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Evaluating the Effectiveness of CALL Technology in Teaching Irish Grammar at Primary Level

A Case Study Approach

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Submitted to University of Limerick, Oct 2011

Declaration

“I hereby declare that this is entirely my own work and that it has not been submitted for the award of any degree at any other university”.

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October 2011

Abstract

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Ann Marie Doherty

Considerable investment has been made in the area of information and communication technology (ICT) in the Irish education sector over the past two decades. The Department of Education and Skills (DES) and the National Centre for Technology in Education (NCTE) has encouraged and supported the integration of ICT with the Primary School Curriculum (1999) by providing funding, professional development and ongoing support for schools and teachers.

This study investigates the effectiveness of computer-assisted language learning (CALL) technologies for teaching Irish grammar to sixth class students in primary school. Following teacher-only and computer-only teaching sessions, quantitative data was obtained by examining the participants collectively.

The participants' attitudes towards ICT in education were also explored by means of focus group interviews and open-ended questions in the questionnaire, providing qualitative data.

The findings of this case study reveal that students can learn equally well from computer-only tuition as teacher-only tuition. However, the students prefer lessons that include human interaction and are better motivated to learn when a teacher takes part in lessons. The participants in this study state that greater use can be made of ICT in lessons.

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List of Abbreviations

BECTA	British Educational Communications and Technology Agency
CAI	Computer Assisted Instruction
CALL	Computer-Assisted Language Learning
CBL	Computer Based Learning
CPD	Continuing Professional Development
CD ROM	Compact Disk Read-only Memory
DES	Department of Education and Science
DVD	Digital Versatile Disc
ICT	Information and Communications Technology
HCI	Human-Computer Interaction
HD	High Definition
L.1	First Language
L.2	Second Language
LCD	Liquid Crystal Display
NCCA	National Council for Curriculum and Assessment
NCTE	National Centre for Technology in Education
NDP	National Development Plan
OECD	Organization for Economic Cooperation and Development
PDA	Personal Digital Assistant
SIP	Schools Integration Programme
TII	Technology Integration Initiative
VR	Virtual Reality

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Chapter 1

Introduction

1.1 Introduction

“The rapid development of technology and work practices is challenging the traditional aims of education” (Lehtinen 2010, p.81). Information communication technology (ICT) plays a very important role in all aspects of life, work and leisure. It is because of this that “technology is seen as a tool for developing learning environments that can optimally prepare people for life” (Lehtinen 2010, p.79). Governments, policy makers and educators originally concentrated on the mechanics of using ICT with “the initial emphasis on learning about ICT” (Volman et al 2005, p.36). Over time monetary investment and research into the area of ICT has changed the mind-set of policy makers and educators, to ensure that ICT “is now increasingly used as a learning tool in all forms and all levels of education” (Volman et al 2005, p.36).

In 1997 the Department of Education and Science (DES) in Ireland identified the need for action in implementing the use of ICT in education. To successfully achieve ICT integration in primary and secondary education, IT 2000 was launched which

aimed to ensure that every pupil at primary and second level education had the opportunity to achieve computer and Internet literacy and be equipped for full participation in the information society

(NCTE 2011a, online).

This was to be achieved through improving ICT infrastructure, teacher training and ongoing support. The successful use of ICT in education “depends on the ability of teachers to integrate technology into their teaching” (Kent and Mc Nergney 1999, p.13).

The Irish Primary Curriculum (1999) identified that “ICT, particularly computers, can make an important contribution to successful learning” (DES 1999e, p.9) and this can be achieved “in every curriculum area” (p.40). In 2004 guidelines for teachers were published by the National Council for Curriculum and Assessment (NCCA) to support teachers in integrating ICT with education. These guidelines

provide aims and objectives that professionals could pursue to achieve ICT integration in the Primary Curriculum.

1.2 Topic

This case study aims to investigate if computer- assisted language learning (CALL) technology can be used to teach Irish grammar to primary school students. The study also aims to explore whether the technology can replace the teacher.

1.3 Research Questions

This study was carried out to examine the effectiveness of CALL technologies for Irish grammar. The study sought to determine the following:

- Can software as a stand-alone teaching tool be successful in teaching Irish grammar?
- Are traditional teaching methods more beneficial when teaching Irish grammar?
- What are the participants' views towards the role of ICT in learning?
- How can technology be integrated with traditional teaching methods in the primary classroom?

1.4 Research Setting

The study was carried out in a large, urban, all-Irish primary school. The medium of instruction throughout the school is Irish but English is the first language (L.1) of the majority of the students. A considerable amount of money has been spent in the school to ensure that pupils are computer-literate before they have completed their primary education.

The group involved in this study consisted of twenty eight sixth class students aged eleven to thirteen years, who have exposure to ICT since they were in second class. They have experiences of using the overhead projector, interactive whiteboards, laptops and various types of software. In this study one of the twenty eight participants' L.1 is Irish.

1.5 Research Methodology

A case study approach was implemented in order to carry out this research. According to Bell (1999) a case study is a style of research best suited to an individual researcher with a limited amount of time at their disposal. This is also a suitable approach as it allows a single issue to be analysed in-depth.

The researcher used quantitative and qualitative data collection methods. Pre- and post-tests were conducted during the study to collect quantitative data. A questionnaire and focus group interviews were used to gather qualitative data. The participants were divided into two groups – A and B. The separate groups were made up of co-ed. mixed academic abilities. Each participant was assigned a number by which they are referred to throughout the study. While Group A were being taught using the computer-only, Group B participated in a teacher-only teaching session. The roles were reversed for the teaching of the preposition “Chuig”. Results from the tests and questionnaire together with focus group data were collated and compared to evaluate the effectiveness of the teaching methods.

1.6 Relevance

In 1999 a revised Irish Primary School Curriculum was introduced. The new curriculum acknowledged that “technological skills are increasingly important for advancement in education, work, and leisure” (DES 1999d, p.29). The publication of the curriculum coincided with the DES setting up the National Centre for Technology in Education (NCTE) in 1998 to support the integration of ICT at primary and secondary level. Investment in ICT infrastructure, teacher training and support are the responsibilities of the NCTE.

Irish is the indigenous language of Ireland and as such

the curriculum recognises that an experience and a knowledge of Irish are important in enabling the child to begin to define and express his or her sense of national and cultural identity

(DES 1999d, p.27).

It is suggested in the curriculum that a minimum of three and a half hours per week is assigned to the Irish language when it is taught as a second language (L.2) and a minimum of four hours per week teaching Irish if it is the L.1 of the school. The curriculum states that “psychologically, historically and linguistically, an experience of both languages is the right of every Irish child” (DES 1999d, p.43).

1.7 Structure of the Thesis

Chapter one outlines the topic, structure and relevance of the study. It provides relevant background information relating to the study.

Chapter two examines existing literature in the areas of learning theories, ICT, language, CALL technologies and human-computer interaction (HCI), to provide knowledge which is of significance to this study. Behaviourist and constructivist learning theories are explored as are learning styles to gather an understanding of learning and the learner. ICT and its place in education are considered, as is the role of the Irish language in Irish education. The development and effectiveness of CALL technologies are explored. Lastly, how humans interact with technology and the implications of design are investigated.

Chapter three explores action research and case study methodologies and sets out the researchers motivation for choosing to use the case study method. Details of the setting, research group and tools used during the study are set out in this chapter. The research aims of the study are also detailed in this chapter.

Chapter four presents the findings of the research relevant to the research questions.

Chapter five discusses the findings presented in chapter four in relation to current literature research.

The final chapter, chapter six outlines the conclusions drawn from the research and recommendations for further research based on the findings.

Chapter 2

Literature Review

2.1 Introduction

This chapter examines behaviourist and constructivist learning theories, learning styles and computer-based learning theories. The effect learning theories and styles have on the use and design of ICT and learner motivation is discussed in relation to the current literature.

The use of ICT in education is also explored in this chapter. Relevant literature has been examined to understand the role ICT and CALL technologies play in the Irish Primary School Curriculum and the learning of the Irish language.

The influence of Mayer's Principles of Multimedia Design and the role the human plays in the successful creation and use of ICT programs are also looked at in this chapter.

2.2 Learning Theories

2.2.1 Introduction

Behaviourist and constructivist learning theories and their influence on education are discussed here. The role of ICT and the learning theories applied in education are explored, while learning styles and the importance of motivation in learning are also examined.

2.2.2 Behaviourism

Behaviourist teaching can be described as instruction that is directed and focused on the outcome. Behaviourism as a learning theory is defined as the effect of a stimuli on an observable reaction or behaviour. Watson, the father of behaviourism "defined learning as a sequence of stimulus and response actions in observable cause and effect relationships" (Forrester and Jantzie 1998, p. 4). Watson used the example of Pavlov's dog to illustrate behaviourism. The dog would salivate upon hearing a bell ringing. The ringing was the stimuli, which was met with the conditioned response of hunger.

The behaviourist theory supposes that learning occurs relative to the environment and "conditions in which the learner is placed" (Luitel 1999, p.34). The work of Skinner

developed Watson's theory of behaviourism in proposing that "voluntary or automatic behavior is either strengthened or weakened by the immediate presence of a reward or a punishment" (Forrester and Jantzie 1998, p.4). Belkin and Gray (1977) and Luitel (1999) support this view, suggesting that positive reinforcement has the effect of developing the learning, whereas negative reinforcement can lead to voluntary behaviour being abandoned.

Traditional teaching styles can be linked to the behaviourist theory, with teaching having specific aims and predicted outcomes. The teacher provides the instruction with rewards for those who can respond when presented with a stimulus such as a question or a test. This type of teaching is often referred to as *drill-and-practice* with "imitation and reinforcement as the prime factors which cause better learning" (Luitel 1999, p.35).

2.2.3 Constructivism

Constructivist learning takes place when the learner links new information with existing knowledge.

Constructivists believe that all humans have the ability to construct knowledge in their own minds through a process of discovery and problem-solving

(Forrester and Jantzie 1998, p.7).

The learner does not "encounter new information out of context but rather apply what they know... to match new information they have gained" (Lambert et al 2002, p.26).

Papert is a theorist strongly linked to the constructivist theory. He believed that learning is "a question of motivating an individual to attach new meaning to past cognitive experiences" (Forrester and Jantzie 1998, p.7).

One of the great constructivists Dewey stated that "life... should form the basic context for learning" (Duffy and Cunningham 1996, p.7). This was also the view of Vygotsky who "emphasized the cultural and social context influencing learning" (Hung 2001, p.282). Vygotsky stressed the importance of human-interaction in cognitive development and this became known as social-constructivism.

Hung (2001) states that in order to create a constructivist learning environment the teacher should "provide instructional context for active and self-regulated students" so that students can "discover relationships between concepts, e.g. addition and

subtraction” and “through authentic projects, students discuss and discover meanings” (p.283).

2.2.4 Learning Styles

According to Dunn and Dunn (1993), learning style is the way students begin to concentrate on, process, internalize, and remember new and difficult academic information

(Dunn and Griggs 2000, p.8).

