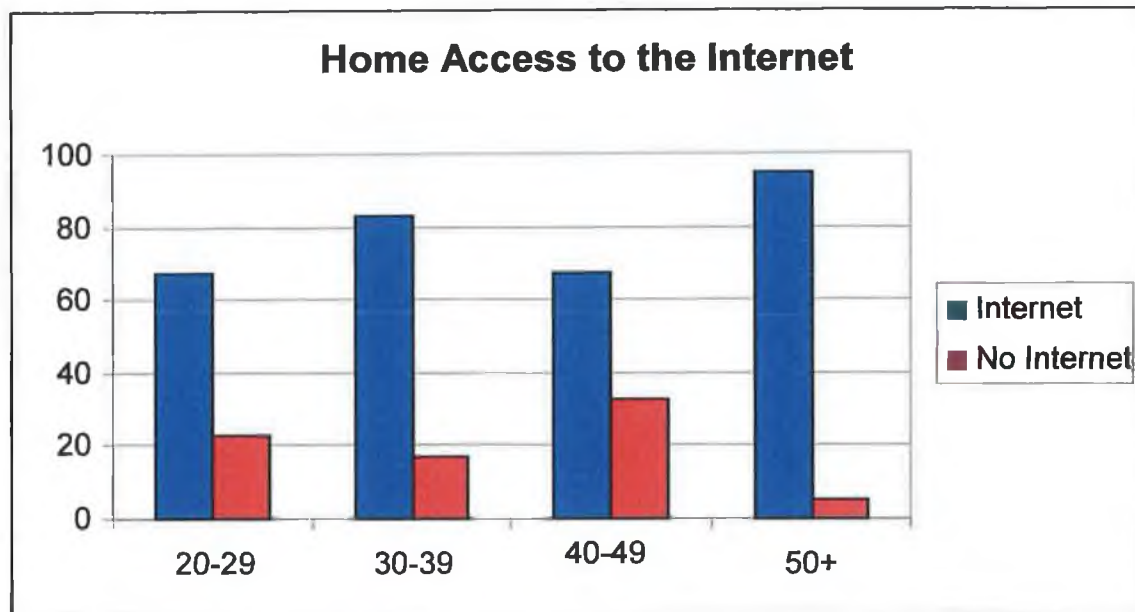


Figure 2 Percentage levels of Access to the Internet on Home Computers for Post Primary Teachers

The examination of the questionnaires revealed that at least 67% of the teachers in each age grouping had Internet access on their home computer (Figure 2). It also showed that the level of Internet access was proportional to the age of the teachers, with it increasing across the age profiles. Again the 40-49 age category was the exception to this trend. However the percentage of Internet access for 40-49 year old teachers was the same as the 20-29 year olds at approximately 67%.

This graph does not tell whether or not the teachers used the Internet themselves. It simply lets one know that the facility is present in their homes. The degree of Internet use by the teachers is discussed later in Figures 4 and 6. The next section of questions in the questionnaires focused on how teachers used ICT in preparation for their classes.

5.2.5 ICT Based Class Preparation

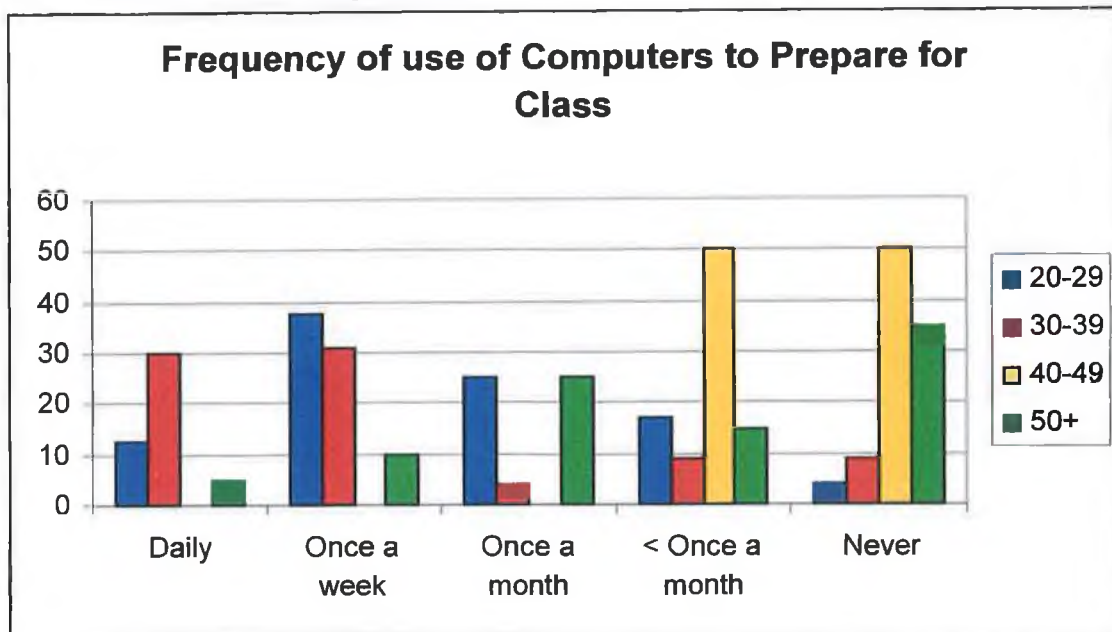


Figure 3 Frequency of Use of Computers to Prepare for Class by Post Primary Teachers

Figure 3 shows how often the teachers use the computer in preparation for their classes. It is most common for post primary teachers not to make use of the computer when preparing material for class (24%). However, if teachers did use computers to prepare for class, they tended to use it on a monthly basis. The graph also shows that the daily use of the computer is inversely proportional to the age of the teacher. It decreases as the age of the teacher increases. Never using the computer is approximately proportional to the age of the teacher. In general, the number of teachers who never use computers to prepare for their classes increases as the age of the teacher increases.

Again the 40-49 age group showed unusual results in comparison to the other teachers surveyed in that they rarely used the computer. They did not even register for use at any greater frequency than less than once a month. The 50+ group showed that while they use their home computer they do not seem to be using it for preparing their school work.

5.2.6 Internet Based Class Preparation

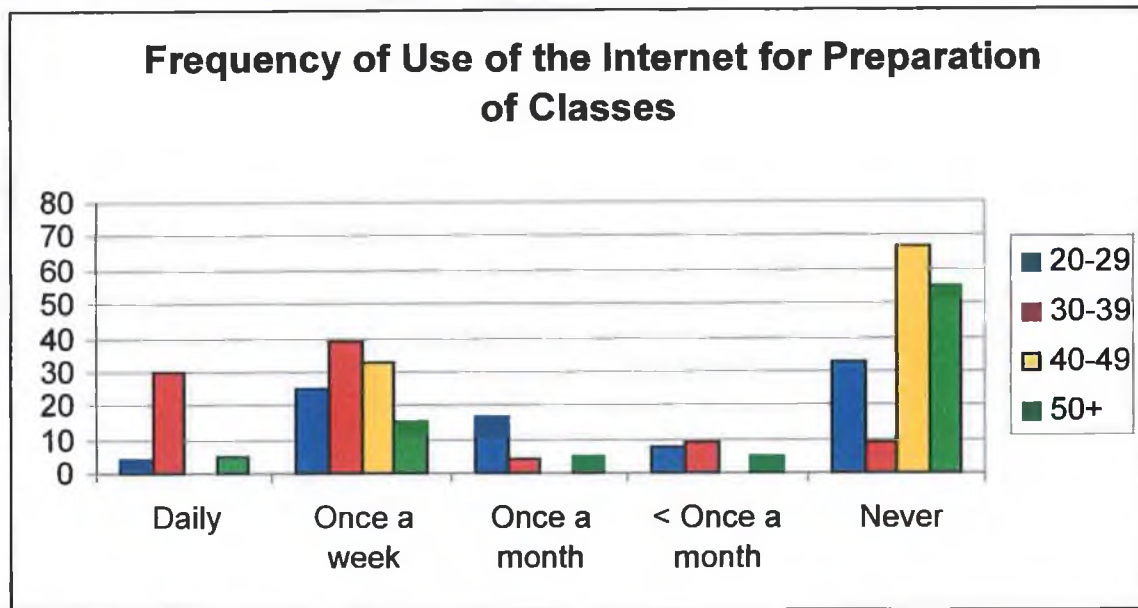


Figure 4 Frequency of Use of the Internet to Prepare for Class by Post Primary Teachers

Figure 4 shows that the post primary teachers tended not to use the Internet when preparing for their classes. On the other hand, if the teachers did use the Internet, they were inclined to use it approximately once a week. The graph also shows that the use of the Internet to prepare for class was similar to the use of computers for class preparation. The teachers most likely to use the Internet for the preparation of their classes are in the 30-39 age bracket. The most unexpected finding from this graph is in relation to the teachers in the 40-49 age bracket. Despite claiming not to use the computer on a regular basis for the preparation of their classes, over 30% of these teachers used the Internet once a week to prepare for class. It may be that these particular teachers are just beginning to learn how to use the Internet and all its resources.

5.2.7 Computers in Class

As the Author now knew that some of the teachers were using computers to prepare for class, she wanted to see if they took the next step and brought the computer into the classroom for use with their students.

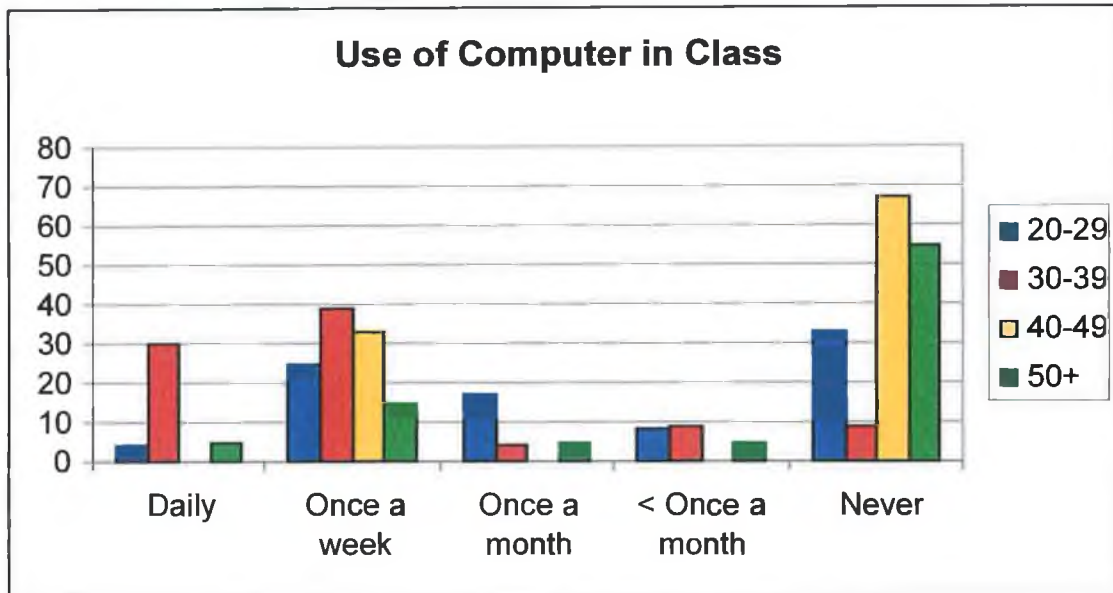


Figure 5 Frequency of Use of Computers in Class by Post Primary Teachers

Figure 5 shows that the majority of teachers questioned did not use the computer in class. However if they did use it, they tended to use it approximately once a week. Overall there did not seem to be any relationship between the age of the teacher and the level of computer use in class. The 30-39 year olds were seen to be the most frequent users of computers in class. The 40-49 age group showed a very high proportion of non users, but they had the second highest rate of use on a weekly basis with their classes. This was not an expected outcome based on the previous graphs above. Despite the frequent use of computers for preparation by the youngest group of teachers, they did not carry this through to their classrooms. Only about a quarter of this age group used the computer in class. The Author believes that there are factors, other than the age of the teacher, which

have a greater influence on whether or not the teachers choose to use ICT in their classrooms. These factors shall be discussed later.

5.2.8 Internet in Class

Once again the Author wanted to see if usage of the Internet in class had made any impact on the classrooms of Post Primary schools. Figure 6 below shows the use of the Internet in class.

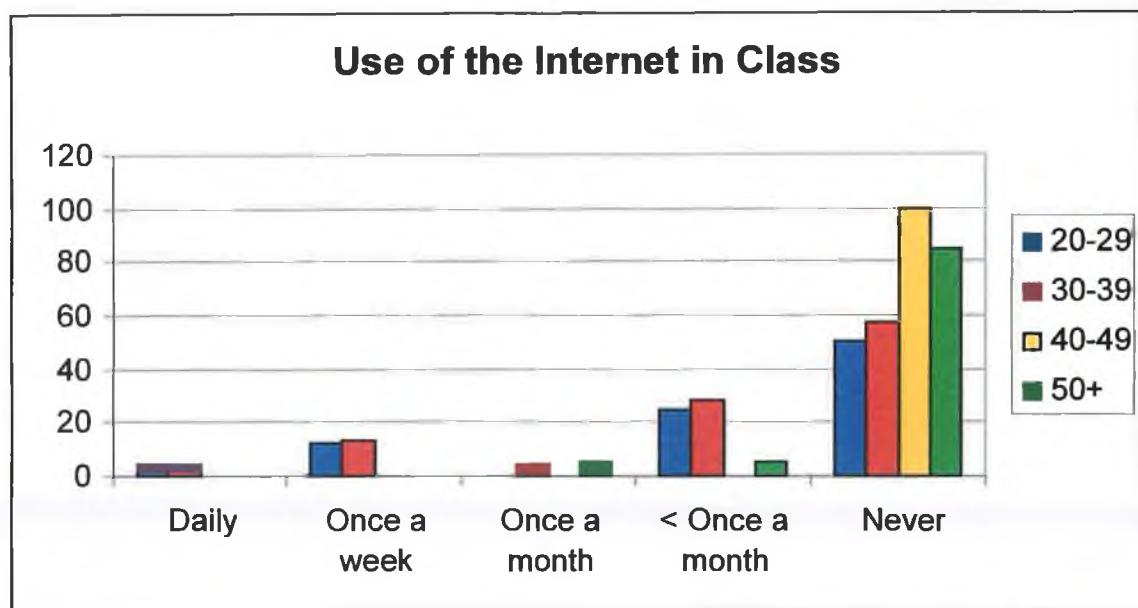


Figure 6 Frequency of Use of the Internet in Class by Post Primary Teachers

As expected the majority of the teachers did not use the Internet in class with their students. While the two younger groups of teachers rarely used the Internet in class (54%), they were the two groups most likely to make some use of the World Wide Web. However, the frequency of this use was usually less than once a month. No correlation was found between access to the Internet at home and the frequency of use of the Internet in class. It was seen in Figure 2 that nearly 95% of teachers in the 50+ age group had the Internet at home but Figure 6 shows that 85% of the same group of teachers never used

the Internet in class. This was also true for the 40-49 age group with none of these teachers ever using the Internet in class. The two younger groups of teachers had marginally less access to the Internet at home (75%), but this graph shows that they only made infrequent attempts to use the Internet in class.