In the late 1960’s, having explored the ability and capacity of individuals to learn Dunn and Dunn created a learning style model which is “now the most widely used learning styles indicator in North America” (Garnett 2005, p. 23). Garnett (2005) considers it to be “the most comprehensive overview of a pupil’s preferred way of learning” (p.23). Dunn and Dunn created this model which “covers the full spectrum of age, ability and gender” (Garnett 2005, p. 23), a model which has been tested and researched extensively.

Dunn and Dunn set out five possible learning styles which can be identified by the elements which stimulate the learner. Garnett (2005) lists them as;

- Environmental (sound, light, temperature, design).
 - Emotional (motivation, persistence, conformity, responsibility, structure).
 - Sociological (alone, one other, with peers, with adults, varied).
 - Physiological (visual, auditory, kinaesthetic, tactile).
 - Psychological (global, analytical, right- or left-brain dominant, impulsive or reflective).
- (p.24).

Research into Dunn and Dunn’s learning style model has proven that student attainment is higher when teaching and learning takes place through the individual’s preferred style. According to Garnett (2005) forty-two studies carried out between 1989 and 1990 using the Dunn and Dunn model

showed that overall, where students’ learning styles had been matched, their results were about three quarters of a standard deviation higher than those students whose learning styles had not been catered for

(p. 23).

2.2.5 Computer Based Learning Theories

Computer Based Learning (CBL) is the term used to encompass both the expository and experiential uses of computers as a teaching tool. It offers students an interactive form of learning, enables self-assessment and supports many different teaching strategies

(Conrick 1998).

CBL can be categorized according to the learning theory associated with it whether it is behaviourist or constructivist.

2.2.5.1 Behaviourism and ICT

Behaviourist CBL is defined by the type of software used in teaching. “Direct-instruction applications” which “include traditional tutorial and drill and practice types of programmes” (Hung 2001, p.284) are typical of the tools applied. These tools “are typically designed to be used by individuals... for supporting basic information and knowledge such as the multiplication table” (Hung 2001, p.284).

2.2.5.2 Constructivism and ICT

Behaviourist learning is now seen as a “conventional conception ... largely quantitative, atomistic and linear” (Wai-wan 1996, p.38) and as such is considered to be teacher-centred. A constructivist approach is deemed a learner-centred approach where “learners learn through the interaction between thoughts and experiences and through the development of more complex cognitive structures” (Wai-wan 1996, p.38). Papert suggested that constructivist learning could be achieved through educational reform in which the computer could play a fundamental role.

I believe that the computer presence will enable us to so modify the learning environment outside the classrooms that much if not all the knowledge schools presently try to teach with such pain and expense and such limited success will be learned, as the child learns to talk, painlessly, successfully, and without organized instruction

(Papert 1993, p.9).

Hung (2001) offers two possible approaches to constructivist CBL, the first being “individual constructive tools” including “multimedia authoring tools, spreadsheets, word processors, simulations, etc., which can support guided inquiry and can be used constructively” and secondly “social communicative tools” including “video

conferencing, lab management systems, multimedia e-mailing and similar systems, which enable communicative processes between users” (p.285).

2.2.5.3 From Behaviourist ICT to Constructivist ICT

Many changes have taken place in how ICT is perceived as part of education. A considerable transition has been made over a number of decades from a behaviourist approach for learning to a constructivist approach for learning. Tapscott (1998) identifies this and has labelled it the “Eight Shifts of Interactive Learning”:

- From linear to hypermedia learning
- From instruction to construction and discovery
- From teacher-centered to learner-centered education
- From absorbing material to learning how to navigate and how to learn
- From school to lifelong learning
- From one-size-fits-all to customized learning.
- From learning as torture as learning as fun.
- From the teacher as transmitter to the teacher as facilitator

(Tapscott 1998).

Geis and Chapman (1972) claim that “one of the supposed benefits of the ‘discovery learning method’ is the sustained interest and motivation generated by the activity of discovering” (p.102).

2.2.6 Motivation

Motivation is a vital element of learning which can determine the degree to which the learner achieves a particular learning aim. A person who is considered to be motivated is “someone who is energized or activated toward an end” (Ryan and Deci 2000, p.54). Ryan and Deci (2000) compare two types of motivation, intrinsic and extrinsic.

Intrinsic motivation... refers to doing something because it is inherently interesting or enjoyable, and extrinsic motivation... refers to doing something because it leads to a separable outcome

(p.55).

Extrinsic motivation is based on rewards or incentives which the student will attain once they have finished a task or achieved a goal. Thus, extrinsically motivated tasks can have the effect of feelings of “resentment, resistance, and disinterest” (Ryan and Deci 2000, p.55) on the part of the student. As intrinsic motivation is based on the learner’s

curiosity and interest in learning, intrinsically motivated tasks have the effect of producing “high-quality learning and creativity” (ibid).

The learning process can in itself be motivational: “one of our strongest needs is curiosity – man’s desire to learn and manipulate his environment” and “since to satisfy the learner’s curiosity is rewarding, allowing him to learn some skill or knowledge will be effective as a reinforcer... if the skill or knowledge is also interesting” (Valentine 1972, p.182). Furthermore, learner motivation can be affected by the setting of goals. The “contract or agreement that the learner will acquire the goal and then be given the reward provides motivation” (Valentine 1972, p.183).

ICT and software design considerations can play an important motivational role in education. Phillips and Pearson (1997), as cited in Cullingford and Haq (2009) noted examples of software usage “where the learner’s enjoyment, motivation and commitment to learn is enhanced” (p.18). Nonetheless, the type of software is crucial to ensure learner motivation. Becta (2007) stated that “engagement and motivation are achieved through a complex mix of aesthetic, technical and educational design” (p.2).

The role of the teacher is just as important as appropriate ICT and software is in motivating the learner. The teacher can act as a guide and facilitator. Contrary to the view of Hawkrigde (1991), as cited by Cullingford and Haq (2009) that “computers will replace teachers” (p.6), Carusi and Mont’Alvão (2007) state that the “computer, alone, cannot assume the function of teaching” (p.189). Holding a “view of ICT as a surrogate tutor is misleading and can lead to pedagogical confusion and de-motivation” (John 2004, p.9).

2.3 Information and Communication Technology (ICT)

ICT play an increasingly important role in society today (Kirkwood 2009). “The increasing pervasiveness of computer technology is a reality no one can ignore” (Shields and Behrman 2000, p.4) as it invades every aspect of peoples’ lives. Work, leisure, transport, entertainment and socializing are becoming progressively more ICT reliant.

The potential impact of new forms of information and communication technologies (ICT) has been speculatively related to almost every aspect of society, from home to work, from education to leisure, from citizenship to consumerism, from the local to the global.

(Livingston 2002, p.2)

For this very reason “we can no longer imagine living our lives- at leisure or at work, with family or friends – without media and communication technologies” (Livingston 2002, p.1).

2.3.1 ICT and Learning

There has been a growth in the use of ICT for learning, both formally and informally. Students in schools, colleges and universities use ICT to support their studies, even if this is not officially part of the curriculum requirements

(Kirkwood 2009, p.107).

Shields and Behrman (2000), state that research proves that parents and the general public are in favour of the use of ICT in educating children. Chen et al (2000) go further, claiming that “equality of digital opportunity is fast becoming a synonym for equality of educational opportunity,” (p.168) for parents and policymakers. The question is not whether ICT should be used but rather how it can be used in education, “teachers need to decide ‘how best’ computers can be used; it is no longer appropriate to ask ‘if’ young children should use ICT” (Cook 2003, p.31).

For this reason ICT for learning has been a prominent concern for governments and policy makers worldwide. Considerable time and financial investments have been made all over the world in the area of ICT and learning (Kirkwood 2009; Tella et al 2007; Ager and Kendall 2003; Han 2003; Leach and Moon 2000; Shields and Behrman 2000). Mulkeen (2003) says that by 1999 “expenditure on ICT in education had exceeded that on textbooks” while at the same time “...countries in the Organization for Economic Cooperation and Development (OECD) invested \$16 billion in ICT in education, representing one to two percent of total education spending” (p.277). “Since November 2009, more than €92 million in ICT equipment grants has been provided directly to schools” (NCTE 2011b) in Ireland.

Reports evaluating the impact of ICT usage in education have highlighted its’ benefits and disadvantages. When Becta (2009) investigated the use of ICT in the classroom, the findings showed “improvements in outcomes”, “a positive effect... on the learners’ experience of classroom teaching” and “a statistically significant decrease in absence rates” (pp.15-16). The same investigation found that children who had access to ICT to

support learning at home benefited through, an increase in test scores and a decrease in truancy and “motivational and self-confidence effects” (p.19). Kosakowski (1998) also found evidence of the motivational benefits and found that “students usually learn more, and learn more rapidly, in courses that use computer assisted instruction (CAI)” (online). The disadvantages or risks of ICT usage must also be taken into consideration. Shields and Behrman (2000) state that

excessive, unmonitored use of computers, especially when combined with use of other screen technologies, such as television, can place children at risk for harmful effects on their physical, social, and psychological development

(p.6)

and when unsupervised “children may be exposed to violent, sexual, or commercial content beyond their years” (p.6). Shields and Behrman (2000) declare that in order to ensure the safe and appropriate use of ICT “children’s computer time must be limited and their exposure to different types of content must be supervised” (p.6). Becta (2009) advocates the importance of the schools role in avoiding such risks by “guiding and building learning-oriented behaviours with technology” which are “likely to be critical important in enabling learners to achieve educational success” (p.19).

2.3.2 ICT in the Irish Educational Setting

During the 1990’s the Department of Education and Science (DES) in Ireland identified the poor performance of the Irish educational system in ICTs in a European context and in November 1997 launched IT 2000 - A Policy Framework for the New Millennium. This initiative began in 1998 and ran for three years followed by the Blueprint for the Future of ICT in Education Programme. “The Schools Internet Access Scheme ran in parallel to these two initiatives while Computer Networking Grants were paid in 2004” (NCTE 2011a). From 1998 to 2004 a total sum of €157million was invested in the area of ICT in education by the DES.

McGarr 2009; Cook 2003; Kosakowski 1998 and many more have queried and investigated how ICT is integrated and used in education. In investigating the effects ICT was having on education, Mulkeen’s (2003) research focused specifically on the Irish situation during a time of huge financial investment in ICT for the Irish Educational system. In the course of his research Mulkeen (2003) found that the presence of ICT equipment is not enough to ensure the use of ICT. Similarly, he found that the provision of skill-based courses is not sufficient to encourage the educators’ use of ICT in teaching. Mulkeen (2003) also claims that the findings of his research illustrate that “the integration of ICT into subject teaching is less problematic in primary

schools” (p.292). The manner in which policy makers approach the creation of policies for ICT in education should reflect the findings of this and other research. Mulkeen (2003) suggests that through placing “an emphasis on courses that build a vision for the use of ICT” policy makers will see greater integration of ICT in subjects than with a more technical approach to courses. He also suggests that policies focused on the individual schools’ collaborative planning “are likely to prove important” (p.291).

2.3.3 ICT in the Irish Primary Curriculum

The current Irish Primary School Curriculum was published in 1999 following the appraisal of the 1971 Primary School Curriculum by the Review Body on the Primary School Curriculum. The Irish Primary School Curriculum 1999

emphasises the importance of literacy, numeracy, and language, while at the same time responding to changing needs in science and technology, social personal and health education, and citizenship

(NCCA 2011, online)

In the Irish Primary School Curriculum Introduction (1999) the following statement is made in relation to ICT in education;

Technological skills are increasingly important for advancement in education, work, and leisure. The curriculum integrates information and communication technologies into the teaching and learning process and provides children with opportunities to use modern technology to enhance their learning in all subjects

(DES 1999d, p.29).

It is obvious from this statement that the architects of the curriculum believe that ICT has a pivotal role to play in the primary curriculum and that ICT can be integrated into every subject. However, reference to the use of ICT in the eleven subject areas as presented in the Primary School Curriculum (1999) documents is limited. For instance in the English curriculum document the only objective relating to ICT use states that “the English language curriculum should enable the child to use computer technology in learning to write and for information retrieval” (DES 1999, pp.11-12). The Mathematics curriculum has no broad objective relating to the use of ICT.

By establishing the National Centre for Technology in Education (NCTE) in 1998 the Irish Government has made efforts to “provide advice, support and information on the use of ICT in education” (NCTE 2011b, online). Initially “charged with managing the implementation of Schools IT 2000” the role of the NCTE has evolved as the use of and need for technology in education has broadened. The NCTE is now responsible for;

- Providing relevant and up to date ICT advice and support to schools on a range of technology related areas to assist in achieving a high quality ICT infrastructure to support learning and teaching
- Coordinating the Schools Broadband Programme for all primary and post-primary schools, and managing the Broadband Service Desk as a single point of contact for schools to support the delivery of online content and learning resources
- Designing and implementing a comprehensive programme of continuing professional development in ICT for teachers
- Developing and maintaining the educational website portal - Scoilnet, which provides access to thousands of teacher reviewed resources
- Development of digital content resources and provision access to digital content tools that are relevant to the Irish curriculum
- Developing and evaluating educational software
- Piloting models of technology integration and support through the Schools Integration Project (SIP)
- Developing resources and providing support in relation to ICT and special needs education
- Providing advice and developing policy proposals for the DES on issues related to the development and use of ICT in the Irish education system
- Providing information and advice to other educational agencies on ICT in education
- Undertaking research on the best uses of ICT in education
- Maintaining Irish involvement in EU and international projects related to ICT and education
- Developing and maintaining the NCTE website

(NCTE 2011c, online).

Conway and Brennan-Freeman (2009, pp.388-391) identified five phases in relation to ICT in the Irish educational system over the past fifteen years.

1. A policy formulation phase; beginning in the mid 1990's it led to leading to the Schools IT 2000 document in 1997
2. Policy rollout period between 1997 and 2000
3. A policy update phase with the publication of a document titled *Blueprint for the Future of ICTs* (2001-2003)
4. There was a lull in policy on ICT in education from 2003 to 2007
5. And most recently a policy reformulation and broadening phase in the context of the National Development Plan (NDP) (2007-2013)

The NCTE plays a key role in all five phases. Conway and Brennan-Freeman (2009, p. 393) noted the success of the NCTE in the development of ICT in “well-resourced and supported innovative projects.” However, census evidence supported by Gleeson et al 2001; Mulkeen 2003; Shiel and O’Flaherty 2006 states that “only a minority of teachers and schools make considerable or extensive use of ICT in their daily teaching and learning” (Conway and Brennan-Freeman, 2009, p.393) .

In investigating the development of ICT in Irish schools, McGarr (2009) agreed with Gleeson et al (2001) in concluding that

the extent to which ICT is integrated for the promotion of teaching and learning will greatly depend on cultural and structural changes in the broader context of Irish education

(p.1107).

This view is supported by the Inspectorate report ICT in Schools in 2008 which

noted that school plans typically focused on ICT infrastructural issues rather than on policies and practices designed to enhance ICT integration into teaching and learning

(Conway and Brennan-Freeman 2009, p. 392).

Overall, findings imply that the integration of ICT into education is undoubtedly linked to “actions taken at the school level, such as the development of an ICT plan, ICT support, and ICT training” (Tondeur et al 2008, p.222).

2.4 Language

Language acquisition and use is a basic human need as it allows us to communicate with one another, acting as “instruments of thought” (Mazrui 2003, p.100). The language used by a person is influenced by environmental factors such as family, community and schooling. Language is “central in the learning process” (DES 1999c, p.8) and as such has a vital role to play in education.

The acquisition of a second language is becoming an educational requirement throughout Europe. “At least one foreign language is now required in primary education in almost every European country” (Goorhuis-Brouwer and de Bot 2010, p.290). Goorhuis-Brouwer and de Bot (2010) go on to state that according to the Eurydice Studies, England and Ireland are the exception to this European educational trend.

2.4.1 The Irish Language

The unique situation of the Irish language presents difficulties to linguists as to its definition. Irish can be seen as a minority language, an indigenous, or heritage language, while also being the national or official language of the country

(Fleming and Debski 2007, p.85).

This unique situation exists as Irish is the first official language of Ireland but “only about five percent of those people who live in the mainly English-language areas of the country speak Irish frequently either at home or at work” (Harris 2005, p.964).

All children in the Republic of Ireland, irrespective of whether they speak Irish or English at home, study both Irish and English as subjects throughout their primary and post-primary careers

(Harris 2005, p.964).

The Irish primary and post-primary education systems are structured in a way that caters for the language needs of the particular communities. In Gaeltacht areas where Irish is the first language of the community, schools provide instruction through the medium of Irish while English is taught as a second language. In Gaeltacht areas of mainly English speaking communities the L1 of instruction is English and Irish is taught as a L2.

Over a number of years the popularity of educating children through the medium of Irish has grown. According to Fleming and Debski (2007) “the number of Irish medium schools in non-Gaeltacht areas is increasing rapidly” (p.86). Statistics from Gaelscoileanna Teo., - a national organisation which supports the development of Irish-medium schools - show that in the 2009-2010 school year “approximately 40,000 children receiving education through the medium of Irish outside of the Gaeltacht” in 139 Primary and 36 Post-Primary schools in the Republic of Ireland. Murtagh and Van der Slik (2004) claim that

this turn-around was due mainly to the activity of a new “all-Irish” school movement of individuals and parents concerned with the provision of immersion education (p.281).

2.4.2 The Primary Curriculum and Language

Language is a very important aspect of all curriculums. This is especially true of the Irish Primary Curriculum which includes two languages, English and Irish. How language is presented and taught can influence its’ attainment. Hinton (2001) as cited in Fleming and Debski (2007) believes that the teaching of language as an isolated subject has two major disadvantages. Firstly, limited exposure to a language does not produce fluency and secondly there is “little opportunity for real communication” (p.86). Horst et al (2010) put forth the ideas of Cook 2001, 2003, 2005; Macaro 2001, 2005; Nation 2001; Turnbull 2001; Kecskes and Papp 2000 and others who have questioned the effectiveness of a language taught in isolation, saying that

talk that makes comparisons across languages has the potential to develop learners’ metalinguistic awareness in ways that may also benefit knowledge of the L1. (Horst et al, p331).

The learning of the language in isolation is not the objective of the Irish Primary Curriculum 1999. Instead it advocates that “in the process of acquiring language skills and in developing the ability to use language other crucial elements of the child’s personality and potential are cultivated” (DES 1999a, p.3) The overall development of the child through language acquisition is paramount in the Irish Primary School Curriculum (1999).

2.4.3 The Primary Curriculum and Irish

The Irish Primary School Curriculum (1999) promotes the use of the Irish language as a normal living language “Is ar úsáid na Gaeilge mar ghnáth-theanga bheo chumarsáide a leagtar béim sa churaclam seo” (DES 1999b, p.2).

Teachers are encouraged to promote and facilitate conversation in Irish by providing appropriate opportunities for the students to converse.

Cruthaíonn an múinteoir na suímh agus na comhthéacsanna sa seomra ranga agus sa scoil ina mbeidh gá ag an bpáiste le cumarsáid a dhéanamh trí Ghaeilge
(DES 1999c, p.2).

2.5 Computer Assisted Language Learning

The use of ICT in language learning is generally referred to as computer-assisted language learning.

The expression ‘computer-assisted language learning’ (CALL) refers to a variety of technology uses for language learning including CD-ROMs containing interactive multimedia and other language exercises, electronic reference materials such as online dictionaries and grammar checkers, and electronic communication in the target language through email, blogs, and wikis

(Chapelle 2010, p.66).

2.5.1 Development of CALL

Since the 1990’s there has been “an explosion of interest in using computers for language teaching and learning” (Warschauer and Healey 1998, p.57). They regard the “advent of multimedia and the internet” (ibid) as the reason for this development. The use of CALL is by no means a new phenomenon.

Since the first use of CALL in the 1960’s there has been considerable development in its use, the types of CALL used and the way in which CALL is used in education. Chapelle 2009, 2010; Lee 2000; Warschauer 1998 and Healey 1998 are but a few of the academics who have devoted much of their research to the area of CALL. Their research is of immense importance in the development and future use of CALL. Warschauer and Healey (1998) examined how CALL had developed since its conception in the 1950’s and first use in the 1960’s. They identified three particular stages of development in CALL: “behaviouristic CALL, communicative CALL, and integrative CALL” (p.57).

Behaviouristic CALL was “informed by the behaviourist learning model” which relied on “drill-and-practice” (Warschauer and Healey 1998, p.57) teaching methods and the

“computer was viewed as little more than a mechanical tutor” (Lee 2000). This type of CALL was used in the 1960’s and 1970’s. One of the major benefits of this model of CALL is that it allowed the individual work at their own pace. PLATO is one of the best-known behaviouristic CALL systems.

Communicative CALL developed in the late 1970’s and early 1980’s and “corresponded to cognitive theories which stressed that learning was a process of discovery, expression, and development” (Warschauer and Healey 1998, p.57). With the availability of personal computers and more stimulating communicative CALL students were offered greater opportunity for individual work, paired- and group-work. However, “by the late 1980s and early 1990s... the computer was still being used in an *ad hoc* and disconnected fashion” (Warschauer and Healey 1998, p.57).

Following “a broader reassessment of communicative language teaching theory and practice” (Warschauer and Healey 1998, p.58) the integrative theory of CALL was initiated. This theory aimed to integrate all the skills of language learning – reading, writing, speaking and listening - using all the technology available. Mirroring constructivist principles, integrative CALL provides “activities that encourage students to explore and be creators of language rather than passive recipients” (Warschauer and Healey 1998, p.58). Warschauer and Healey (1998) advocate that such activities should be used on a continuous basis in language learning and not just “on a once a week basis for isolated exercises” (p.58).