5.2.8.1 *Exam Classes*

The Author next decided to see if the use of ICT in class only occurred with certain classes. It was not possible to analyse the data by year group so the Author focused on exam classes. She wanted to know if exam classes got to use computers in school as part of their preparation for the State exams.

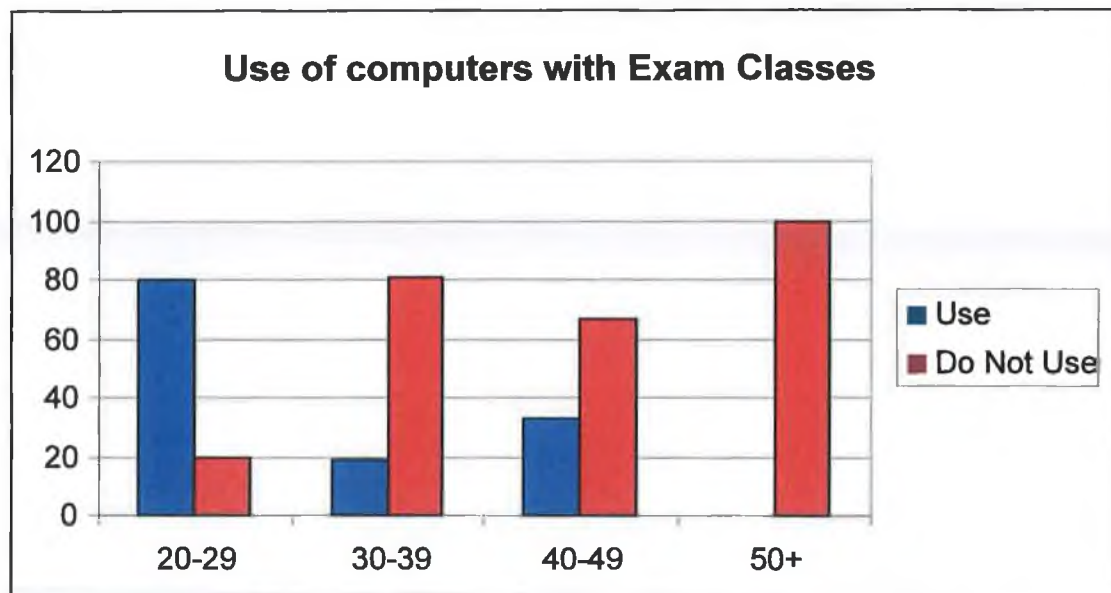


Figure 7 Percentage Use of Computers in Class with State Exam Classes

The majority of the teachers questioned did not use computers with their exam classes. This was found to be true for all of the teachers questioned in the 50+ age bracket (Figure 7). It was mainly the teachers in the 20-29 age group who were prepared to use

computers with their exam classes. This was quite a big group as nearly 80% of teachers in the 20-29 age bracket used computers with their exam classes. This was investigated further at the interview stage of the study. Unexpectedly, approximately a third of the 40-49 year old teachers used computers with their exam classes. This result is unusual as it goes against all the previous trends seen for this particular group of teachers. All of the previous graphs had shown them to be a group of teachers who did not choose to use computers for their school work.

The 40-49 year old teacher group tended to show unusual results throughout the questionnaire in comparison to the other teacher age profiles. However this may be due to the small sample size in this age bracket (n=6). Thus, the results for this particular group may have been biased and hence may not be representative of 40-49 year old post primary teachers in general.

5.2.9 Gender

The Author was interested to know whether the gender of the teacher had an impact on the choices made in relation to the use of ICT in post primary schools. The gender ratio amongst the post primary teachers who responded to the questionnaires was 3:17 male and female.

	20-29	30-39	40-49	50+	Total
Male	6	12	3	12	33
Female	18	11	3	8	40

Table 3 Number of Male and Female Teachers who Returned Questionnaires within each Age Grouping at Post Primary Level

Table 3 shows that two thirds of the 50+ age group was made up of men while in the 20-29 age group the gender balance was reversed as only one third of them were male. In the other two groups gender was balanced.

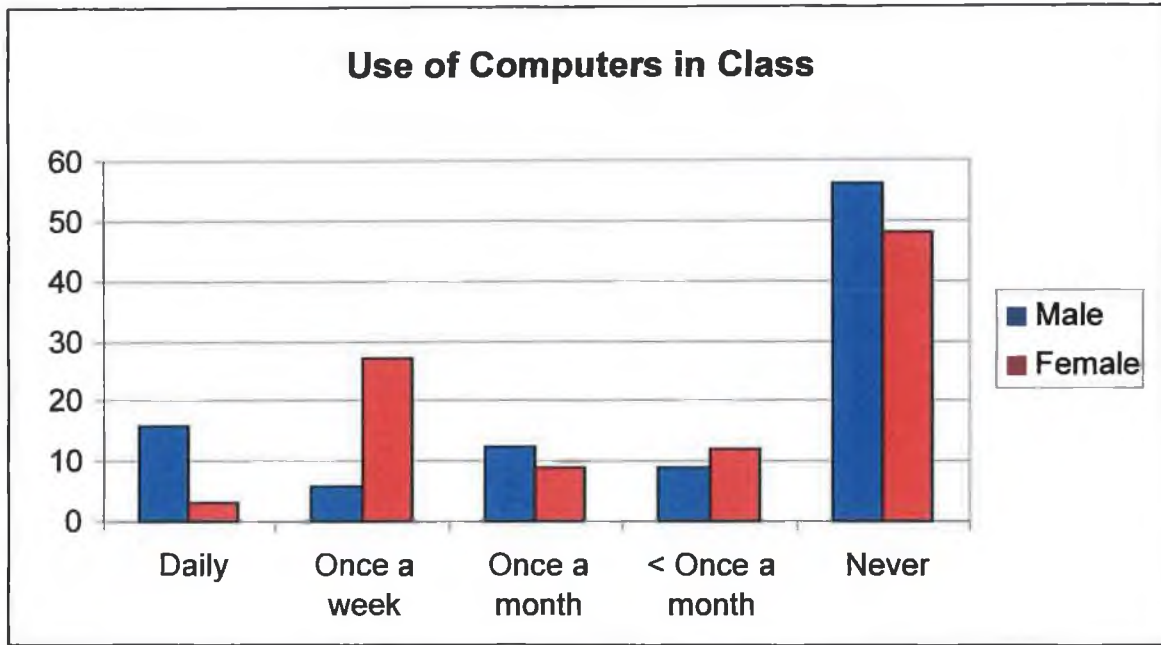


Figure 8 Gender Effects on the Use of Computers in Class

Figure 8 above shows that there is no clear link between gender and the use of ICT in class. Both male and female teachers choose not to use computers in class on a frequent basis (56%:48%). Men are more likely than women to use computers in class on a daily basis (16%:3%). However, females are more likely to use computers on a weekly basis than their male colleagues (27%:6%). The Author found that approximately half of all teachers who responded never used computers in class with their students.

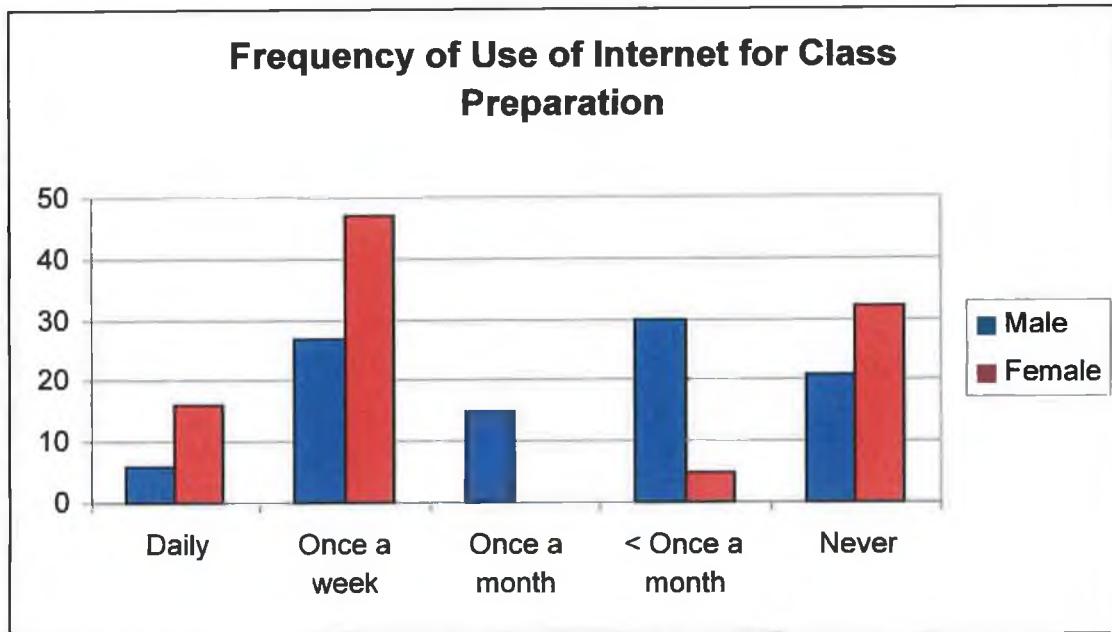


Figure 9 Gender Effects on the Frequency of Use of the Internet for Class Preparation

In relation to the use of the Internet for class preparation Figure 9 shows that females were more likely than males to use the Internet on a regular basis approximately once a week. No females used the Internet on a monthly basis to prepare for class while nearly a third of the female teachers who replied never used the Internet for class preparation. The male teachers surveyed showed a more even spread throughout the frequencies suggested in the questionnaires. There were no other gender related differences in the use of computers that were revealed by the analysis of the questionnaires.

5.3 Primary Questionnaires

5.3.1 Return Rates

The Author shall now look at the trends that emerged from the primary teacher questionnaires. Approximately 80 questionnaires were sent out to the teachers in four primary schools. 46 questionnaires were returned with varying degrees of success from

each school as displayed in Table 4 below. This gave an average return rate of almost 72%.

	Girls' School	Boys' School	Co-educational School 1	Co-educational School 2
Sent Out	30	20	8	15
Returned	17	6	8	15
% Returned	57	30	100	100

Table 4 Numbers of Questionnaires returned from each Primary School

As in the post primary questionnaires, the teachers were grouped according to their age. The same age bands were used: 20-29, 30-39, 40-49 and 50+. The Author was curious to know if the age of the teacher had an impact on the choices made in relation to the use of ICT in primary schools. As before, there were differences in the actual numbers of teachers in each of the age cohorts (see Table 5), so all the results displayed in each of the graphs are given as percentages.

Age Cohort	20-29	30-39	40-49	50+
Number of Questionnaires returned	16	5	9	14

Table 5 Number of Teachers who Returned Questionnaires within each Age Grouping at Primary Level

5.3.2 Use of Home Computer

The Author began her analysis of the individual questions in the questionnaires by looking at the percentage of teachers who made use of their home computers. All but three of the teachers surveyed had a computer at home. This is 6 % of the sample size which is the same proportion as at post primary level.

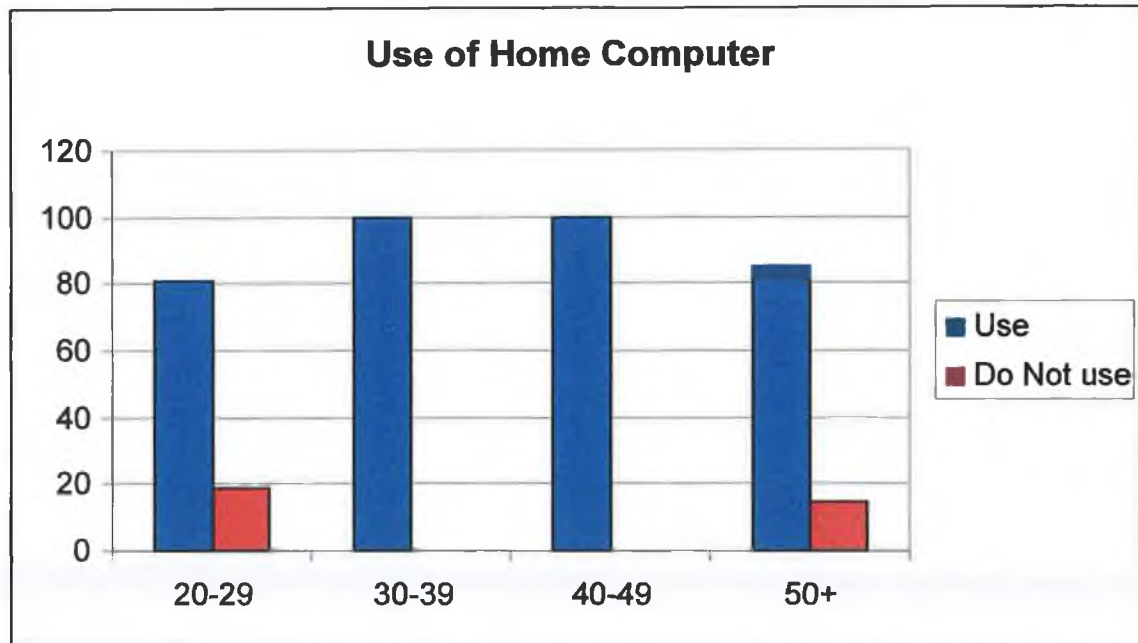


Figure 10 Percentage Use of Home Computers by Primary School Teachers

Figure 10 shows that the majority of the primary teachers who responded used their home computers regardless of their ages. Unusually the greatest proportion of non-users was found amongst the youngest teachers where just over one in five does not use his/her home computer. If the results from this graph are compared to those in Figure 1 a number of differences emerge. Firstly the percentage of 40-49 year old teachers at primary level (100%) using their computers is much higher than the percentage of post primary teachers (67%) in the same age bracket. Secondly, there is a small percentage

increase in the total number of primary school teachers using their computers (92%) in comparison to the total number using theirs at post primary level (85%).