2.5.2 Benefits and Limitations of CALL

Chapelle (2009) stated that “the majority of professionals in language learning and teaching see this [CALL] as an area worthy of attention” (p.751). However, before embarking on a CALL structure professionals should first consider the benefits and limitations of CALL.

Warschauer and Healey (1998) advocate the use of computer programs in language listing the following seven benefits;

1. Multimodal practice with feedback
2. Individualisation in a large class
3. Pair and small group work on projects, either collaboratively or competitively
4. The fun factor
5. Variety in the resources available and learning styles used
6. Exploratory learning with large amounts of language data
7. Real-life skill-building in computer use

(p.59).

CALL technology provides “access to a variety of media to help make the language come alive” (Warschaeur and Healey 1998, p. 68), while the use of multiple modes “enhances recognition and recall” (ibid, p. 59). The use of computer fun and games is important in presenting opportunities for collaborative work

where the language that takes place in the pair or small group of students in front of the computer is as, if not more, important than the language on the computer screen

(ibid, p.60).

According to Warschaeur and Healey (1998) this type of collaborative language learning is central in creating a “real- world model” (p.61) for the learners.

Lee (2000) presents a list of eight benefits of CALL technology which are parallel to those offered by Warschaeur and Healey (1998). These are;

1. Experiential Learning
2. Motivation
3. Enhanced Student Achievement
4. Authentic Materials for Study
5. Greater Interaction
6. Individualization
7. Independence from a Single Source of Information
8. Global Understanding

(online).

Warschaeur and Healey (1998) and Lee (2000) cite individualisation as a benefit of CALL. Students should be given an opportunity to work independently, as knowledge is “a personal interpretation, individually and actively constructed on the basis of experience rather than transferred from a third party” (McKenna and Laycock 2004, p.167). Research shows that the use of CALL technologies affords learners such opportunities.

CALL materials and content should therefore be carefully designed and selected to mirror the needs of the learner and the aims of the curriculum, so that their beneficial rewards can be exploited. When choosing appropriate software or hardware the educator must consider a number of key issues. Wood (2001) developed evaluative criteria which correspond with the “interactionist view of language processing” (p.171). Set out as guidelines, these criteria can assist in assessing CALL materials. The guidelines are:

Guideline 1: Does it relate the new to the known?

Guideline 2: Does it promote active, in-depth processing? This includes (a) association processing, (b) comprehension processing, and (c) generation processing.

Guideline 3: Does it provide multiple exposures of new words?

Guideline 4: Does it teach students to be strategic readers?

Guideline 5: Does it promote additional reading?

(Wood 2001, p.171).

Wood (2001) believes that children do not learn a language best through CALL. She supports the role of the teacher in language teaching, claiming that “teachers can interact with students in ways that “smart machines” cannot” (p.185). Wood (2001) recommends that educators should be involved at the design stages of software. She maintains that software which is independently developed by software designers may appear attractive but in fact “the educational underpinnings are often not strong enough to support in-depth learning; there is sometimes more sleight of hand than substance” (Wood 2001, p.186). Sabieh (2001) supports this recommendation saying that “unless the educator develops a bond with the technology, he will not be able to use published CALL material” (p.15).

Many other hurdles limit the use of CALL. Lee (2000) cited the availability of equipment; hardware and software, “a lack of technical and theoretical knowledge” (online) and the acceptance of technologies as factors which have a considerable effect on the implementation of CALL. As “it is not the computer itself that is good or bad for learning, but rather the use we put it to” (Clifford and Granoien 2008, p. 27), it is vital that the teacher accepts and understands the technology before it can become effective.

A great deal of research has been done into the area of the teacher involvement and influence on CALL and the use of other ICT in the classroom. Baek et al 2008; Tella et al 2007; Ager and Kendell 2003; Laffey and Espinosa 2003 and Mumtaz 2000 examine the role of the teacher and their influence in accepting and integrating technology. The importance of professional development in the use of technology is a re-occurring theme in all the research. Martin et al (2010) state that

High-quality professional development (PD) is central to any education improvement effort, particularly those that seek to integrate technology in support of classroom instruction. Successful implementation of education technologies depends upon extensive, high-quality teacher PD and ongoing support
(p.53).

No matter how good the resources provided are, without a theoretical knowledge of the technology educators cannot successfully implement programs in CALL. Moseley and Higgins (1999) found that teachers who were successful in using ICT in the classroom showed “a positive rather than a negative attitude towards ICT”, promoted “pupil empowerment as learners rather than pupils receiving instruction” and displayed “a preference for individual study rather than pupils working with other pupils” (online).

Mumtaz (2000) attributes teachers' use of technology in the classroom to "three interlocking factors.... institution, resources and the teacher" (p.335). The first of these factors, the institution, refers to the policies and policymakers. How technology and CALL is perceived by the institution has a considerable influence on resources and the teacher. Drent and Meelissen (2008) stated that "the internal support structure influences the innovative use of ICT" (p.197). While encouraging whole school planning for ICT Han (2003) concluded that "school curriculum planning should be redesigned to incorporate information technology as an element of learning and teaching" and "on-site technical and pedagogy training workshops are essential" (p.51). Research findings "indicate that school policies are often underdeveloped and underutilised" (Tondeur et al 2008, p.212). These findings indicate that policy makers should reconsider the way ICT is integrated into language learning through CALL. Through their research Carusi and Mont' Alvão (2007) found that educational professionals are of the opinion that "interactive systems can be a potential source of motivation and stimulus to think when applied during children's learning process" (p.189).

2.6 Human-Computer Interaction

As technology becomes a more enveloping element of our everyday lives it is important that HCI is properly understood. HCI

is a multidisciplinary subject that involves information technology, computer science, psychology, library science, education, business and management, human factors, industrial engineering and ergonomics

(Chen 2001, p.i).

A less daunting image of HCI is presented by Dix et al (2004). They demonstrate four "foundations" of HCI which involve the human, the computer, the nature of the interactive process and the history of interactive systems.

2.6.1 The Human

The human is "the central character in any discussion of interactive systems" (Dix et al 2004, p.12). For this reason computer systems should be designed with the human needs as a "first priority" (Dix et al 2004, p.12) central to design and construction. The cognitive psychology of the human is an intricate puzzle that needs to be examined in its various components before the construction of a computer system can begin. In producing a computer system, aesthetics and content are not sufficient, consideration for

the cognitive psychology of the human must be made. (Ambler 2001; Drommi 2001 and Dix et al 2004) Designers should take the time to consider

how humans perceive the world around them, how they store and process information and solve problems, and how they physically manipulate objects

(Dix et al 2004, p.12)

before embarking on the design of a computer system.

Human users and their contexts are major components of the design problem that cannot be wished away simply because they are complex to address

(Card 2003 p.xvii).

Burger and Blignaut (2007) highlight the importance of the human role in the interaction by stating that “the success of an information system can be influenced by the psychological make-up of an individual” (p.173). They further explore the role of the human in their research and present a list of individual and cognitive factors that have a bearing on how humans interact with computers. The eight factors are: “Personality Type, Learning and Learning Styles, Computer Attitude, General Anxiety and Computer Anxiety, Spatial 3-D, Calculations, Grade 12 Final Examination Mark and Mathematical Ability” (Burger and Blignaut 2007, pp.174-176).

Similarly Dix et al (2004) outline factors which influence HCI; input and output channels, human memory, reasoning and problem solving and emotions (pp.13-51). By examining all aspects of the human cognitive psychology, “principles, guidelines and models... derived” can be an “invaluable tools for the designer of interactive systems” (Dix et al 2004, p.55).

2.6.2 The Computer

The computer is a far less complex element of HCI. Unlike the human, it is not affected by anxiety or emotions. A computer system is made up of a variety of components; the computer, text input devices, positioning devices, display devices, virtual and 3D devices, physical controls, sensory devices and printing devices (Dix et al 2004). Each of these components has a different effect on the learner according to how they interact with them. Dix et al (2004) go to great lengths to explore this.

The computer system can determine how the user interacts with the material being used. Using a desktop, laptop, Personal Digital Assistant (PDA), mobile phone, i-pad or other interface influences the way in which the computer is used and the frequency of use.

The accessibility of smaller devices may benefit some users, while others may interact better with desk-top devices which are in a structured environment.

How information is presented can determine how it is received. Liquid Crystal Display (LCD) and High Definition (HD) are common abbreviations associated with television. Their use in computing is also important. Dix et al (2004) contribute the use of colour, contrast, high resolution and position of display devices as important catalysts for learning.

Virtual reality (VR) or 3D devices are those which are required to “navigate and interact in a three-dimensional space” (Dix et al 2004, p.87). These devices are specific to particular computer systems and have their own range of display, input and positioning devices.

How humans perceive the computer and all its device components plays a key role in the interaction achieved. “Interaction is therefore a process of information transfer... from the user to the computer and from the computer to the user” (Dix et al 2004, p.60).

2.6.3 The Interaction

The way in which the human interacts with all of these devices can determine the success of the computer system in learning. If a human can successfully interact with the computer the learning outcomes should be optimised (Crook 1998). “Teaching and learning should engage, challenge and motivate learners” (Becta 2007, p.2). Becta (2007) proposes that effective learning can occur when a number of guidelines are followed. Becta (2007) recommends that autonomy be optimised, meta-cognitive skills and higher order thinking be encouraged, and reflection and collaboration be enabled. These guidelines will encourage the user to interact fully with the computer. As well as following the recommendations;

using an appropriate mix of media for the learning objective (for example graphics, animation, photographs, video, sound) to engage the learner with the educational purposes

(Becta 2007, p.6).

should have a positive effect on the HCI.

The interaction in HCI is an area that must consider the other two elements involved to fully understand it. “In order to understand how humans interact with computers, we need to have an understanding of both parties in the interaction” (Dix et al 2004, p.60). Becta (2007) set out the following recommendations to optimise HCI when creating or purchasing ICT resources:

Digital learning resources should facilitate sound human- computer interaction by having:

- icons that are clear and consistently used
- navigation that is consistent and appropriate for the user
- action systems that follow generally used conventions
- functionality that is transparent, meets users' expectations and helps learners to adapt to that functionality
- appropriate visual and auditory cues and feedback
- aesthetics that support the educational objectives

(Becta 2007, p.7).

These recommendations can provide a guide for those who design, construct and use ICT resources. “As the technological and social contexts have changed, so the focus of HCI has changed accordingly. It is now time to consider HCI not just from a technical point of view, but also from an ergonomic, design and artistic point of view” (Rauterberg et al 2003, p.xxi). By considering these recommendations resource designers should be more responsive to the needs of the users. Designers should also take Mayer’s principles of multimedia design into account to achieve sound HCI.

2.6.4 Mayer’s Principles of Multimedia Design

Mayer (2001) “emphasizes the learner-centered approach in multimedia design” which “is grounded in our understanding of how the mind works and how multimedia can enhance an individual’s learning” (Weinreich and Mendez 2009, p.155). With this in mind Mayer (2001) produced seven principles of multimedia design which are considered a benchmark for good HCI.

The seven principles are;

1. *Multimedia Principle*: Students learn better from words and pictures than from words alone.
2. *Spatial Contiguity Principle*: Students learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen.
3. *Temporal Contiguity Principle*: Students learn better when corresponding words and pictures should be presented simultaneously rather than successively.
4. *Coherence Principle*: Students learn better when extraneous words, pictures and sounds are excluded rather than included.
5. *Modality Principle*: Students learn better from animation and narration than from animation and on-screen text.
6. *Redundancy Principle*: Students learn better from animation and narration than from animation, narration and on-screen text.

7. *Individual Differences Principle*: Design effects are stronger for low-knowledge learners than high-knowledge learners and for high-spatial learners rather than for low-spatial learners

(Mayer 2001, p.184).

These principles have been created to optimise HCI and the opportunities presented by ICT in learning. The importance of ICT in education cannot be taken for granted as

Multimedia learning offers a significant opportunity to reach the greatest number of students and most effectively support students with different learning styles and “can significantly enhance student learning” (BrainPop 2008, p.13).

Chapter 3

Methodology

3.1 Introduction

This chapter will identify, examine and present the research methodology utilised for the purpose of this study. Methods of data collection and data analysis will also be presented.

3.2 Background to the Research

As Irish is the first official language of Ireland it is central to both the primary and secondary educational systems in Ireland. Children begin formal instruction in the Irish language when they enter primary school at age four to five years. Instruction continues throughout their primary education and onwards through their post-primary education, ending when they are seventeen to eighteen years old. It is possible for students to continue learning the Irish language at third level if desired. In order to achieve a high standard of Irish it is important that students receive a positive foundation in the language at primary level.

Kosakowski 1998; Crook 1998; Shields and Behrman 2000; Mulkeen 2003 and Becta 2007 agree that ICT can play an integral part in education. They also agree that this can only occur when ICT is appropriate and properly utilised. Mulkeen (2003) states that primary level is the most appropriate time to integrate ICT with other subjects.

Over the past fifteen years the integration of ICT into the Irish educational system has been encouraged and driven by such initiatives as Schools IT 2000, The Schools Integration Project (SIT), The Digital Content Initiative, The Technology Integration Initiative (TII) and Continuing Professional Development (CPD). In 1998 the NCTE agency was set up by the DES in order to maximise the use of ICT in education. In addition to managing many of the initiatives already mentioned the agency takes responsibility for the integration of ICT in education, professional development and

training, resource development, policy development and research in the area of ICT. As a result of this work the use of ICT in primary education has increased greatly over the last decade. This study aims to examine how ICT and the Irish language can be integrated and how ICT can benefit the learning of the language.

3.3 Research Setting

The setting for this study is a classroom in a large all-Irish primary school in an urban area. The classroom is modern and equipped with one computer, an interactive whiteboard, high-speed broadband and access to an Intranet. The students have access to a set of laptops – one per student - for one and quarter hours per week, with access to the Internet and the Intranet.

3.4 Research Group

The research group is a sixth class group aged eleven to thirteen years. There are twenty eight participants in the group, fifteen boys and thirteen girls. The participants have experience of using the school laptops and have received instruction in using the internet, Microsoft Word, PowerPoint and educational software. The class teacher uses an interactive whiteboard on a daily basis. All the participants have at least one computer at home. The participants come from a range of socio-economic backgrounds and live in urban, suburban and rural areas. The participants receive instruction in all subjects through the medium of Irish with the exception of English. English is the L.1 of twenty seven of the participants with Irish being the L.1 of only one participant. The participants are of varied academic ability. This convenient sample group was chosen for the study as the researcher is teaching the group.

3.5 Research Questions

The aim of this study is to determine the following;

- Can software as a stand-alone teaching tool be successful in teaching Irish grammar?

- Are traditional teaching methods more beneficial when teaching Irish grammar?
- What are the participants' views towards the role of ICT in learning?
- How can technology be integrated with traditional teaching methods in the primary classroom?

3.6 Research Methodology

In order to gain a better understanding of the field of research the researcher undertook a literature review. By exploring the research and views of experts in the areas of ICT, language, CALL and HCI the researcher gained a comprehensive knowledge of the chosen subject. Mayer's Principles of Multimedia Design (2001) were also examined in order that the researcher could understand how various aspects of design affect the learner.

Following this the researcher investigated a variety of research methodologies in order to select the most suitable type. The benefits and shortcomings of the two main methodologies are outlined in the next section.

3.6.1 Action Research

Action Research has been defined by numerous experts in the field. Byrman (2001) defines action research as "an approach in which the action researcher and members of a social setting collaborate in the diagnosis of a problem and development of a solution based on the diagnosis" (p.382). Carr and Kemmis 1986; Cohen and Manion 1994; Costello 2003; Greenwood and Levin 2005; Koshy 2005; McNiff and Whitehead 2006; Cohen et al 2007 and many others have defined action research in a similar fashion with the conclusion that action research is an investigation of current practice with a view to improving it. "Action research involves learning about the real, material, concrete, and particular practices of particular people in particular places" (Kemmis and McTaggart pp. 563-564).

Many authors identify the benefits of action research. Koshy (2005) states, that "the purpose of action research is to learn through action leading to personal or professional

development” (p.3). Studies recorded by Carr and Kemmis (1986) support this theory. They showed that educators involved in action research began to understand the aspects of their teaching that were ineffective and were able to rectify the problem by actively changing how they taught. Further evidence of this can be found in the work of McKernan 1996; Zeichner and Liston 1996 and Kemmis and Taggart 2005.

Action research can be successful and effective when correctly applied; however there can be disadvantages associated with this type of research that cannot be ignored. Denscombe (2007) identified a number of these. As the researcher becomes intrinsically involved in the process of the action research the ability to be impartial is diminished. An increased work load for the researcher can also lead to a skewed view of the research. Action research is a cyclical method (Zuber-Skerritt 2011). That is to say that action research is an ongoing process which can be labour-intensive and time-consuming.

3.6.1.1 Case Study

Orum et al 1991; Stake 1995; Blaxter et al 2006 and Denscombe 2007 all describe the case study as a method of research in which the researcher chooses to focus on a single aspect of a problem in order to better understand it. Case studies focus on answering questions relating to the *why* and the *what* of the issue. The answers depict what is happening in a specific situation, whereas action research seeks to answer questions which relate to what can happen.

Bell (1999) advocates case studies as a time-efficient way of researching a particular area in depth, allowing the researcher to focus on a specific aspect of research which could get hidden in the scale of a larger survey. She also states that as a methodology the case study is well suited to the lone researcher, helping the researcher focus on a specific area has the benefit of reducing the overall time required to attain the results.

3.6.1.2 Methodology Chosen

As the researcher aimed to focus on a specific issue and had a limited amount of time in which to conduct the research a case study approach was deemed to be the most appropriate for this study (Bell 1999).

3.7 Research Tools

Qualitative research is concerned with the views of the target group. It focuses on what is said by the target group (Bryman 2008). Qualitative data presents the opinions and feelings of the target group. Quantitative research on the other hand is concerned with collecting numerical data which can be easily interpreted and analysed.

In order to ensure the reliability and validity of the research the researcher will conduct a triangulation of investigation. Pre-testing and post-testing of the target group will provide quantitative data, while focus groups will provide qualitative data. A questionnaire will provide both qualitative and quantitative data.

3.7.1 Testing

Testing was used in order to gather quantitative data. According to Cohen et al (2007) testing can be categorised in two ways; parametric and non- parametric tests or norm-referenced and criterion tests. The researcher considered these before preparing any tests.

Parametric tests are standardized tests conducted on a large scale to give results which reflect the ability of the overall population. These types of tests are norm-referenced and compare a student's ability with the ability of others of similar age or class.

Non-parametric tests "are designed for a specific population" (Cohen et al 2007, p.415). They do not compare the ability or achievements of a large population but concentrate

on a class or small group. Non-parametric tests are criterion referenced and “provide the researcher with information about exactly what a student has learned” (Cohen et al, p.416).

One of the key principles of the Irish Primary School Curriculum is that “assessment is an integral part of teaching and learning” (DES 1999, p.9). Primary schools in Ireland conduct parametric tests from first to sixth class in Mathematics and English. However, no test is currently available for Irish. The researcher was therefore restricted to designing non-parametric tests for the purpose of this study.

Teacher designed tests are recommended by the DES in the Primary Curriculum (1999). Cohen et al (2007) provide detailed directions on how to construct a test. They advise that a series of steps should be followed to achieve the optimum test. The teacher must firstly identify what the purpose of the test is and how it is to be administered. The contents of the test are then chosen together with the form the test will take. Once the test has been prepared the teacher must consider the time allocation and how the test is to be scored.

The first of the two tests designed by the researcher took the form of a diagnostic test. The purpose of such a test is to diagnose where students are experiencing difficulties in a particular subject area (Cohen et al 2007). This type of test is criterion based as it gives an overview of each individual student’s ability.

The second test designed by the researcher took the form of a summative test which was used to assess what the students learned. Summative tests can be either norm-referenced or criterion based.

The tests were piloted on a group of six students of mixed gender, ability and background from another sixth class group in the same school. Piloting was conducted in order to ensure that the tests were viable.

3.7.1.1 Pre-Testing

The pre-test was designed specifically for the target group by the researcher. As their class teacher the researcher has an insight into their abilities and level of Irish grammar. The test took the form of a cloze test with blank spaces which the students could fill in with their answers. As the aspect of grammar being investigated -although not formally taught - is part of everyday speech in their school environment the answers were not given to the students. The class were tested collectively.

3.7.1.2 Teaching

The students were placed in two separate teaching groups, Group A and Group B. Each group included a gender, ability and socio-economic mix of students. A piece of software “Na Réamhfhocail”, created by the author for a Graduate Diploma course was used in the teaching. On the same day that Group A used laptops, headphones and the software to learn one particular aspect of “Na Réamhfhocail” - the preposition “Roimh” - the researcher used the traditional *chalk-and-talk* method to teach Group B the same topic. The following week the roles were reversed, Group A received *chalk-and-talk* instruction for the preposition “Chuig” and Group B used the laptops, headphones and software to learn the same topic of “Na Réamhfhocail” (Table 3.1).

Réamhfhocail	Teacher-Only	Computer-Only
Roimh	Group B	Group A
Chuig	Group A	Group B

Table 3.1: Teaching Groups for “Roimh” and “Chuig”

In order to facilitate the split class the researcher conducted the teaching during a learning support, time-tabled, team-teaching session. During this session another teacher is available to the class to assist in teaching any area of the curriculum which needs extra tuition. This facility allowed the researcher to be present during computer-only sessions and conduct the teacher-only sessions uninterrupted. The process was

explained to the class as a whole before teaching began. Each session was approximately thirty minutes in duration.

3.7.1.3 Post-Testing

The post-test was a teacher-designed summative test. The objective of the test was to discover if and how the students' knowledge of the taught subject had improved. Although the groups were taught separately they were tested as a whole class. Again the test took the cloze format, in which the children filled in the most appropriate answer in the spaces provided. As there are seven personal pronouns in Irish the students were scored out of seven in the test results.