5.3.3 Home Internet Access

The Author decided to take a closer look at the use of the home computers to see if the primary teachers had access to the Internet from their computers.

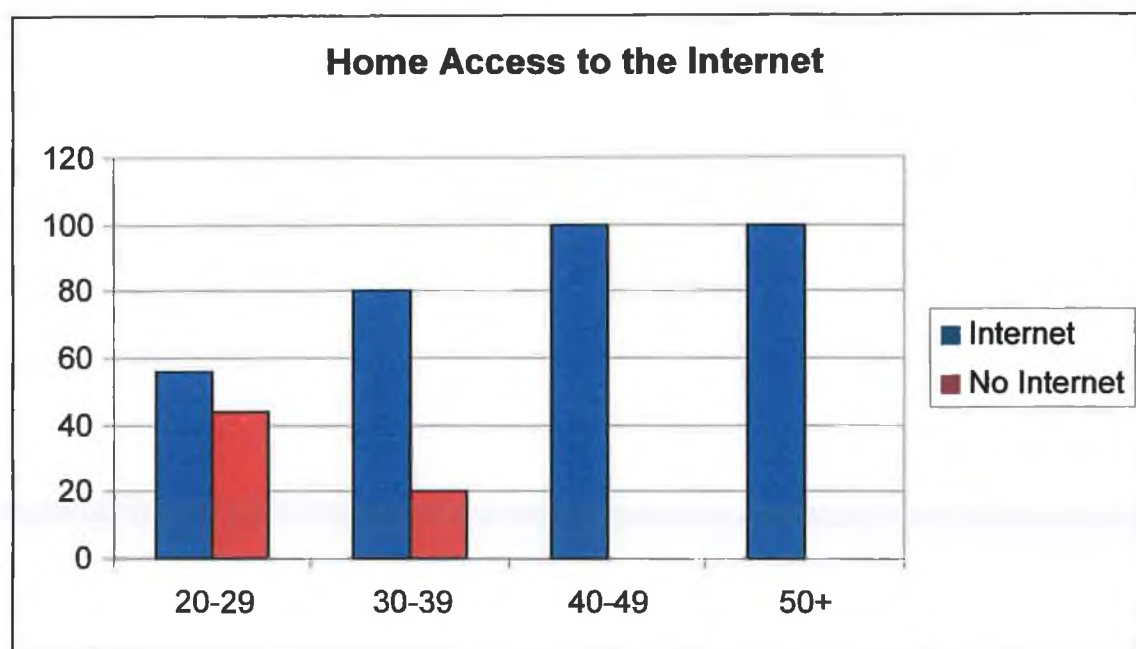


Figure 11 Percentage levels of Access to the Internet on Home Computers for Primary Teachers

From Figure 11 it is clear to see that the majority of all primary school teachers responding had access to the Internet on their home computers (84%). It also showed that the level of Internet access was proportional to the age of the teachers, increasing across the age profiles. This is a very similar profile to the level of home Internet access seen at post primary level. The percentage of 20-29 year old primary teachers with access to the Internet at home is a little smaller than the same age group at post primary level (56% compared with 67%)

It is interesting to note that the primary teachers in the 40-49 age group do not show the same results as their post primary colleagues. All of the primary teachers in this age bracket have Internet access at home, while only two thirds of post primary teachers have the same facility.

5.3.4 ICT Based Class Preparation

As the Author now knew that primary school teachers were using their home computers, she wanted to see if this was reflected in the use of computers to help them prepare for class.

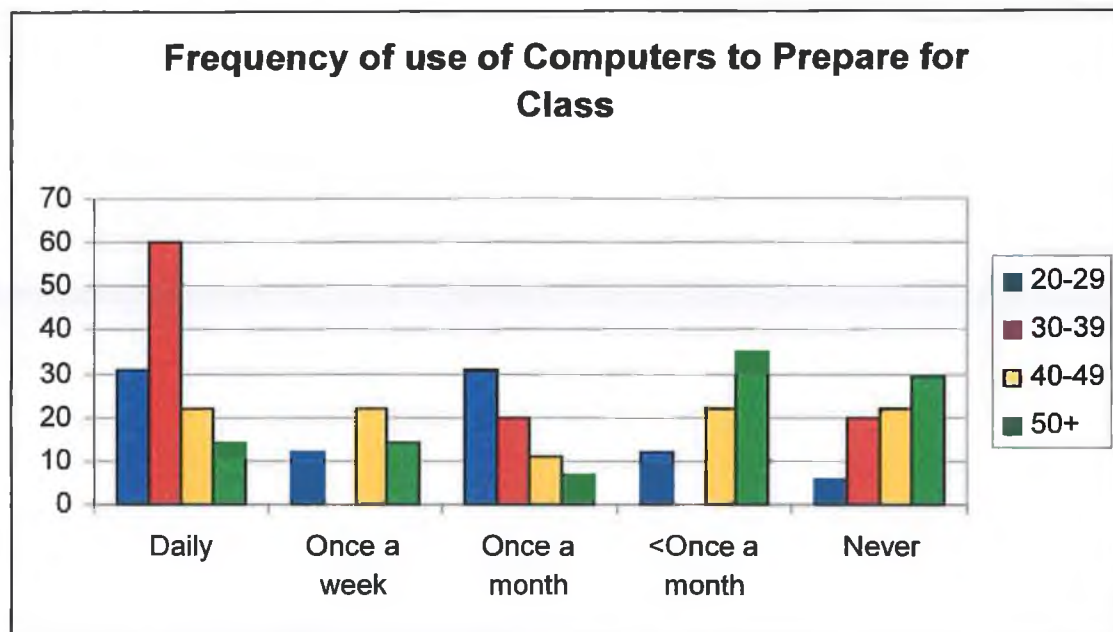


Figure 12 Frequency of Use of Computers to Prepare for Class by Primary Teachers

Figure 12 tells us that primary teachers do use computers to prepare for class (80%).

There is no distinct pattern between use of the computers for preparation for class and the age of the teachers. Teachers aged between 30 and 39 years of age are most likely to use the computers on a daily basis (60%). Younger teachers were split in their use of ICT.

They either tended to use them on a daily basis (31%) or once a month (31%), while the most senior teachers used them less frequently than this. Like their post primary colleagues, the primary teachers are seen to be using their home computers but not necessarily for the preparation of their classes. Once again, primary teachers in the 40-49 age bracket are not following the same usage trends as their post primary counterparts. This group at primary level are making some attempts towards ICT preparation in the primary sector.

5.3.5 Internet Based Class Preparation

The Author wished to discover if the primary teachers used the Internet when preparing for their classes. She was particularly interested in the youngest group of teachers as only 56% of them had Internet access at home.

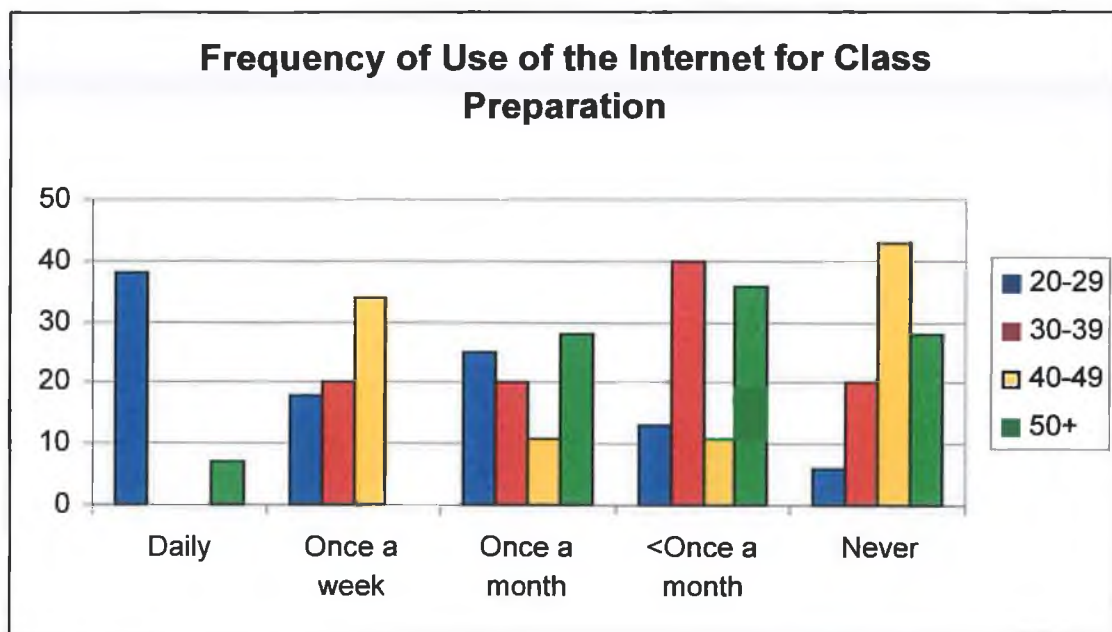


Figure 13 Frequency of Use of the Internet to Prepare for Class by Primary School Teachers

Figure 13 shows that the teachers at primary level tend to use the Internet to prepare for their classes on a monthly basis (25%). The younger teachers use the Internet more frequently with them tending towards daily usage despite the fact that just over half of them had access to the Internet at home. No correlation was found between the frequency of use of the Internet for preparation at primary and post primary level, as the post primary teachers tended not to use the Internet for class preparation.

5.3.6 Computers in Class

As the primary teachers used computers and the Internet to prepare for class, the Author continued with her analysis to determine if these teachers had begun to incorporate ICT into their classrooms.

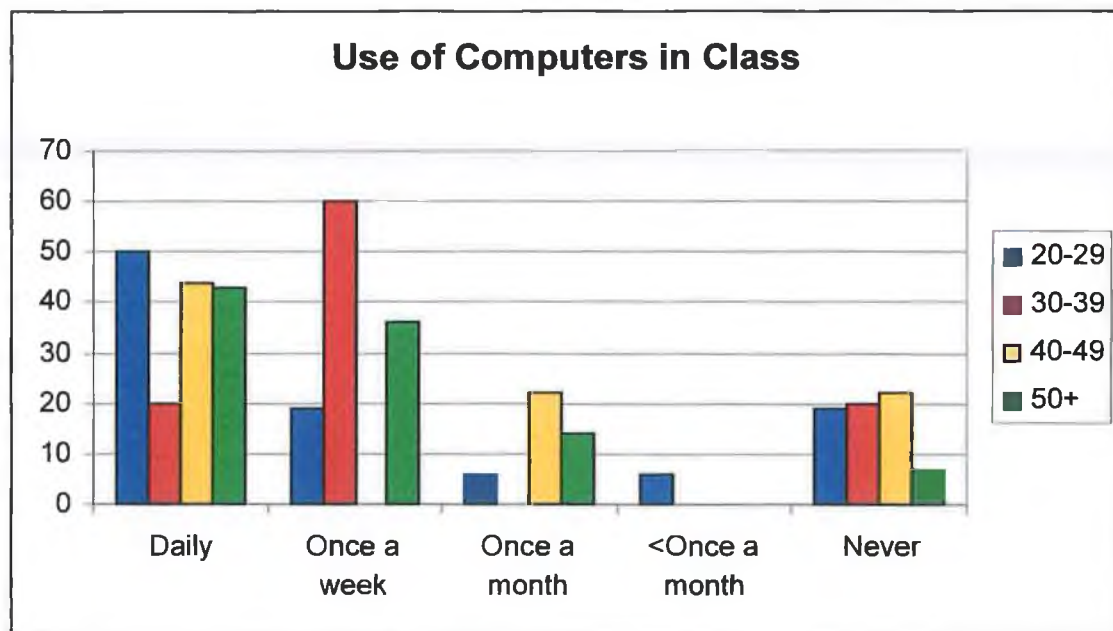


Figure 14 Frequency of Use of Computers in Class by Primary Teachers

Figure 14 shows that primary teachers regularly used computers in class with their pupils. This was seen across all teacher age groups. Computers were used on a daily basis by

39% of the group. The teachers in the 30-39 age group were the exception to this trend. They tended to use computers on a weekly, rather than daily, basis (60%).

The percentage of primary teachers who were using the computers in class was nearly double the number of post primary teachers within the two younger age groups. The amount of in class computer use made by the older teachers was nearly 80% greater at primary than at post primary level. This raises a number of questions for the Author. She wonders if factors relating to the differences between the education sectors are responsible for the dramatic differences in results, rather than the ages of the teachers involved. The Author researched this further through the group interview phase.

5.3.7 Internet in Class

As the level of use of computers in class was so different at primary level to post primary level, the Author was interested to see if the same was true for the use of the Internet.