3.7.2 Questionnaire

According to Oppenheim (1992) a questionnaire is not an official form or a set of randomly selected questions but rather “an important instrument of research” (p. 100) whose function it is to collect and measure data. A questionnaire should be carefully planned, designed and piloted in order that the data collected is relevant and reliable. Oppenheim 1992; Bell 1999 and Brace 2008 advocate the need for care during the design stages of a questionnaire. Attention to detail and adequate consideration for the following topics during the planning process are recommended by Oppenheim (1992).

1. The type of data collection instruments needed
2. The method of approach to respondents
3. The build-up of question sequences
4. The order of questions
5. The type of question to be used

In order to achieve the optimum response rate the researcher chose a self-administered questionnaire which was completed by the respondents in the researcher's presence. The twenty-eight respondents were those from the study-group. The language of the questionnaire was simple and appropriate for the age-group. The researcher chose English as the language of the questionnaire as it is the L1 of the majority of the respondents. A linear approach to questioning was followed in the questionnaire,

beginning with questions focusing on general background information and becoming more specific as the questionnaire progressed. Closed, multiple-choice and open-ended questions were asked in the questionnaire in order to obtain a broad view of the topic.

3.7.2.1 Closed/Open Questions

Closed questions and multiple-choice questions elicited quantitative data, while qualitative data was gathered from open-ended questions. A combination of quantitative and qualitative data provides a more comprehensive analysis.

3.7.3 Focus Groups

Stewart et al (2007) outline advantages for the group participants and the researcher when involved in focus groups. These advantages helped the researcher to decide which method would be appropriate and of benefit. The researcher chose to use focus groups in this research as Irish is not the L1 of the majority of the students. The researcher decided to use English in the focus groups to explore the children's views, as they would be more comfortable when discussing the topic in their L1.

The researcher aimed to use the focus groups to explore the following:

- The students' general opinions, views and attitudes towards ICT.
- Their experience of ICT use in the learning of Irish.
- Their opinion on whether/or not ICT can be beneficial in learning Irish.

Litosseliti (2003) emphasises the importance of planning for the successful use of focus groups. Three important planning considerations as laid out by Greenbaum (1998) assisted the researcher in the planning process. The first of these is that there would be a focus to the session and all discussion would centre on this. Secondly, that the formation of the groups should be considered carefully and finally the moderator should be chosen to suit the group.

3.7.3.1 Focus Group Procedures

The researcher chose to split one of the testing groups into two smaller groups, creating two focus groups of seven students. The groups were of mixed gender, ability and socio-economic background. The session took place during class time over a period of two days. Each day one focus group session took place while the remaining students received instruction in other curricular areas from other teachers. The researcher created a comfortable atmosphere and encouraged the discussions throughout the sessions.

Some simple ground rules were set out before each session. This was to ensure that each session ran efficiently, no one individual dominated the discussion and each participants view was heard and appreciated. The researcher is the class teacher and as such has an understanding of the different personalities and abilities of the students and consequently was able to reduce domination where necessary. For this reason the researcher was a suitable moderator for the focus groups. The duration of the focus group sessions was approximately twenty minutes each.

3.8 Reliability and Validity

Reliability and validity are vital in data collection. Bell (1999) describes reliability as the consistency of a test or procedure under similar circumstances. A test or procedure should therefore have similar results when used with different groups with common experiences, thus making it reliable.

Denscombe (2007) pointed out that validity occurs when “the data and the methods are right” (p.335). Cohen et al (2007) states, that “validity is a requirement for both quantitative and qualitative research” (p.133). The reliability and validity of a study is paramount. If part or all of the research in a study is unreliable or invalid the findings of the study are unsound and of no value. The variety of research methods used in this study will ensure both the reliability and validity of the research. However, due to the size of the convenient sample group the findings are not transferrable. This is further

compounded by the fact that the researcher could only conduct two focus groups instead of four due to time constraint pressure.

3.9 Data Analysis

All tests results gathered during the study were collated and examined by the researcher and input into Microsoft Excel 2007 to create tables and graphical representation of the results.

3.10 Ethical Considerations

The researcher initially discussed the study with the principal of the school in which the study was conducted. Upon receiving approval from the principal to proceed with the study the researcher sent a letter to the Board of Management of the school seeking permission. When permission was granted a note was sent to the parents of all the participants stating that the study was being carried out, the identity of the students would not be disclosed at any stage and that the parents were welcome to contact the researcher regarding any queries.

Each participant was assigned a number at the beginning of the study and is referred to by their number only.

Chapter 4

Findings

4.1 Introduction

This chapter presents the findings of the case study research. For the purpose of this study the findings were obtained through the administration of a pre-test, a post-test, a questionnaire and focus group sessions. The questionnaire and focus group sessions were conducted through the medium of English as it is the L1 of twenty seven of the twenty eight students.

Twenty eight pre-tests were distributed by the researcher, all of which were completed and returned. Fourteen students were placed in Group A and fourteen students were placed in Group B. The grouping was decided upon by the researcher in order that each group was made up of students of varying educational and technical abilities. Group A were first to use the computer-only teaching method while Group B received the same instruction from the researcher who used the whiteboard. Group A then took instruction from the researcher and Group B used the computer as instructor. Both groups were tested using the same post-test. Results were collated and are presented according to each research question.

Group A was divided in two, with each sub-group consisting of seven respondents of mixed gender and ability for the focus groups. These sub-groups were named Group A1 and Group A2.

Qualitative and quantitative data was obtained from the questionnaire. Quantitative data was collated from the closed questions while qualitative data was acquired from the open questions.

4.2 Participant Profile

All twenty eight students that took part in the study are from a sixth class primary school group. The group was made up of fifteen male and thirteen female students aged eleven to thirteen years. The school which they attend is an urban all-Irish school with over five hundred and forty pupils. All curricular subjects are taught through the medium of Irish with the exception of English. Twenty six of the twenty eight participants have attended an all-Irish school since the age of four years, one student began their all-Irish education at the age of six years and one other student came to the school at age ten years. The first language of twenty seven of the students is English and the first language of one student is Irish (Fig. 4.1).

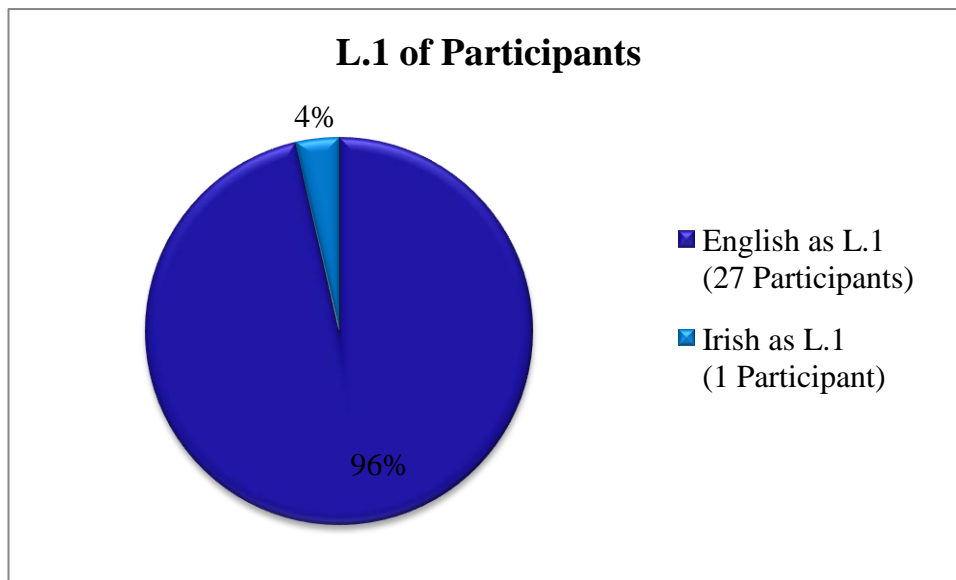


Fig. 4.1: L.1 of the participants.

Each student was assigned a number from one to twenty eight by which they were referred to throughout the study. The students were then placed in Group A or Group B. Each group was composed of both male and female students of varying academic ability and understanding of the Irish language.

4.3 Findings by Research Questions

4.3.1 Can software as a stand-alone teaching tool be useful in teaching Irish Grammar?

For the purpose of this study the researcher chose two aspects of Irish grammar that would be taught. These were the prepositions “Chuig” and “Roimh”. The researcher chose these prepositions for the following reasons:

- i. None of the twenty eight students were successful in filling the four blanks pertaining to these prepositions in the pre-test.
- ii. With many years experience of teaching prepositions the researcher has found these to be the most challenging to teach and learn.

On the first day of computer-only tuition Group A used the computers to learn the preposition “Roimh”. They used laptops and headphones with “Na Réamhfhocail” software. Later that day the researcher taught the preposition “Roimh” to Group B using only the whiteboard and markers. No technology was used during this teaching session. The group that was not engaged at each session was partaking in other curricular work in the classrooms of the learning support teachers.

On the second day the teaching roles were reversed. Group B used the computers to learn the preposition “Chuig”. As per Group A they used laptops and headphones with “Na Réamhfhocail” software. Later that day the researcher taught the preposition “Chuig” to Group A using only the whiteboard and markers. Again no technology was used to assist in the lesson. Students not taking part in the sessions were engaged in other curricular work with the learning support teachers.

The post-test was designed to assess the students’ knowledge of the prepositions “Chuig” and “Roimh” following the learning. In the post-test all Group A students using the computer-only learning technique for the preposition “Roimh” achieved at least one out of seven correct answers, while one student attained a maximum number of correct answers (Fig. 4.2).

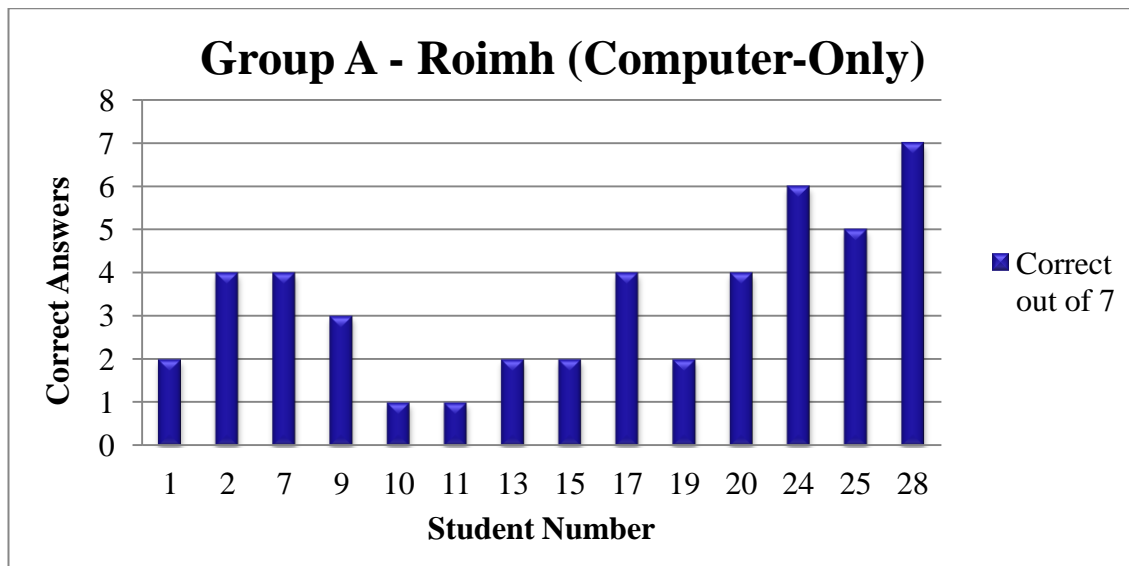


Fig. 4.2: Scores out of seven attained by computer-only taught Group A.