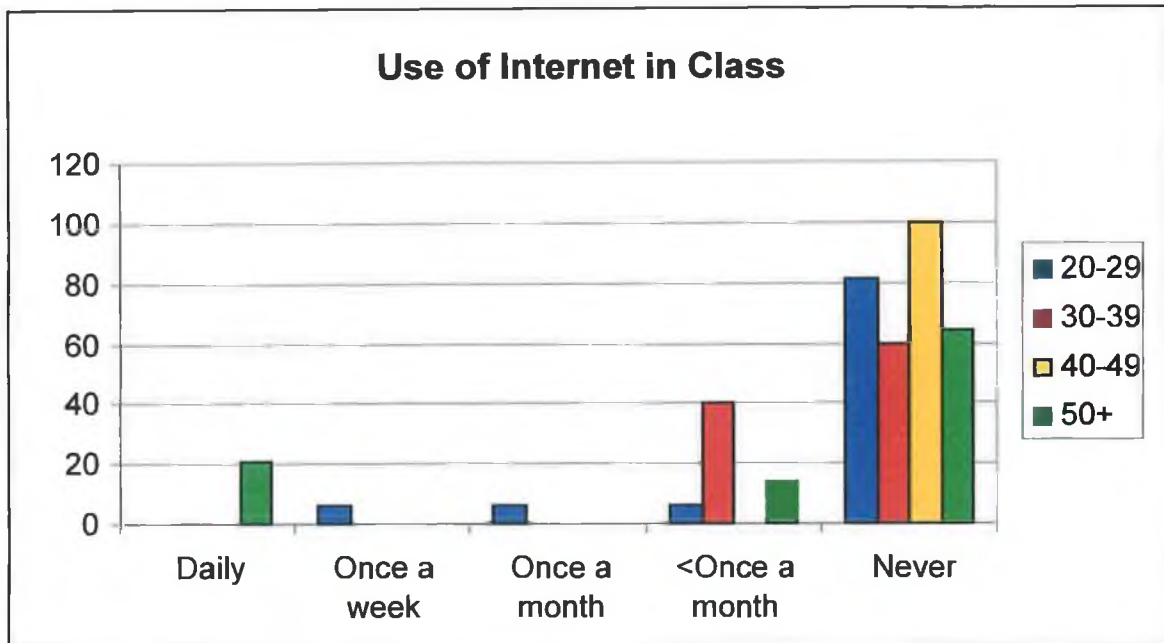


Figure 15 Frequency of Use of the Internet in Class by Primary Teachers

It is clear from Figure 15 that primary school teachers tended not to use the Internet in class with their pupils. The only exception to this was the teachers in the 50+ age group where a fifth of the teachers surveyed used the Internet in class on a daily basis. There was evidence of some inclusion of the Internet in the classroom by the youngest group of teachers. This of course may be linked to the age of the students rather than the age of the teachers (see Figure 16).

The level of use of the Internet in primary class correlates with the use of the Internet in class by post primary teachers. However the age profile of the primary teachers who are using the Internet on a frequent basis does not correlate with the age profile at post primary level.

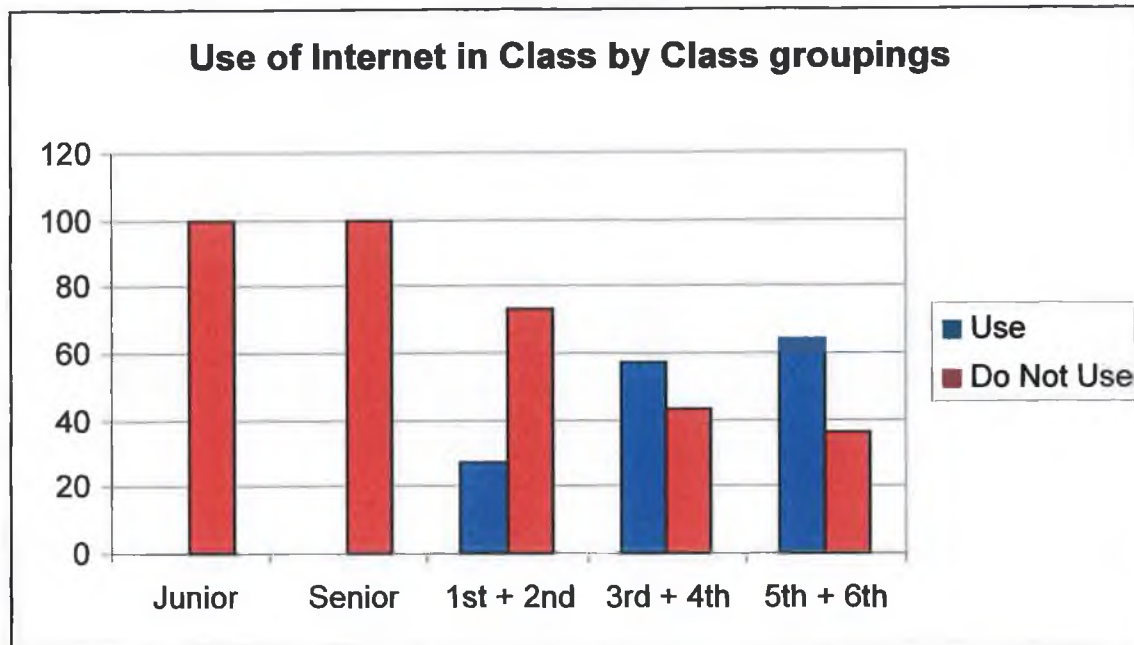


Figure 16 Relationship between Class Use of the Internet and the Age of the Pupils at Primary level

It is obvious from Figure 16 that, at primary level, the use of the Internet in class was related to the age of the pupils. As the pupils get older, the teachers were more likely to use the Internet with them.

When the Author compared the age of the teacher with the age profile of their classes, she found that the younger teachers tended to have the younger classes. Almost 65% of 20-29 year old teachers who responded taught classes ranging from Junior Infants up to 2nd class. The reverse of this pattern was true for the older teachers. Nearly 53% of teachers in the 50+ age band taught 5th and 6th class. These teachers were also involved in learning support or resource teaching so the remaining 47% did not all have junior classes. These two factors, age of pupils and the relationship between the age of the teacher and the seniority of their classes, account for the combined results seen in Figures 15 and 16.

5.3.8 Pupil Age Effects

It has been seen that the age of the pupils was an important factor in determining the use of the Internet in primary school classes. The Author wished to know if the age of the pupils had an impact on the use of computers in the same classrooms.

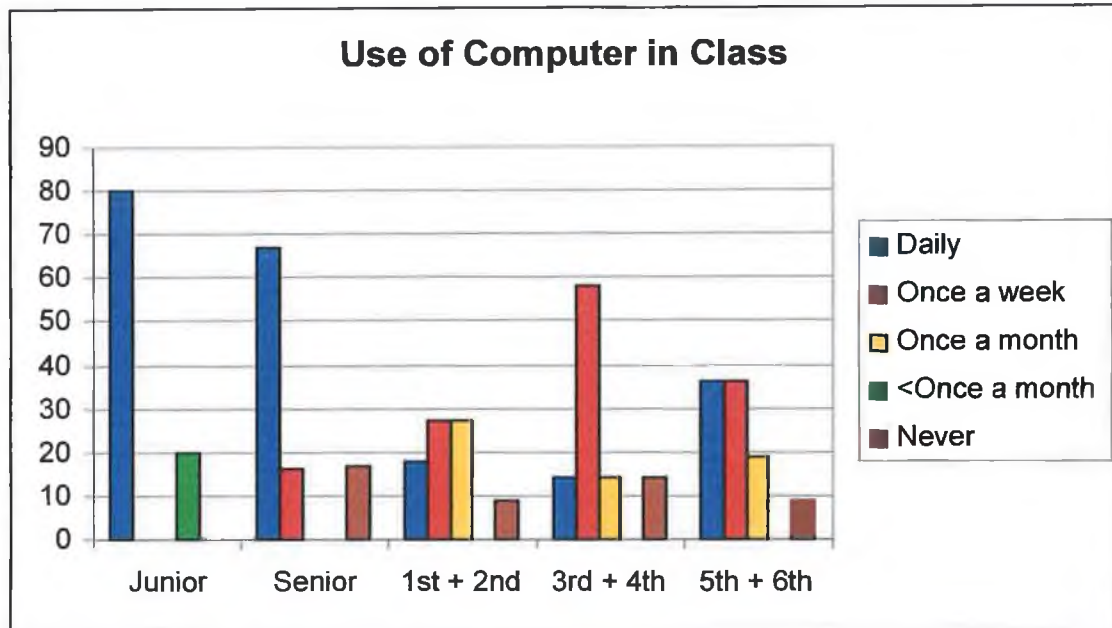


Figure 17 Relationship between Class Use of the Computer and the Age of the Pupils at Primary level

The computer was used by all class groups at primary level (Figure 17). All of the classes used the computers at least on a weekly basis, if not on a daily basis. The younger the children the more likely they were to use the computer on a daily basis. Approximately 10% of primary school pupils never used the computer. This result indicates much higher levels of use by primary schools pupils compared to the post primary classes. 41% of post primary pupils never used computers in class (Figure 5). In addition, the post primary teachers tended not to use computers with their exam classes (67%, Figure 7). This is not very surprising as the teachers did not tend to use computers very frequently at this older level of the education system.

5.3.9 Gender

The Author was also interested to know if the gender of the teacher had an impact on the choices made by the teachers in relation to the use of ICT in primary schools.

	20-29	30-39	40-49	50+	Total
Male	1	0	1	4	6
Female	16	5	8	10	39

Table 6 Number of Male and Female Teachers who Returned Questionnaires within each Age Grouping at Primary Level

The gender ratio amongst the primary teachers who responded to the questionnaires was approximately 7:39 male to female (Table 6). In addition, the majority of the men were over 40 years of age. The breakdown of classes amongst the men was half senior and half junior classes. A quarter of the men taught in the single-sex boys' school, while the others taught in the co-educational schools. No men replied from the girls' school.

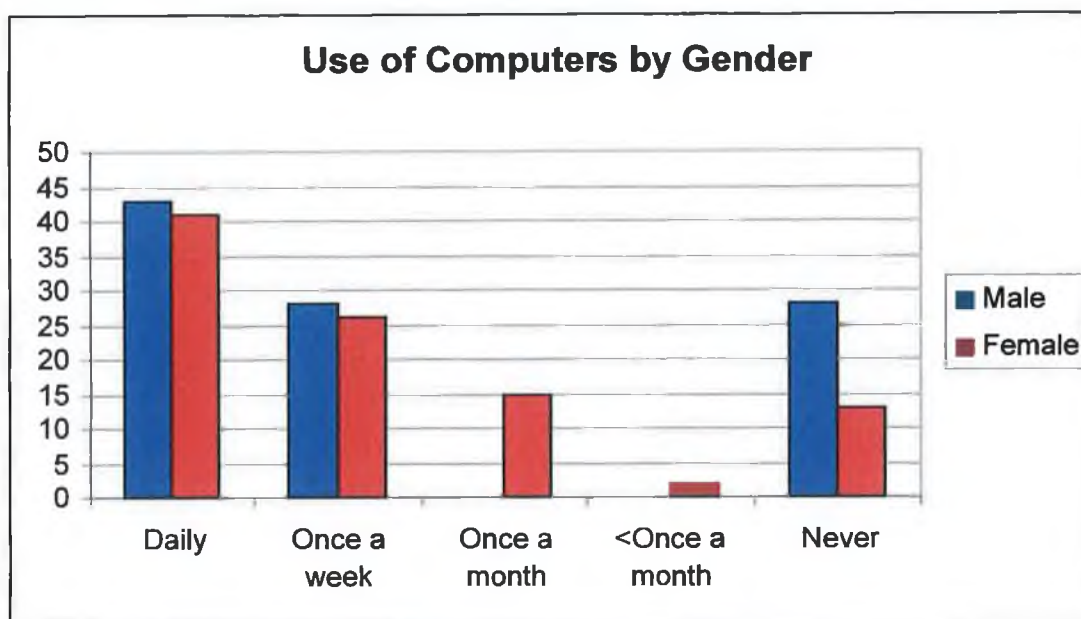


Figure 18 Use of Computers at Primary level by Gender of the Teachers

There was no noticeable difference in the amount of use made of ICT in primary schools in relation to the gender of the teacher (Figure 18). There were twice as many males as females who chose never to use computers with their classes. The Author believed that no further gender effects could be inferred from the data as the male sample size was tiny ($n=7$) and therefore extremely biased.

5.4 Summary of Findings

This initial survey showed usage of computers by teachers. Thus the Author's question re the computers being left to gather dust (Section 2.5) has been shown not to be true.

The Author summarised her findings from the analysis of the questionnaires in order to design her interview questions. It was clear that, at the primary level, the age of the pupils was an influencing factor on the type of ICT that was being used in the classrooms.

It was not possible to draw the same conclusions from the post primary questionnaires.

Instead the Author reviewed the results to see if there was a subject influence at this level.

Once again, this was not clear from the questionnaires, and the Author decided to investigate this further during the interview stage of her research.

The Author found that greater numbers of the primary school teachers used computers and the Internet more frequently than their post primary colleagues. This was seen across all areas examined. The only small difference was the post primary teachers were slightly more likely to use the Internet in class than their colleagues in the primary sector. The Author found it interesting that primary teachers were seen to make greater use of computers and the Internet than their post primary colleagues. This was particularly striking as two of the primary schools questioned were in the process of equipping the school with computers or only had a connection to the Internet in the Principal's office. The Author found that the age of the pupils was an influencing factor when deciding whether or not to use the Internet in class. The younger the pupil the less likely they were to have access to the Internet during the school day. However, at second level, the State exam classes did not generally get to use computers in class. Therefore it was not possible to draw the same age based conclusions for post primary students.

Age was also an important factor in relation to the teachers at both levels of the education system. The Author found that the younger the teacher, the more likely they were to use ICT in their preparation for class. This was also true for the use of ICT in the classroom. This is something which the Author wanted to research further in her group interviews.

The one group of teachers that was different between the two education levels were the teachers in the 40-49 age bracket. At primary level, this group of teachers were much more ICT-friendly than at post primary level. At post primary level, this group of

teachers stood out as being different from all the trends emerging from the data. They gave unexpected responses to many of the questions. The Author felt that many of these surprising results were due to bias from the small sampling size. She felt it was worth further discussion through her interviews to see if her results were transferable to the post primary sector as a whole.

It is well known from the research (see section 3.6) that education is becoming more feminised as the number of men entering the profession is declining. The Author wished to know if this gender imbalance was having any impact on the use of ICT in schools. The questionnaire analysis showed no link between the gender of the teacher and the use of ICT in their teaching at both the primary and post primary level.

It had been seen that different degrees and types of use of ICT were found between the two education levels. The Author wished to explore this further in the interviews. She wondered what it was about the primary system that was encouraging successful ICT use that was not present in the post primary system.

5.5 Interviews

Following the analysis of the questionnaires the Author conducted some group interviews. The interviews were designed to help the Author account for some of the ideas that were emerging from the questionnaires. The interviews led the teachers gradually through their use of Information and Communication Technologies both inside and outside the classroom. The interviews concluded with the teachers looking at the use of ICT within the education sector as a whole. A number of common elements were

found in all of the interviews. The Author shall now review these major themes, with more detailed discussion of these and other issues in the following chapter.

5.5.1 Software and Reasons for using the computer

The software packages that were used at post primary level were mainly of the content-free software type. Of these, word processing and presentation software were the most popular. This was because the post primary teachers mainly used computers to prepare handouts or worksheets or as an alternative means of presenting the information to their students.