With the exception of Student 16, all Group B students using the computer-only learning technique for the preposition “Roimh” achieved at least one out of seven correct answers in the post-test. However the highest score achieved was six out of seven (Fig. 4.3).

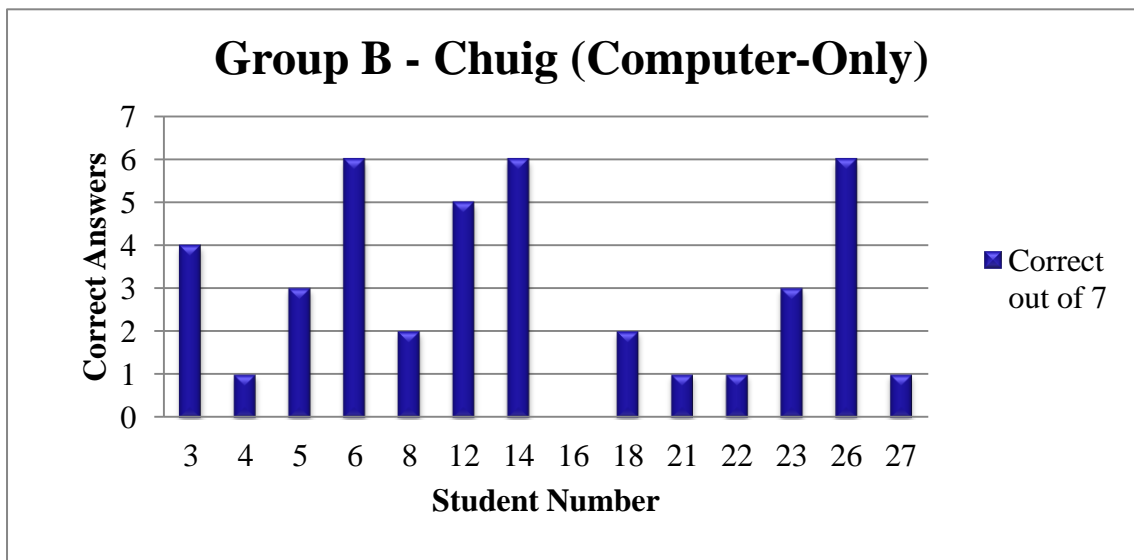


Fig. 4.3: Scores out of seven attained by computer-only taught Group B.

Group A scored an average of 3.357143 out of seven in the post-test examination of the preposition “Roimh” and Group B scored an average of 2.928571 out of seven in the post-test examination of the preposition “Chuig”.

Therefore, through using the computer-only method of learning twenty seven of the twenty eight participants improved their knowledge of the topic and their ability to use it in context, while one student showed no sign of progress after using the computer-only method of learning (Fig. 4.4).

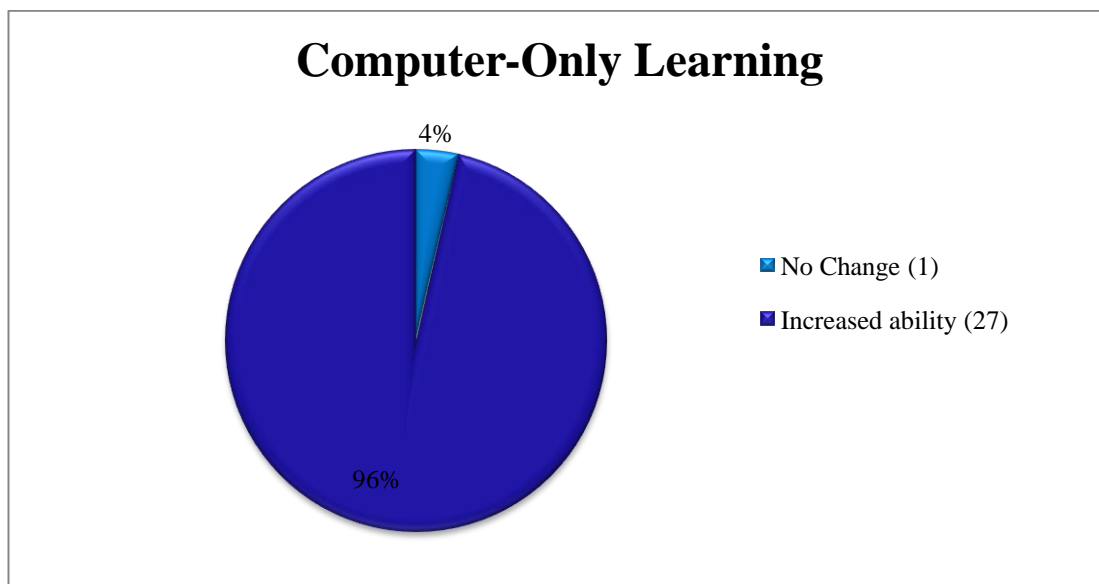


Fig. 4.4: Computer-only learning achievements.

4.3.2 Are traditional teaching methods more beneficial when teaching Irish grammar?

On the first day of teacher-only tuition Group B were taught the preposition “Roimh”. The researcher used only the whiteboard and markers to teach this lesson. No technology was used to support the teaching. The researcher explained the preposition to the group and asked them for examples. The researcher proceeded to explain possible uses of the preposition and wrote the correct spelling of each on the whiteboard. The students were then asked to write a sentence for each of the seven possible uses of the preposition – 1st and 2nd person singular, 3rd person singular masculine and feminine conjugation and 1st, 2nd and 3rd person plural. These were reviewed amongst the group and peer-corrected where necessary. Group A was engaged in other curricular work in the classrooms of the learning support teachers during this session.

As with the computer-only teaching, the teaching roles were reversed on the second day. Group A were taught the preposition “Chuig” using the teacher-only method to

learn. The same conditions applied to this teacher-only session as existed in the teacher-only session with Group B. Group B were engaged in other curricular work with the learning support teachers at this time.

The post-test results show that all Group B students using the teacher-only learning technique for the preposition “Roimh” achieved at least one correct answer. No student in this group achieved a maximum score of seven (Fig. 4.5).

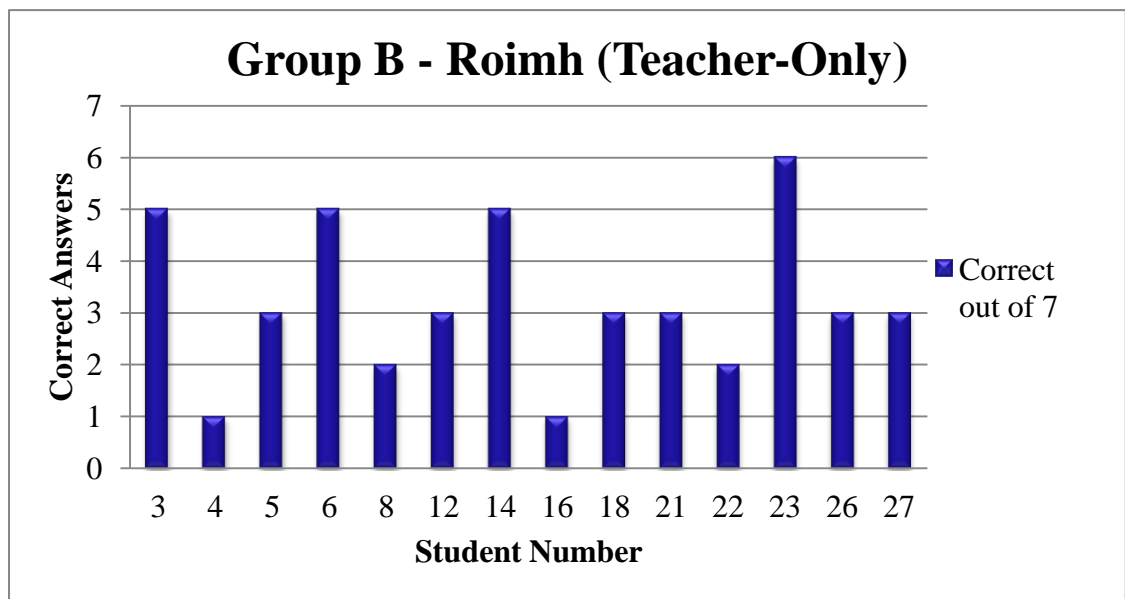


Fig. 4.5: Scores out of seven attained by teacher-only taught Group B.

All of Group A students using the teacher-only learning technique for the preposition “Chuig” achieved at least one correct answer in the post-test, with one student achieving a maximum of seven out of seven (Fig. 4.6).

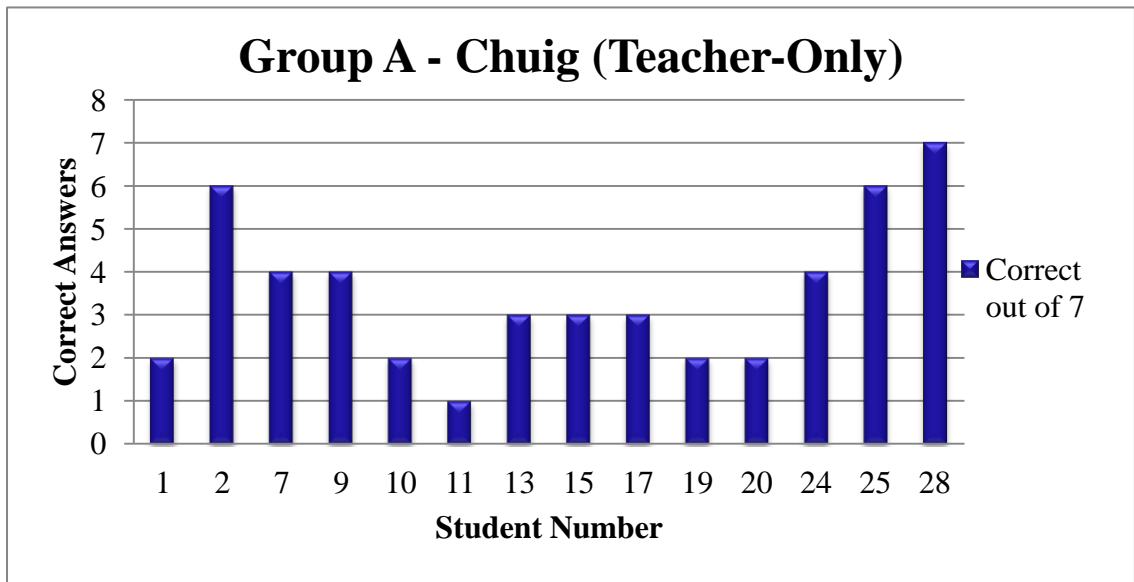


Fig. 4.6: Scores out of seven attained by teacher-only taught Group A.