At primary level the same software packages were used. In addition to these packages the primary sector also made use of a range of specific educational software packages to give increased variety to the delivery of the material. These focused on the areas of mathematics, reading and writing. Other subject specific packages were used (e.g. geography, science) but at the discretion of the individual teacher. Both of the education sectors used the computers for research and project work. Therefore the Internet and reference software like Encarta were also used regularly.

All teachers interviewed chose to use ICT as it allowed for better presentation of material. “Bad handwriting” was the first response given by all teachers to this question. It was seen to be a quicker method of preparation in the long term, as copies could be stored on the computer for future use. The teachers felt that the computers were motivational for all of the pupils especially those with special educational needs or short concentration spans. Lastly the teachers believed that ICT skills were now a necessary skill for all.

They felt that it was important for the pupils to be able to use technology especially as education is now aimed at fostering lifelong learners.

5.5.2 The Future for Further ICT Integration

All of the teachers believed that ICT would continue to be further integrated into the Irish education system. They felt that resources were reaching a good level. However they believed that funding had to be budgeted for the renewal and upgrading of hardware as it aged. They were of the opinion that that support services and training had to be a priority from now on, rather than acquisition of hardware. All of the teachers interviewed saw a need for permanent support and maintenance staff for managing the school networks. They also wanted time to learn and play with their equipment. Now that these teachers had ICT skills, they wanted further training to allow them to maximise the benefits that their equipment could offer to enhance teaching and learning in Irish classrooms.

5.5.3 Impact of Age on ICT Integration

The questionnaire analysis had indicated that teacher age seems to have an impact on ICT integration. The teachers were asked to give their opinions and suggestions as to why this may be. At post primary level the teachers were surprised by this finding. They felt that it was more of an issue of personal choice whether or not teachers used ICT in their classrooms rather than an age issue. They also felt that the lack of both technical support and time were crucial factors for teachers making the choice of whether to use ICT or not. Fear was given as another reason. The teachers believed that not enough was being done to help those teachers who are afraid of technology or change. They believed that supportive training for these teachers was essential. As one teacher put it,

The critical factor is getting teachers to make that first step and start using IT, all other improvements will naturally follow on from this.

Teacher, Post Primary Boys School

At primary level the response was similar. Again they felt that it was more of a personal choice issue. However these teachers thought that a number of other factors were having an impact too. Firstly the age of the teachers' own children had an impact on the amount of technology that the teachers felt comfortable using their classrooms. They stated how important their children were in teaching them how to use the different aspects of the computer to their best advantage. They believed that as the teachers got older, they did not want to be seen as lacking or falling behind their younger colleagues. Lastly they offered the opinion that older teachers were comfortable with their jobs and how to complete their remit. Older teachers often looked for new methodologies to prevent boredom or burn out. The interviewees felt that this might account for their interest in ICT. The Author will discuss each of these issues further in the next chapter.

6 Discussion

6.1 Introduction

The Irish Government has invested approximately €140 million in Information and Communication Technology for schools over the last decade (Mulkeen, 2004). This is a huge amount of money and it is of interest to the Author to investigate how the schools are using and benefiting from this investment. The key focus of this study was to investigate how teachers are making use of ICT in a selection of Irish schools. It was then decided to use this information to compare the primary and post primary education sectors. The Author wanted to give the teachers an opportunity to voice their opinions as to how future initiatives in educational ICTs should be directed for their benefit and that of their students. In this section, the overall results of this study will be discussed thematically in order to draw out the main findings as described in the previous chapter.

6.2 ICT and Class Preparation

The majority of teachers surveyed from the case study schools used computers or ICT in their preparation for class. They tended to create documents for use in class or slide show presentations. However the primary teachers seemed to be more creative in their use of ICT. They were more likely to use the computer to help them make resources like number-lines or charts. From the discussion at the interviews, it was clear that the most commonly used software packages were for word processing or giving presentations. This was the case at both primary and post primary level.

The study showed that another essential ICT resource for the teachers was the Internet. All of the teachers interviewed spent time on the World Wide Web as part of their preparation for their classes. They liked the fact that so many varied and colourful resources were available on the Internet. Another element which appealed to the teachers

was that many of the resources were prepared by other teachers as it gave them a sense of validity and reliability. The fact that up to date material was available on the Internet was also appealing to the teachers. They felt that their students were having a better learning experience when using this current information. The Internet allowed them greater creative freedom as they were able to find material which was relevant to their subjects but not specified in the syllabi. A number of teachers across a wide range of subjects stated this as one of the benefits of ICT for their students. This wider content was useful and appreciated by teachers at both levels of the education system. Morrissey (2004) found that the Internet is an important resource as

it is an increasingly rich source of educational content, much of which is interactive and multi-media in nature and which can be delivered directly to the classroom

(Morrissey 2004:7)

The Author wished to know why the teachers prepared for class in this manner. Were they mainly concerned with the Internet or were they making use of computers or other technologies? She was keen to identify any other benefits of this type of preparation. Was it simply because they felt they had to make use of the computers that had been provided for them as was initially seen in the case study conducted by Gleeson et al (2001)?

Almost all teachers gave presentation as their main reason. They all referred to the fact that printed documents were much easier to read than their handwriting. The teachers found that once they had become comfortable with the use of ICT, it was the simplest method for preparing their work. They felt it was a better use of time and liked the fact that they had a permanent record of the original document on their PC. The freedom of

access to up to date material was a critical factor for the teachers when choosing to use the Internet in the preparation of their classes. The teachers also appreciated the fact that much of the material on the Internet was free, or that they had the option to test the resources before they bought them. The use of ICT was found to have an added benefit. It is more environmentally friendly as they were able to use less paper. They suggested that school management also appreciated this as it helped to reduce costs.

In one school, the group of teachers being interviewed was very surprised that the Author was asking them about how they used computers and the Internet when preparing for class. For them it had become such a basic tool and common way of doing things that they were hardly aware that they were using the equipment over any other method of preparation. This is a very positive sign; once the use of technology stops being novel and is no longer noticed then the integration process will have been successfully completed. Evans (2001) found that this was a critical factor in relation to change. The Author believes that it also applies to the integration of ICT. It will have to become a norm of the teachers and the practices of the school in order for the full benefits to be achieved.

6.3 Home Access

It can be seen from the results of the questionnaires that primary school teachers made slightly more use of computers when preparing for class than their post primary colleagues (see Figures 3 and 12). This was interesting for a number of reasons. While the same proportions of primary and post primary teachers owned a home computer, there was greater home Internet access found amongst post primary teachers. However, the post primary teachers did not think that their home facilities had an important role in

their class preparation. The majority of the post primary teachers interviewed carried out their ICT based class preparation in school. These teachers tended to use their free time in school to use the Internet or prepare for their other classes. Thus, they were more concerned with the school facilities and being able to bring ICT into their classrooms, especially the Internet.

The primary teachers gave the opposite response, saying that most of their class preparation was carried out at home. The Author found this particularly interesting as the majority of primary teachers being interviewed had computers in their classrooms. She was surprised that the teachers were not using these computers for their ICT based preparation. She thought that it would have been more convenient for them to prepare on these classroom based computers so that all necessary resources could be loaded onto these machines ready for use in class. These teachers felt that home preparation was essential to ensure sufficient time to assess the suitability of the material. With further discussion the real reasons for home preparation began to emerge.

When the teachers were working at home, they could guarantee access to the software packages that they wished to use, and the Internet. In one particular school it was only the classrooms in the senior building which had Internet access, in another the office computer was the sole Internet connected computer. In a third primary school, the teachers felt that their support network was at home and so were more comfortable doing their technology based preparation where they could get immediate assistance if they needed it. Once again the issue of support and reassurance is highlighted by these teachers.

It was obvious from the interviews that the younger primary school teachers who did not have access to the Internet at home felt at a disadvantage. The study highlighted how important the Internet appears to be for class preparation. It was a highly valued and popular resource. Certainly, at post primary level, ICT based preparation appears to mean using the Internet. The teachers were more concerned about their access to the Web than any of the software packages. The Author wonders if this is due to the lack of suitable software, or whether it is their exam focus which directs them towards the Internet. The production of revision notes may also be a factor. However this does not account for the preferences of the primary teachers. Further research may be needed here to explain the popularity of Internet based preparation.

It was usually for financial reasons that the teachers did not have the Internet in their homes. The teachers with limited school access to the Internet pointed out that they were reducing the costs for the school by using the Internet at home. Thus finance appears to be an issue for some teachers. Perhaps this is the difference between the fee paying post primary schools and the non fee-paying primary schools in this study. The fee-paying schools could afford to connect frequently to the Internet, thus the teachers there did not have to give consideration to the cost of using the technology. Once the school had acquired the ICT resources the teachers were free to use them as they wished. The Author expects that the arrival of broadband connectivity into the schools later this year should help ease the financial burden of providing Internet access for the primary teachers and their pupils. It is possible that the arrival of a broadband connection to schools will also have an impact on where primary teachers choose to prepare for class as it should allow for unlimited access. This could also be supported through the use of wireless connections to give school wide access to the Internet. The NCTE recommends

that all schools develop a local area network (LAN) so that the broadband connection will be available wherever it is needed throughout the school

(<http://www.ncte.ie/Broadband/>). All of this should help give the primary teachers the choice of completing their class preparation in school if they wish.

The Author wonders if the new primary curriculum could be another factor which accounts for this difference in where class planning takes place at primary and post primary level. The Primary curriculum is based around themed teaching. It is very student centred and promotes discovery learning by the pupils (NCCA, 1999). It allows for a large degree of flexibility and has a strong emphasis on planning. Perhaps it is this emphasis on planning which results in primary teachers making greater use of the Internet.

The DES is striving towards changing the style of learning that takes place within Irish classrooms. This is clear from all of the new curricula and syllabi (see <http://www.education.ie/home/home.jsp?maincat=17216&pcategory=17216&ecategory=17233&language=EN> for curricula and syllabi). They all promote active, discovery learning which is student centred. At the same time, Government aims to prepare students for life in a technology based society. It is important that teachers are equipped to promote student learning through the use of ICTs. The Author believes that schools need to have a change in pedagogy towards a constructivist approach which encourages the development of learning communities, where all the individuals in the community learn from each other. Thus the aim of the ICT integration is not to simply encourage teachers to use technology to facilitate their class preparation. Rather the DES is

planning towards the full use of ICT in the classroom as another teaching tool to help implement this style of learning for our students.

6.4 ICT in the Classroom

The Author was already aware from the results of the questionnaires that primary teachers used computers in class more often than their post primary colleagues (see Figures 5,6,12 and 13). Through the course of the interviews it became apparent that the ways computers are used in class also differs between the two education sectors. Thus the two sectors shall be considered separately.

6.4.1 Post Primary Classrooms

The post primary teachers were inclined to use the computers with their students for research purposes or project work. They tended to use the Internet as a reference tool. This was supplemented by the use of presentation software. In one of the schools there were examples of some staff being slightly more active with the use of the technology. Their students had the option of emailing the teacher with their homework. This allowed for easy redrafting of material that was not accurate. This was seen to be particularly useful when group work had been completed, as the students could work together to document their activities. The students liked working in this way as they felt they gained by listening to each other's ideas and opinions. They were also quick to point out the advantages of having less books or copies to carry to school each day!

Other studies have shown that it is mainly transition year students who get regular access to the computer room as much of their work is project based (Mulkeen, 2004). The two schools who took part in the interviews offered the ECDL certificate to their transition year students. In the girls' school the ECDL program took up three quarters of the

timetabled access to the computer room. This created some problems within the school, as many of the other teachers found that the computer room was always busy with ECDL when they wanted to use it with their own classes. This had become such a significant issue within the school that management was looking at different options to ensure greater ICT access for all classes.

These options included building a second computer room or fitting each classroom with a computer and Internet access. Both options are expensive and they felt that further research had to be carried out before a decision could be made. The school management was aware that a second computer room may not be the best solution. However management needs to be assured that classroom based computers will be used regularly as it would involve such a large financial investment to connect the entire school to the network. The Author supports the option to place computers in every classroom. It opens up more options to the teachers. Elliott (2004) discusses how teachers find that they do not get to take advantage of the “teachable moment” when they have to leave the classroom and go searching for the technology. If the computer is simply being used as a reference tool to support the learning, then it is more beneficial to have it in the classroom especially if a data projector is also provided. The school’s computer room will still be available when the entire class will be engaged in ICT based learning or acquiring ICT skills. This also brings up the issue of whether students need to be taught ICT skills, especially when they are at post primary level. The Author believes that as the use of ICT in school increases, these skills classes will no longer be necessary.

Only a limited amount of other educational software seemed to be employed in the schools where the interviews took place. The most frequently used of these was a career

guidance package. However all of the newly revised curricula include suggestions for ICT integration. This should see an increasing amount of technology usage at second level as the new curricula are adopted. It could also see an increase in the amount of software being used as the educational software providers meet these new demands. The ICT competent teachers may possibly be inspired to create their own resources which will be relevant to the Irish curriculum. These could be made available to all teachers through “Scoilnet” an Irish on-line education portal. This could come to resemble a portal like “Teachnet”¹ more closely in the future. This of course would need further training and support for the staff as they acquire the necessary skills to be able to create these resources. Scoilnet was initially created with these options in mind when it was launched as part of the Schools IT 2000 program in 1997. It was never intended to be simply a collection of classroom resources. It was seen as a point from which to connect with all the necessary partners to ensure the best possible education for our students. It was to be a link to resources as well as an arena where professional discussions and development could take place.

In the interviews with the post primary schools, subject was not seen to be an influencing factor in relation to the use of ICT. This research is in agreement with Mulkeen’s findings in the Progress Report published 2004. In one of the study schools, the language teachers had access to a multi-media language laboratory. This facility had been recently up-graded and the teachers and pupils were keen to make use of their new equipment. Every language class was timetabled for one period a week in the multi-media laboratory. The teachers found that it was very motivational for the students. It was particularly

¹ “Teachnet Ireland funds innovative Irish teachers to publish curriculum units that demonstrate the integration of ICT into classroom teaching in a meaningful and practical way” (www.Teachnet.ie/aboutus).

helpful for the quieter students. They were more willing to speak in the second language as all of the other students in the class were not listening to them. The software was designed to be flexible so that it allowed the students to work at their pace. It was a useful feature as it accommodated as much repetition as the students wanted. This was found to be of particular benefit in mixed ability classes. An added bonus of the software chosen was that it corrected their pronunciation. This allowed the students to work independently without losing out on the feedback given by the teacher in a group discussion. The teacher was able to communicate individually with each student during the class and monitor their efforts so that the teacher remained aware of the students' abilities and progress. The only disadvantage associated with the multi-media laboratory was that the more ambitious students preferred greater interaction with the teacher. It may be that these students know how to succeed within the existing educational system and therefore dislike change. As the laboratory proves its own worth, these ambitious students may appreciate it more.

The only other subject factor was seen in the area of science. In one of the post primary schools it was only the science teachers who replied to the questionnaires. Perhaps it is the case that the most recent investment by the school in ICT had been for the science department or that these teachers were involved in an ICT in science based project.

Unfortunately the school chose not to part-take in the interviews. This meant that it was not possible to determine the factors in their school that were suggesting this subject effect. No further subject based conclusions could be drawn from the research data collected as teachers from all subject departments made some use of ICT. Unfortunately there were also teachers from all the departments who made no use of ICT. Thus there

must be other factors which come to have an effect when teachers are deciding on whether to use ICT in class.

6.4.1.1 Exam classes

It was obvious from the results of the questionnaires that very few of the post primary teachers used the computers with their exam classes. When this was discussed at the interviews the Author got a very mixed response as to why this was so. It appeared to be a personal choice of the teacher. In one school, a number of the teachers tended not to rely on textbooks for the delivery of the different syllabi. Therefore, they did use the computers with their exam classes, but it was often just for the presentation of slide shows. Here the students were not engaging or learning with the equipment as it was really just acting as a projector to transmit material. The students were not really experiencing a new learning strategy; rather the teachers were simply doing what they did before in a slightly different way. This is echoed by McFarlane and de Rijcke (1999) who found that teachers with Internet access did not really alter their pedagogy; they simply improved on traditional practice (cited in OECD, 2001). The teachers interviewed may use the Internet to reinforce a particular topic with further support references. However, not all of the staff in this school taught in this manner. Some still relied on textbooks and “chalk and talk”. Even in this school, the use of ICT remained a personal choice for the staff.

In the other school they did not use computers (aside from those in the multi-media laboratory) with their exam classes as they felt there was insufficient time. The teachers involved believed that their courses were too long to lose class time moving to the computer room. They preferred that students would learn computer skills independently

so that the students could use the Internet at home themselves. They felt that this was of greater benefit to the students as it would help them to become independent learners. These teachers had the luxury of teaching students who almost all had Internet access at home. For the students who did not have such access, there were a number of computers available to the students in the school library which remained open until 6pm each evening. Thus the teachers felt that the students had ample opportunity to access the material if they so wished. These teachers were giving these students the responsibility for their own learning and hoping to develop life long learners.

6.4.2 Primary Classrooms

The Author found that the use of ICT in primary classes was generally different to that in the post primary schools. The primary classes used a large variety of educational software when they used computers in class. It was very student orientated with the students being the main users of the equipment and the teachers acting in a supportive role when needed. The software covered a range of subjects but the most popular were those that contain material on mathematics or literacy. This is supported by Mulkeen's (2004) findings.

The current study found that it was really only the older children in 5th or 6th class who would use the Internet in class at primary level. The main reason given for this was that the teachers believed that the younger children did not know how to use the Internet. This meant that a greater amount of teacher assistance would be required to help these children get onto a particular site and possibly while they were on the site too. The teachers did not feel that pupils were reaping enough rewards from the Internet to justify giving this much assistance to individuals. They were happy to point out the ease and

safety of using reference software like Encarta which made them more likely to use these resources instead of the Internet.

All of the primary teachers made reference to how motivational ICT is for their pupils. They told how many of the pupils saw the computer as a challenge; they kept trying to get on to the next level of the software package. All of the pupils seemed to enjoy their time on the computer. As one primary teacher stated

They also like to see their work being “professionally” presented.
(Teacher, primary co-educational school)

The Author wondered if this was related to the fact that much of the work that the teachers were producing for class was also created using ICT word processing equipment. Were the pupils trying to be like their teachers? The vision paper for ICT in Education (ILO, 2002) talks about how children learn by copying and imitating others. Secondly, the material produced on the computer was always referred to in positive ways like “professional”. The Author is of the opinion that it will be a combination of copying the teacher and the positive attitude towards ICT-produced material that will be central in ensuring the continued integration of ICT into primary schools. She hopes that as the pupils progress into secondary school they will champion the use of ICT for themselves until it is commonplace in post primary school too.

The computer seemed to work really well to help reinforce knowledge that had already been taught. It added variety and interest to the material. The teachers pointed out that it was especially beneficial to the weaker students, as it held their concentration for longer than book work in class. The Author chose not to research the area of special educational needs in great depth. She wanted to see what was being done in general throughout the

different classes in the schools. She feels that this is an area of interest for further study as all of the teachers involved in learning support were seen to be frequent users of ICT. This was true for both primary and post primary learning support teachers. Once again the primary support teachers used the computers in class far more frequently than their post primary colleagues. Further research may point to factors that explain this difference.

6.5 Age

Age was found to be a key factor when looking at the use of Information Technologies.

This included both the age of the pupils and of the teachers. This section of the discussion shall begin by considering the effects of the age of the pupils.

6.5.1 Post Primary Students

At second level, the age of the pupils was not of great concern to the teachers interviewed. The majority of the students were competent users of both computers and the Internet. The teachers were always present when the students were using the computers in class and so were able to supervise the work that was being done. The educational software that was selected for use at post primary level was very user friendly. The students rarely needed help to operate it. The sites visited on the Internet were, occasionally, of some concern but the use of net-nannies helped overcome this issue. Usually, it was not the content of the sites that was the problem, but rather that the students were off task.

6.5.2 Primary Pupils

At primary level the age of the pupils was not a factor for teachers considering the use of ICT. In fact more of the younger pupils were seen to use the computers more frequently

than the senior classes. The teachers stressed that the age of the pupils was not a barrier when looking at the pupils' proficiency on the computers. Mulkeen (2004) and the NCCA (2004) both found that age of the pupil had a small effect on ICT usage. They found that as the pupils got older the amount of ICT usage increased. However, this did not correlate with the findings in this study where the youngest pupils were more than twice as likely to use computers on a daily basis when compared to the 5th and 6th class pupils. The sample size was very small in this study as it only included three primary schools. Again this is an area that would benefit from further research to eliminate the possibility of biased sampling.

It was the material on offer, rather than the age of the pupils, that was of concern for the teachers. They felt that they had to spend a lot of time assessing the software before they used it to ensure that it was not too difficult or that the levels of progression matched the abilities of the students. These teachers were very concerned not to let the computers be seen as a waste of time or "filler" activity by their pupils. This generated a desire to ensure that the pupils were always benefiting and learning from the use of the educational software. This desire may also help to develop on-line professional communities as teachers seek out new ways to use the technology to meet this aim. Such communities could also support student led learning as in the "Tech Angels" initiative in New Zealand. Here it is the students who "teach the teachers how multimedia world fits together with learning" (McLeod, 2005). The Author believes that this should be the ultimate goal for ICT integration so that communities of lifelong learners are developed.

However, in relation to potential use of the Internet, the age of the pupils was a critical factor (see Section 5.3.7, Figure 16). Levels of Internet usage were directly proportional

to the age of the pupils. It was usually reserved for 5th or 6th class pupils. The teachers felt that the younger pupils simply did not know how to use it as discussed above (section 6.4.3). The older primary pupils had learnt how to use it. (The Author did not research how or when the pupils gained these skills.) They were guided by their teachers, and unlike the post primary students did not think to reference other sites from the ones that they were being directed to by their teacher. In fact they found the “pop-ups” a total nuisance, and tended to ignore them. In one of the schools, some of the teachers tended to use reference CDs in preference to the Internet when the pupils were researching their projects. It was found that this was simply a reflection of the teacher’s competence with the Internet rather than the pupils’ ICT abilities. This finding shows the teachers’ fear of what they might find on the Internet rather than a belief that the software is superior. This suggests that further support is needed to help the teachers overcome any anxieties they may have about using the Internet.

6.5.3 *Age of the Teachers*

This factor has emerged as being important throughout the study, but thus far the Author has only presented the results and given some brief comments. It will now be considered in-depth and discuss each age band across both sectors. In this study the teachers were grouped according to age as shown in the Table 7.

Age Bands	20-29	30-39	40-49	50+
Number of Teachers	40	28	15	34

Table 7 Total number of Teachers within each Age Band

6.5.3.1 20-29 Age Band

The interviewed teachers were very surprised to learn that the age of the teacher seemed to have an effect on the amount of use being made of ICT. They felt that as younger teachers had grown up with ICT it would be completely normal for them to use it in their daily lives. At primary level this was found to be the case. Half of the primary teachers in the 20-29 age band used the computers in class on a daily basis. However, in the post primary schools the response was very different. Here only one or two teachers within this group used the computer on a daily basis. In fact a third of these teachers never used computers in class. In contrast to this over four fifths of the teachers in the 20-29 age profile used computers with their exam classes. Perhaps these teachers are at a critical stage in their use of ICT. They may be aware of the benefits of using ICT and so have chosen to begin to implement the change to ICT-based learning with their exam classes.

As the results are so different between the two education sectors, it may be other factors which are having such a huge impact on the post primary classroom. These could include the location of the computers, the length of the class period or the external pressure imposed by the exam system (OECD, 2001). When the Author pushed for suggestions, the teachers being interviewed felt that the youngest teachers were still mastering their teaching skills. Some of the young teachers present stated that they preferred to focus on developing the social relationships in the classroom rather than the integration or use of ICT. This was supported by the data from the questionnaires. While the youngest group of teachers were making an effort to use ICT especially in their class preparation, it was the next group of teachers in the 30-39 age bracket who were seen to be making the most use of the technology.

6.5.3.2 30-39 Age Band

The Author believes that the DES should learn from these teachers in their thirties. They are actively integrating ICT into their classrooms. They are prepared to invest the time and energy required to ensure that their students reap the benefits of using ICT. The DES needs to become aware of the critical factors that helped these teachers become successful in their use of ICT. They should build on this experience to help other teachers in the integration process. These teachers would also be able to offer advice on where future resources should be directed. These are the teachers who would be most likely to contribute to discussion groups and on-line professional communities to further the integration of ICT into our classrooms. The Author believes that the DES needs to focus on the experience and knowledge of these teachers when designing their next ICT policy for schools. However the DES needs to also consider the teachers who avoid using the technology. Obviously these teachers would not benefit from on-line resources or Scoilnet based training as they do not have the skills or wish to use the technology to gain access to these facilities. They too will have valuable knowledge to offer so that a more inclusive and motivational strategy can be developed.

6.5.3.3 40-49 Age Band

There was a difference in the amount of ICT being used by the teachers in the 40-49 age bracket. At post primary level these teachers tended to avoid using ICT as much as possible. Two thirds of them never used ICT in class. This was not the case in primary schools. At primary level the 40-49 year old teachers were evenly spread across the suggested frequencies in their use of the computer when preparing for class. Just under half of the teachers in this group used the computers in class on a daily basis. The only time the primary and post primary teachers were giving the same results was for the use of the Internet in class. None of them used the Internet in class.

The different results received from across the two education sectors were surprising. There may have been a number of reasons for this outcome. Firstly it may have been due to the difference in sample size. This group of teachers (40 - 49) only made up 8% of the teachers who replied at the post primary level. In fact there were only 6 teachers in this group. At primary level they made up nearly a fifth of the teachers questioned. However there were only 9 teachers in the group. Therefore the Author believes that the sample size is too small to be reliable when drawing up conclusions. She feels that a wider survey of teachers in this age group would be beneficial. Secondly there may be school effects which are responsible for these results. These could include the class group that is being taught, the amount and suitability of the training that the teachers have received, the difference in the daily timetable between primary and post primary schools or even the personal interest of the teachers in technology (OECD, 2001).

Some of the teachers at the post primary interviews felt that the 40-49 year old teachers had a fear of the computers. This reason was usually offered by the teachers who had an ICT supporting or co-ordinating role in their schools. They also wanted to highlight the fact that the teachers do not need to be very computer literate as they have the support from these co-ordinators to set up the software for them. Therefore the teachers are free to let the students work themselves without the teachers having to be able to use the computers themselves. One of the co-ordinators felt that this was the reason why so many of these teachers were using ICT in class in that school. They knew that once the co-ordinator had set up the software the students would be able to manage without much help from them.

The Author agrees with this observation. It is beneficial to the students as it allows the students an opportunity to display their knowledge and ICT skills. They also support each other through the software in times of difficulty. Secondly it is creating an opportunity for the teachers to incorporate team teaching into their teaching repertoire. The ICT coordinator is supporting and teaching both the class teacher and their students. It should also be of benefit as the curriculum in post primary schools becomes more themed and cross curricular in structure as is being promoted by the NCCA's new proposed Leaving Certificate Program (2005).

6.5.3.4 50+ Age Band

Finally the most senior group of teachers (50+) were considered. The teachers being interviewed felt that it was mainly a personal interest which determined their use of ICT. At the interviews the teachers pointed out the fact that it was the older and more senior teachers who would have been actively involved in setting up the computers and the network in the schools. As a result of this they would have a vested interest in ensuring that all their effort was successful. Secondly, the interviewees were aware that the older teachers did not want to be seen to be left behind or lacking in skills in comparison to their younger colleagues. Therefore they actively sought training to ensure that they were kept up to date with new methodologies. These older teachers have a thorough grasp of the subject matter and curriculum that they are teaching. They are often looking for new strategies to ensure that they stay motivated and inspired as they continue with the job that they have been doing for the last thirty years.

At primary level, the interviewees thought that the age of the teachers' own children also had an influencing effect. They believed that the children were teaching their parents

how to make the most of their home computers. The teachers were then bringing their newly acquired ICT skills into the classroom with them. The teachers felt that as their children became more adept with their ICT skills their parents followed. The primary teachers were of the opinion that this was probably the key reason for the difference in use of the computers by the teachers in the 40-49 age bracket in their school. They believed that the primary teachers in this group all had children who were promoting the use of ICT. They suggested that perhaps the influence of the teachers' own children was greater than they had initially expected.

Indeed, some of the teachers felt that their children were more influential than any of the in-service training that they had received. This is a factor that needs further research. The DES are benefiting here from a hidden provision. The teachers are receiving extra training free of charge. The Author believes that the DES should investigate the popularity of this type of training and develop it within their training strategies. The presence of technicians in school may replace this teachers'-children effect. Mulkeen (2002) found that training courses were more successful when they were held on-site as the teachers were able to form their own support networks. This supports the idea that teachers need access to their support network when they are actively implementing the change, not just when they are participating on courses.

6.6 Technicians

During the interviews, teachers were asked to suggest strategies which could be put in place to encourage greater usage of their ICT facilities. The most frequent suggestion was the employment of ICT Technicians. All of the schools thought that technicians would be a valuable resource for the school. All teachers wanted somebody who would

be on hand to help fix the machines if anything went wrong. They felt that time was a critical issue, hence having a technician on the staff would greatly reduce the waiting time if a computer broke down and needed to be repaired. The majority of the teachers felt that there should be a designated technician per school. This person would be available for support and maintenance throughout the school day. They could also help in the development of the curriculum and integration of ICT into the school.

Another teacher felt that there was not the need for individual school technicians. Rather she believed that a technician per locality would be sufficient. This teacher was the ICT coordinator for her school. She believed that the main role of the technician would be maintenance. She felt that if maintenance was no longer her responsibility then she would be free to work on the other areas of ICT integration. In her opinion it was better to have a teacher involved in curriculum development and the purchasing of software. She felt that such a teacher would know the needs of the pupils, teachers and school better than somebody who was trained in information technology. The OECD (2001) is in agreement with this, especially when considering the development of new educational software.

The Author agrees that teachers are best placed to do this work. She thinks that the DES would prefer technicians in the locality, rather than in each school, as they would have fewer people to employ. However the Author is concerned that these technicians should not be based in the education centres. She believes that they would have responsibility for too many schools if they were based there. This would mean that the schools would still be dealing with a long delay for the repair of their machines. Instead the Author would prefer to see one technician for a maximum of four or five schools. This person

should be on call for the school and have to give a commitment to deal with the problem within the school day, even if this meant giving the school an alternative computer until they had fixed the problem. In effect, this technician should take over from the technical support that many schools are paying for at the moment. This would allow the schools to direct this money towards further investment and upgrading of their hardware and software.

6.7 Gender

Feminisation is continuing in the teaching profession. As was discussed in the literature review (Section 3.6) approximately 85% of teachers in Ireland are female. The Author was interested to note that the gender balance in the response to her questionnaires reflected this. It was also interesting that no men responded from the girls' primary school. It later became known that there are no male members of staff in this school. If gender has an effect on the integration of ICT, it will be seen in this school. This includes whether gender has a positive or negative impact.

Volman & van Eck (2001) found that boys have a greater preference for computers than girls. The Author wondered if this was being brought into the classroom by the female teachers. She did not find this in her research, although for different reasons in the different sectors. In the secondary schools both male and female teachers made very little use of the computers. In fact nearly half of all the teachers questioned chose never to use ICT in class. The opposite response was found in the primary schools. Here approximately half of the teachers used computers on a daily basis, irrespective of gender.

The lack of gender effect is reassuring for the Author. She had some concern that her sample size was very small and therefore not reflective of school ICT use nationwide. However it was found by Mulkeen (2001) that gender is having very little impact on Irish teachers' use of ICT and that all teachers had similar ICT skills regardless of gender. This is a positive sign as it reduces the likelihood that students will be affected by the gender of their teacher in relation to ICT use. It also reduces the need for alternative styles of in-service provision customized on gender as mentioned in Chapter 3.

6.8 Time

Time was another element that kept reoccurring throughout the interviews. This included time in class with the students as well as practice time for the teachers as they familiarised themselves with new software or hardware. They also wanted time to share ideas and methodologies with other teachers. As one teacher put it:

We should have time to play with the ICT equipment
Teacher from the Girls' Primary School.

While the Author is aware that teachers nearly always state that time is a critical factor for every new initiative, she is in agreement with the teachers. She believes that users of technology require time to learn the skills needed to operate the equipment. Once they have gained sufficient skills to be able to use the device they then need an opportunity to master the technology and the variety of tasks that it can do. This will ensure that the technology is being used to the best advantage.

Linked to both the time and technicians is training. All of the teachers interviewed would like further training. They would like this training to be designed specifically for their own school needs. They would like the training to occur in their schools and then to have

the technician or ICT coordinator present for continuous support, available when they need it during the different stages of their careers. However they also want the time to practice the skills learnt on the training courses before they are used in the classroom. The Author believes that this training should be delivered in a similar manner to that employed by the teachers in the classroom. Therefore it should be designed to encourage the use of ICT through discovery learning or in a constructivist manner. This would be of great importance for the teachers who were trained before the constructivist pedagogy became popular. It would allow the teachers to relate to the learning experiences of their students so that they would be able to empathise with them in class as they employ this new learning strategy. Again it should encourage the development of learning communities where both the teachers and students are learning from each other.

6.9 Location of Hardware

One of the critical factors affecting the amount of time that is given to ICT in the school day may be due to the location of the computers. In general, the computers are found in the classrooms at primary level, but are clustered together in computer rooms at post primary level. The Author believes that this is one of the reasons why the primary teachers are making more use of their ICT resources. The primary teachers felt that they were under less time constraints than their post primary colleagues and so were able to be more flexible during their day. On the other hand the post primary teachers felt that it was often not worth losing time travelling to the computer room and getting set up for the amount of time left in their 40 minute period for learning. Despite this, all teachers interviewed said that they would like both computers in the classroom and a computer room when asked for their ideal ICT hardware allocation. This finding is in support of

O'Briain's (2004) research. The teachers felt that this provision would allow them the greatest choice when deciding how to incorporate ICT into their daily teaching methods.

6.10 Professional Communities

As the teachers were becoming more adept at integrating ICT into their classrooms their ideas were changing. Some of the teachers simply wanted more printers, preferably colour printers, and paper. Many of the teachers believed that small simple changes like these would allow them the opportunity to maximise the technology that is already present in the schools. Others could see the benefits of data projectors, digital cameras and even the potential of video conferencing. All of the teachers interviewed were ICT competent with a good ICT skills base. Therefore they were also open to and considering the benefits of on-line learning communities for their further professional development. It is important that these communities develop the use of ICT so that it is not simply using new equipment to complete the same tasks in a similar manner as before.

Most of the teachers were aware of the existence of "Scoilnet", the Irish DES supported on-line teaching portal. However none of these teachers had made much use of it. This was partially due to the fact that it used to take a very long time to connect to the site if a dial-up connection was being used. There was a limited amount of subject specific content available, with some subjects at post primary level containing no material.

Scoilnet was up-graded and its current interface was launched in March 2003(http://www.scoilnet.ie/Article.aspx?id_art=3250). It is now much quicker to download. The arrival of Broadband connectivity into the schools should also reduce this difficulty. Nevertheless, at the time of this study, many of the teachers had forgotten about this resource and had not used it since it was updated.

The Author regards Scoilnet as an excellent site with lots to offer to the Irish education system across a wide range of subjects. Again she believes that it is a resource that needs greater publicity and promotion. Perhaps more of the support services for the new curricula could follow the lead of the PE support group and start submitting their resources to this site to help attract more teachers to the site. This could be a means to develop the support section of the site. The Author believes that it is in the development of this section that Scoilnet will progress from being a classroom resources site to one which is of use to teachers for all aspects of their professional development. A new strategy to reacquaint teachers with all that Scoilnet has to offer would also be a worthwhile action. This should increase teachers' awareness of the site and highlight the improvements that have been made since it was up-graded in 2003. In particular the newly trained teachers should be targeted alongside their more experienced colleagues. These teachers will not have other sites that they habitually use and hence may be more likely to include Scoilnet amongst their list of favourite sites to visit when browsing the World Wide Web.

At the launch of the Schools IT 2000 initiative, Scoilnet was to allow for communication with the education sectors across Europe and increase communication within the education system (DES, 1997). This is one area where Scoilnet has not been successful. The main area that needs development is that of a professional teacher community. There used to be threaded discussion groups available on this site but they are no longer facilitated (Murray, 2004). This is probably due to a lack of interest or input by teachers. The data gathered through this study suggests that the teachers are more ready for this type of resource following the all the skills training that has been delivered since the

launch of Schools IT 2000. They are more comfortable with the Internet and all it has to offer.

Teachers are regularly using the Internet to find resources for their pupils. They have mentioned how they are more confident in using the resources that come with teacher recommendations. Yet they are not so familiar with sharing ideas and resources with teachers from other schools. This is especially true when it comes to suggestions that may improve their teaching. Schools have worked hard to develop subject departments which support the sharing of ideas. These departments could now be extended to other schools, though the Internet, so that a professional community could be created.

The ILO (2000) found that such a community could be established with minimal expense. It is mainly an issue of making sure that the target audience is aware of its existence and are willing to contribute. However it is important to note that these communities should not be simply an arena for continuing with more or less the same pedagogy. They would represent an opportunity to develop the self-directed discovery learning that the Government is keen to foster amongst students in both education sectors. It is a means to create constructivist learning strategies and resources. This is linked to Papert's (1993) advice on finding connections in learning. As a professional body, teachers need to connect with other teachers to construct the best practice to ensure that our students develop the skills and knowledge to become lifelong learners.

6.11 Conclusion

The Author was encouraged by the many positive descriptions of ICT use in the schools participating in her study given at the interviews. In all of the schools the teachers were

doing their best to integrate the ICT equipment into their daily activities. The teachers felt that ICT would continue to grow in popularity. They believed that the use of ICT in the classroom was a personal choice made by each teacher. They also felt that as more ICT literate staff work in the schools the integration of ICT into the classrooms will continue to grow and be successful. The Author is aware that she was only interviewing the ICT competent teachers. Therefore she accepts that some of the findings of this study may be biased in favour of ICT integration. There are wider implications and further questions arising from this study which will be discussed in the next chapter.

7 Conclusions and Recommendations for the Future

7.1 Introduction

This thesis began with an evaluation of the ICT based initiatives for education which have been implemented in Ireland over the last decade. It is clear from these initiatives that the Government has made a large financial investment into educational technologies. The money has been directed towards infrastructure, support and training. The aim of this study was to discover how the teachers were using their new technologies and what they felt should be done to promote their use in the future. A second aim of the study was to see whether and how teachers are benefiting from this investment through their use of ICTs in class.

The results of this questionnaire and interview based study were presented in Chapter 5. The results of the questionnaires showed that the majority of teachers who responded are not making regular use of their ICT equipment. However the amount of use was not the main focus of the study. Rather, the Author decided to focus on the type of use that was being made of these ICT resources. The study showed that the teachers were more likely to use these facilities for class preparation rather than in class with their students. In fact in one of the schools computer based preparation had become a norm for the teachers working there. They did not notice that they were using the computers to prepare for class. They were simply working in a way that they considered to be best practice. This was a positive result, demonstrating that ICT is beginning to have an impact in Irish schools. The Author hopes that this trend will continue, with greater inclusion of the use of ICT in the classroom by teachers and students.

The Author shall now draw out the recurring themes highlighted in this study in order to make some final comments on them. In addition, she wishes to indicate areas in need of further research in order to assist the integration of ICT into all Irish classrooms.

7.2 Training

Following the training that has taken place through Schools IT 2000 (DES, 1997) and other initiatives the majority of teachers in Ireland have some ICT skills (Mulkeen, 2004). Many of these teachers are highly competent in their ICT usage, and are ready to meet the challenge of integrating ICT into their classrooms. However, the teachers who choose not to use ICT must not be forgotten. If the Government is intent on developing the amount of ICT usage in our schools then these teachers must be accommodated. Strategies need to be devised for their training which persuades these teachers of the benefits of using ICT for both themselves and their students.

Another aspect of training that needs to be considered is its pedagogical approach. The Government are trying to promote the development of student centred, discovery learning curricula. Ultimately they wish the teachers to foster lifelong learning amongst their pupils. The Author believes that this will only be established once the teachers are taught in this manner themselves. The training or professional development that is designed for teachers must demonstrate the benefits of discovery learning or choosing to incorporate a constructivist approach to teaching and learning.

An interesting source of training has emerged from the study. It is that supplied by the teachers' own children. The primary teachers, in particular, made reference to the amount of help they received from their children. Many of the teachers who were

interviewed found that they learnt more from their children than they did from their formal training days. The Government, and in turn, the education system are benefiting from this hidden training resource. The Author believes that further study is needed in this area to determine why it has been such a positive experience for these teachers.

What is it that the children are doing that is so successful in conveying their knowledge to their parents? Is it the location that is the critical factor? Perhaps it is that they are sharing their expertise when the teachers are ready to take on board new information.

The idea that training needs to be given at different stages of teachers' careers has been discussed in this piece of work. There has also been reference to the need to match the training with both the teachers' needs and readiness to learn. A supportive relationship is the second vital ingredient making this type of training so successful for the teachers.

They are not embarrassed to show their weaknesses or lack of knowledge in this home setting. Therefore this informal training is more accurately matched to the actual needs of the teachers. The Author believes that the Government needs to focus on the establishment of such supportive training environments if they are to be able to provide effective training and up-grading of skills for their teachers.

7.3 Technicians

A means to establishing such supportive settings was put forward by the teachers being interviewed. The teachers wanted to see the provision of ICT technicians for all the schools. There was some debate amongst the teachers being interviewed, whether it would be best to provide a technician per school or one for every four or five schools in a locality. The teachers focused on the need for these technicians to deal with the maintenance and repair of the equipment. The Author is in agreement that they are

needed to carry out these duties. However, she believes that they have a more critical role to play too. The role of the technicians in the schools should be designed so that it would allow them to develop the encouraging relationships that are so vital in a learning environment. As the teachers become more relaxed and create a good supportive relationship with the technicians, it would be easier to deliver school based training for the teachers with an individual that they trust. Gleeson et al (2001) found that the ICT coordinators were under pressure to provide assistance to all staff members. In fact it was a barrier to greater ICT integration. The provision of training in the school, by the technicians, could be structured in a way that encouraged and allowed the teachers to share training experiences with their colleagues. This would increase the support network available to the teachers and help to ensure that they were not dependent on just one source.

7.4 Age

Age was seen to be a central aspect of this study. It included the effects of both the age of the students and the teachers. The age of the students was not seen by the teachers to be a critical factor when considering use of the computers in class. This study found that children in the junior and senior infant classes made noticeably more daily use of the computers than the other primary school children. This result does not correlate with the findings of research conducted by Mulkeen (2004) or the NCCA (2004). They found that the use of computers in class increased as the pupils got older. However, the Author's research found that the amount of Internet use increased as the age of the pupils increased. Neither the Mulkeen (2004) nor NCCA (2004) studies specified the type of use that was being made of the computers in their studies. In fact the NCCA called for further research to find out what the pupils were actually doing when they had access to

the computers. The Author suspects that the older pupils are seen to be using the computers more than the juniors as they are spending their time carrying out research on the Internet. She believes that detailed research is needed to show accurately how the ICT equipment is being used. This knowledge could then be used to provide resources or training in areas that are being under-utilised in class.

The age of the teacher was also seen to have an effect on the amount of ICT use being made in Irish classrooms. The younger teachers were seen to be making greater use of the computers than their older colleagues. This was especially true for the teachers in their thirties. They were seen to be the group of teachers most actively using ICT both for the preparation of class, and in class with their pupils. The age of the teacher was seen to be linked with the class group that they taught. The younger teachers tended to teach the junior classes. This may account in part for the fact that this study found that younger pupils were using the ICT equipment more than the older classes. The Author believes that these innovative teachers who are using computers with their classes need to be encouraged and perhaps rewarded for their efforts. It is important that they continue to progress and develop this teaching methodology.

7.5 The Two Education Sectors

It was interesting to note the difference in the amount of use of ICT when the two education sectors were compared. The primary teachers have integrated ICT into their classrooms and teaching practices far more than their post primary colleagues. This was especially true of the teachers in the 40-49 age group. Factors which may account for this difference could include the location of equipment in primary school, the nature of the Primary Curriculum or the flexibility of their school day. The Author believes that

further study is needed to determine whether these factors do indeed account for the difference between the two sectors. Once these or other factors have been identified, measures could possibly be taken to eliminate or reduce their effects.

7.6 Professional Communities

A theme running throughout this study is the creation of on-line professional communities. The Author believes that this is the next step in the integration process for the ICT literate teachers. This study focused on the teachers who are already using ICT in their classrooms, as well as in their preparation. They were all competent and comfortable with their ICT strategies. In the Author's opinion these teachers have a bank of experience to offer to their colleagues with less ICT experience. They know the best practice to employ to ensure that the use of the computers works within the class setting. The easiest means for these teachers to communicate with large numbers of other teachers would be through the use of the Internet. On-line professional communities could be established and promoted to accommodate this sharing of information and experience.

This is already happening "off-line" in a number of projects, with pilot work developing on-line. The Education department in N.U.I. Maynooth is currently running a collaborative professional development project for teachers and school leaders (www.nuim.ie/TL21). One of the aims of this project is to build professional discussion between groups of teachers in their own schools and with teachers from other schools. The Author hopes that this project will be a success. However, all projects of this kind need promotion especially if they are to be launched on a National scale.

Teachnet is another initiative operating to promote and encourage innovative teachers to create web-based resources for use within the Irish curricula. This initiative supports the creation of fifty resource projects each year which are then posted on the site for access by all teachers. The site has a facility to allow professional discussions take place. None of these appear to have occurred as there were no messages posted when the Author visited the site prior to the submission of this document. There was no evidence of any previous discussions which may have taken place. Teachers need to be made aware of all these spaces for on-line discussion. This is one of the areas where the establishment of professional communities appears to be failing. There appears to be some difficulty in finding an effective means of ensuring that teachers are aware of the resources and training that are available for them. If the Government are to be successful in creating the lifelong learners that they are aiming for then they need to invest in the promotion of such resources.

7.7 Conclusion

The Author found many positive signs towards the integration of ICT into Irish schools in the course of this piece of research. It was reassuring that factors such as the feminisation of teaching, which might have been expected to have slowed the adoption of technology, were not having an adverse impact on the use of technology in schools. While teacher age was seen to have some influence over the use of ICTs, the Author believes that this influence will reduce over time as the current ICT literate teachers replace the more senior teachers who have less of an interest in the use or benefits of ICT. It was disappointing to find that so few teachers were using ICT but those that were seemed to be making good use of it. The Author believes that Irish teachers are reaching a crucial point in the integration process. The experience of speaking with these teachers, as well

as the analysis of the interview data, led the Author to believe that they are keen to continue the process and ensure that their students are prepared for life in the information and communication society in which they live. Much has been put in place to achieve this outcome. At this stage, the provision of technicians in the schools appears to be a key factor needed to ensure it becomes a reality. All that is needed now is sustained funding from the Government to guarantee that the support structures are put in place for the teachers.

8 Appendices

8.1 Appendix A – Questionnaires

Post Primary Questionnaire

I am currently studying for my Masters in Education in N.U.I. Maynooth. As partial requirement for the award of the Masters, I am carrying out a research thesis. I wish to investigate the actual use of computers and information technology in both primary and second level schools.

Section A

1. Name: _____
2. Age (Please circle the relevant grouping.)
20-29 30-40 40-50 50+
3. Gender (Please circle.)
Male Female
4. What subjects do you teach?

Section B

In the following questions, please circle whichever option is most applicable.

1. Do you have a computer at home?
Yes No
2. Do you use it?
Yes No
3. Do you have the Internet at home?
Yes No
4. How often do you use a computer to prepare for your classes?
Never Rarely Regularly Always
5. How often do you use the Internet to prepare for your classes?
Never Rarely Regularly Always
6. How often do you use a computer in class with your students?
Never Rarely Regularly Always
7. How often do you use the Internet in class with your students?
Never Rarely Regularly Always

8. Do you use the computer with your exam classes?

Yes

No

9. If you answered yes to question 8 above, how often do you use the computer with these classes?

Never

Rarely

Regularly

Always

Thank you for taking the time to complete my questionnaire.

Trish Mulcahy

Primary Questionnaires

I am currently studying for my Masters in Education in N.U.I. Maynooth. As partial requirement for the award of the Masters, I am carrying out a research thesis. I wish to investigate the actual use of computers and information technology in both primary and second level schools.

Section A

5. Name: _____

6. Age (Please circle the relevant grouping.)

20-29

30-40

40-50

50+

7. Gender (Please circle.)

Male

Female

8. What class are you teaching this year?

Section B

In the following questions, please circle whichever option is most applicable.

10. Do you have a computer at home?

Yes

No

11. Do you use it?

Yes

No

12. Do you have the Internet at home?

Yes

No

13. How often do you use a computer to prepare for your work in school?

Never

Rarely

Regularly

Always

14. How often do you use the Internet to prepare for your work in school?

Never

Rarely

Regularly

Always

15. How often do you use a computer in class with your students?

Never

Rarely

Regularly

Always

16. How often do you use the Internet in class with your students?

Never

Rarely

Regularly

Always

Thank you for taking the time to complete this questionnaire

Trish Mulcahy

8.2 Appendix B – Interview Questions

Interview Questions – Post Primary

You have been selected for the interview as you are all deemed to be high or regular users of computers. I would like to discuss your use of the ICT.

1. Firstly you use the computers to prepare for class. What do you do?
2. Which software packages do you use?
 - Word
 - Excel
 - Powerpoint
 - Other
3. Why do you choose to prepare in this way?

You use the internet for some of your preparation.

4. Which websites do you visit?
5. How do you select them?
6. Any addresses that you would like to recommend to others?
7. Why do you choose to prepare in this way?
8. Does having access to the Internet at home influence your choice in terms of use of the Internet?

You also use the computers with your classes.

9. How do you use them in class?
10. Which software packages do you use?
11. If you use the internet in class, which sites do you visit?
12. Does the class take place in the computer room or in your class room?
13. Why do you choose to teach in this way?

I got very mixed results as to whether or not people used computers with their exam classes.

14. Why do you choose to use ICT (or not) with your exam classes?
15. Do you think your subject influences your decision to use ICT either in preparation for or in class with your pupils?
16. Why?
17. Age of teachers seemed to be an influencing factor. Young teachers are using ICT to prepare for class but are not using it in class. On the other hand more senior teachers (40-50) are not preparing with ICT but are using it in class? Have you any suggestions as to why this might be?
18. How could we benefit from their experience to get more teachers using ICT? Should that be our aim?
19. Is there any thing else that could be done to encourage others or yourselves to integrate ICT even further into the curriculum or teaching strategies chosen?
 - Location of the hardware

- training
- In-service (subject specific or ICT)
- Principal support
- Influenced by your subject department colleagues?

Interview Questions for Primary Teachers

You have been selected for the interview as you are all deemed to be high or regular users of computers. I would like to discuss your use of the ICT.

1. Firstly you use the computers to prepare for class. What do you do?
2. Which software packages do you use?
 - Word
 - Excel
 - Powerpoint
 - Other
3. Why do you choose to prepare in this way?

You use the internet for some of your preparation.

4. Which websites do you visit?
5. How do you select them?
6. Any addresses that you would like to recommend to others?
7. Why do you choose to prepare in this way?
8. Does having access to the Internet at home influence your choice in terms of use of the Internet?

You also use the computers with your classes.

9. How do you use them in class?
10. Which software packages do you use?
11. If you use the internet in class, which sites do you visit?
12. Does the class take place in the computer room or in your class room?
13. Why do you choose to teach in this way?

14. Do you think the age of your pupils influences your decision to use ICT either in preparation for or in class?
15. Why?
16. Age of teachers seemed to be an influencing factor. Have you any suggestions as to why this might be?
17. However 40-50 years much more ICT friendly at primary level than at post primary level? Any ideas as to why this might be?

18. Primary sector have been seen to be integrating ICT into their curriculum more than post primary sector? What is it about the primary system that is helping this?
19. How could we(at post primary) benefit from your experience to get more teachers using ICT? Should that be our aim?

20. Is there any thing else that could be done to encourage others or yourselves to integrate ICT even further into the curriculum or teaching strategies chosen?
 - Location of the hardware
 - training
 - In-service (subject specific or ICT)
 - Principal support
 - Influenced by your class group colleagues?

8.3 Appendix C Interview Notes

1. Firstly you use the computers to prepare for class. What do you do?
 - Search Web for ideas and information for class
 - Make worksheets (especially for Infants)
 - Make Handouts (particularly for History, Geography, Science)
 - Make Tests
 - Words to Songs or Poems
2. Which software packages do you use?
 - Word
3. Why do you choose to prepare in this way?
 - Neater
 - Clearer
 - Looks Better
 - As easy to use PC once you get used to it
 - Have a copy then on the PC for future reference

You use the internet for some of your preparation.

4. Which websites do you visit?
 - General education sites
 - Scoilnet
 - Skool
 - Abcteach (American primary teachers site goof for Art and Wordsearches)
 - Hooligans (Child version of Yahoo)
5. How do you select them?
 - Some recommended
 - Own searches
 - INTO teacher site have mailing list mainly for tech support
6. Any addresses that you would like to recommend to others?
 - See Appendix
7. Why do you choose to prepare in this way?
 - As questions 1 and 3.
 - These teachers very pro the Internet and its resources
 - Just the easiest way of doing things as far as they were concerned
 - Surprised I was even asking about its use.
8. Does having access to the Internet at home influence your choice in terms of use of the Internet?
 - Definitely, huge benefit to teacher and to the school in terms of cost of time on the Internet
 - Gives time to review site before children see it
 - Sure that the site is suitable for the class
 - Stops any time wasting in school

- Limited in the areas in the school where there is Internet access, only in the senior side of the school at the moment

You also use the computers with your classes.

9. How do you use them in class?

- Infants: daily occurrence, working in pairs
- Senior level: educational software
Research
Presentation of work

10. Which software packages do you use?

- Millies maths
- Tizzy's toy box
- Mattie moles summer
- Oxford readers
- Encarta,
- Creative writer (no longer being produced)

11. If you use the internet in class, which sites do you visit?

- Hooligan
-

12. Does the class take place in the computer room or in your class room?

- All in classroom as do not have a computer room
- No space for a computer room

13. Why do you choose to teach in this way?

- Research
- Reinforcement
- Motivational
- Variety
- Presentation

14. Do you think the age of your pupils influences your decision to use ICT either in preparation for or in class?

- Yes

15. Why?

- If too difficult its just wasting time
- Level of difficulty of software as children progress through it
- Amount of assistance needed by the children either with the jumps in the software or managing the Internet (especially for Infants)
- Man power needed for this assistance

16. Age of teachers seemed to be an influencing factor. Have you any suggestions as to why this might be? However 40-50 years much more ICT friendly at primary level than at post primary level? Any ideas as to why this might be?

- Amount of use in college for younger teachers

- Personal choice
- Having home computer and hence levels of comfort with technology
- Access to computers by the post primary teachers during the day?
- Having the same class all day really helps
- Limited time with the class in post primary
- China All younger teachers who took up the challenge of using computers, older ones avoided it completely
- Older teachers helped to set up the technology in the school, therefore have a vested interest in it, younger taught in college, middle group just passed over and never really got involved
- Older teachers have PC's at home for their children, middle group may not have this and therefore don't see the benefit or have an interest in using ICT with their classes

17. Is there any thing else that could be done to encourage others or yourselves to integrate ICT even further into the curriculum or teaching strategies chosen?

- Location of the hardware
 - training
 - In-service (subject specific or ICT)
 - Principal support
 - Influenced by your class group colleagues?
- i. Technical Support (physical how to set up system)
 - ii. So much money invested but no back up provided
 - iii. Schools just expected to get on with it suddenly know how to do it and what is the best way to go about it so that children get the most benefit
 - iv. Technician within the schools of a locality as school currently spending a lot on technical support for themselves (gov. funding)
 - v. Post of responsibility so caught up in managing repairs have no time to communicate good software, sites, methodologies (are they fulfilling their remit by not communicating this information)
 - vi. TIME
 - vii. Training: whats available, individual packages, skills, at a school level as not always possible to go the Education centres
 - viii. Lots of small amounts of training with time to practice and "play"
 - ix. Perhaps a few enthusiastic teaches could do this
 - x. Time to play and learn the software package
 - xi. Time management in class for setting up the equipment
 - xii. Teacher station idyllic but not to the extreme (have own system in class)
 - xiii. Access to cheap ink and paper, printers

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