All twenty eight participants improved their knowledge of the topics taught and their ability to use it in context, having been taught by the teacher-only method.

Following instruction with the teacher-only method, Group A scored an average of 3.5 out of 7 in the post-test examination of the preposition “Chuig” while computer-only instructed Group B scored an average score of 2.928571 out of 7. When viewed, the post-test results for the preposition “Chuig” present overall higher student scores for Group A, taught by the teacher-only method as opposed to the computer-only taught Group B (Fig. 4.7).

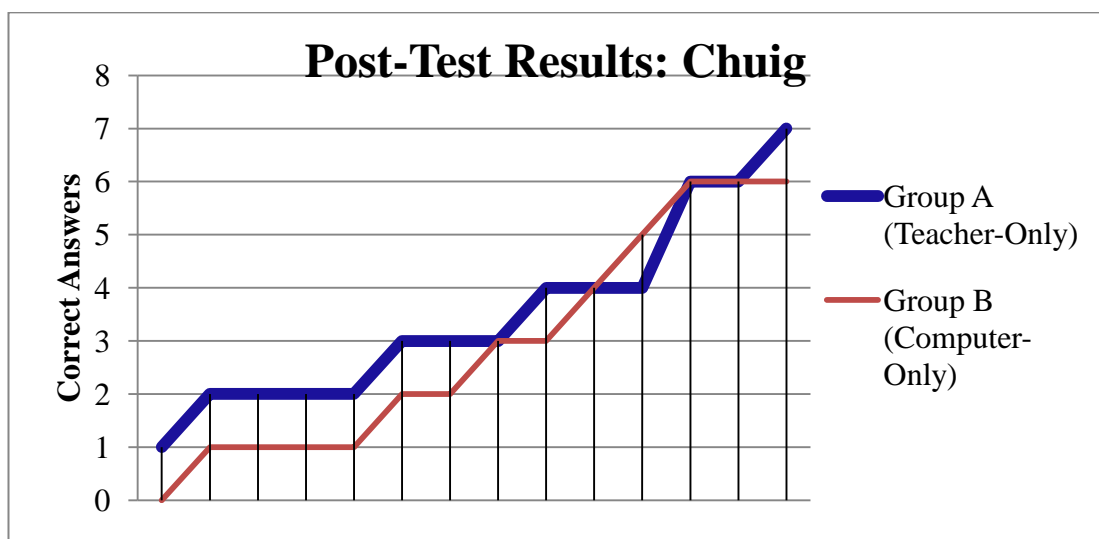


Fig. 4.7: Comparison of post-test scores for the preposition “Chuig”

When viewing the post-test results for the preposition “Roimh” neither group show a noticeably higher range of scores. However, in the post-test examination of the preposition “Roimh”, computer-only instructed Group A achieved an average score of 3.57143 out of seven, whereas teacher-only instructed Group B scored a lower average score of 3.214286 out of seven (Fig. 4.8).

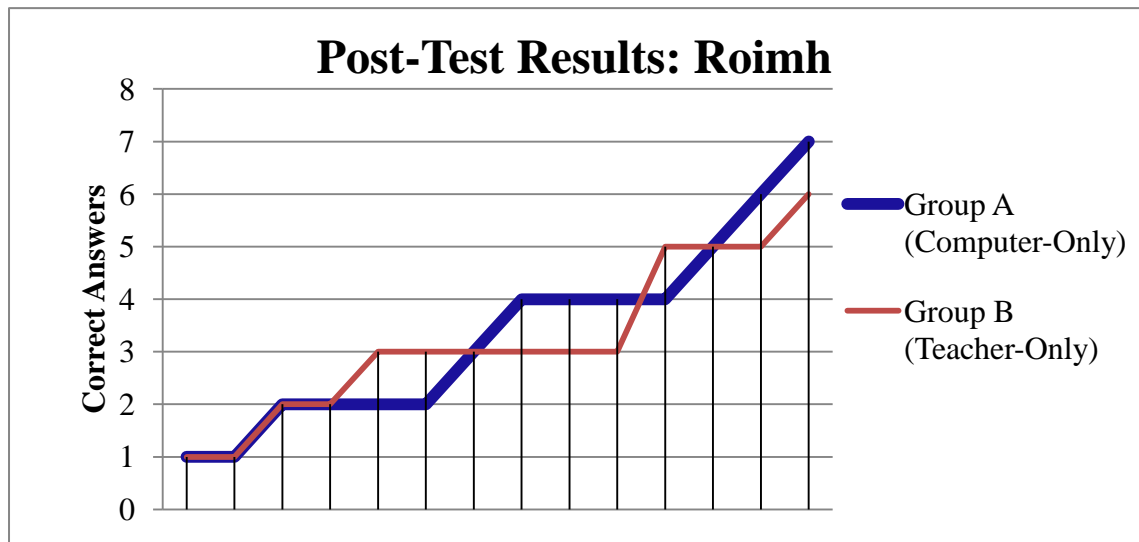


Fig. 4.8: Comparison of post-test scores for the preposition “Roimh”

4.3.3 The participants’ views towards ICT in learning.

One hundred percent of the participants stated that they liked using technology. Some reasons given for why they enjoy using computers and technology include “I like playing games”, “It’s fun”, “I can find out information about things”, “I talk to my cousins in New York” and “I like being on YouTube”. The response “It’s fun” was repeated by six participants, while a further five participants made reference to using the computer to play games.

The researcher elicited information regarding the students’ views towards technology, during the focus group sessions. Students said they thought using technology was important. Some students were emphatic about the importance of using technology in teaching and learning “or else we’ll go back to dinosaurs” (Focus Group A1, Student 2). Quick retrieval of information was also stated as an important reason to use technology

by other students “it gives you information quicker” (Focus Group A1, Student 2). Another student expands on the importance of the speed of access stating that “you’d be bored without it” (Focus Group A1, Student 19). While some students were unsure as to why they believed technology to be important, they still believe that has an important role to play in teaching and learning. Communication was another reason given for why using technology is important, to “communicate with your family and friends” and “keep up to date on the latest gossip” (Focus Group A2, Student 15).

In relation to their home computer usage, twenty three participants said they use computer technology every day, three participants said they use computer technology a few times per week and two participants said they use computer technology once per week. No participant indicated that they use computer technology less often than once per week (Fig. 4.9).

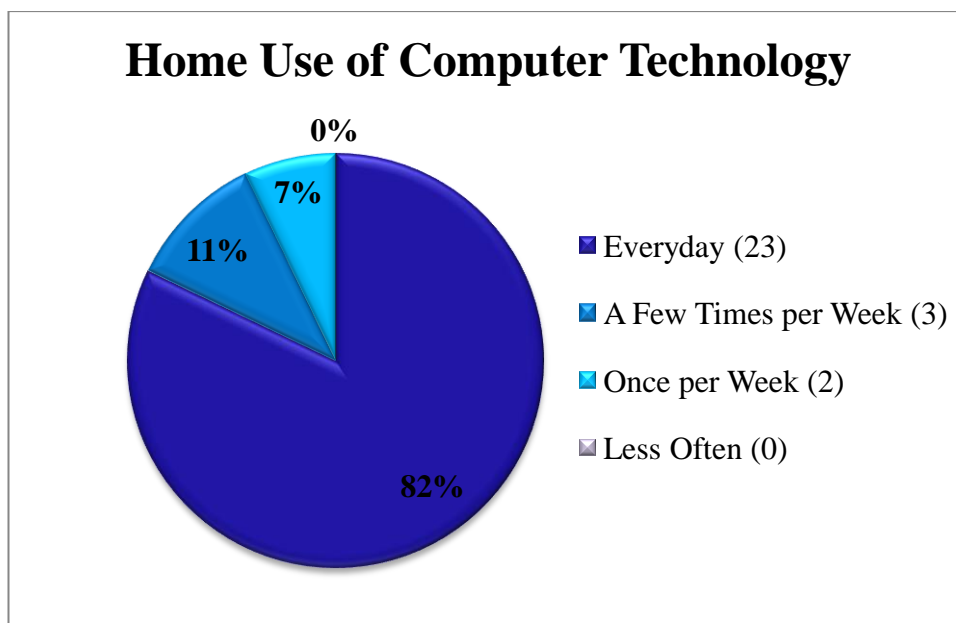


Fig. 4.9: Students use of computer technology at home.

When asked how often they use computer technology at school twenty four participants said they use computer technology every day, one participant said a few times per week and the other three participants said once per week. No participants indicated that they use computer technology less often than once per week (Fig. 4.10).

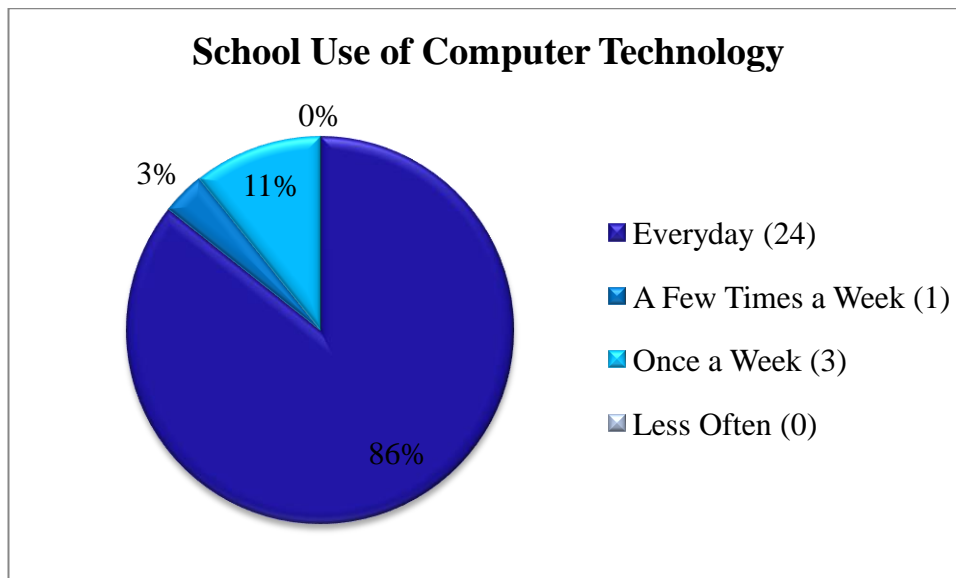


Fig. 4.10: Students use of computer technology at school.

All twenty eight participants said that the teacher uses computer technology in teaching and learning every day.

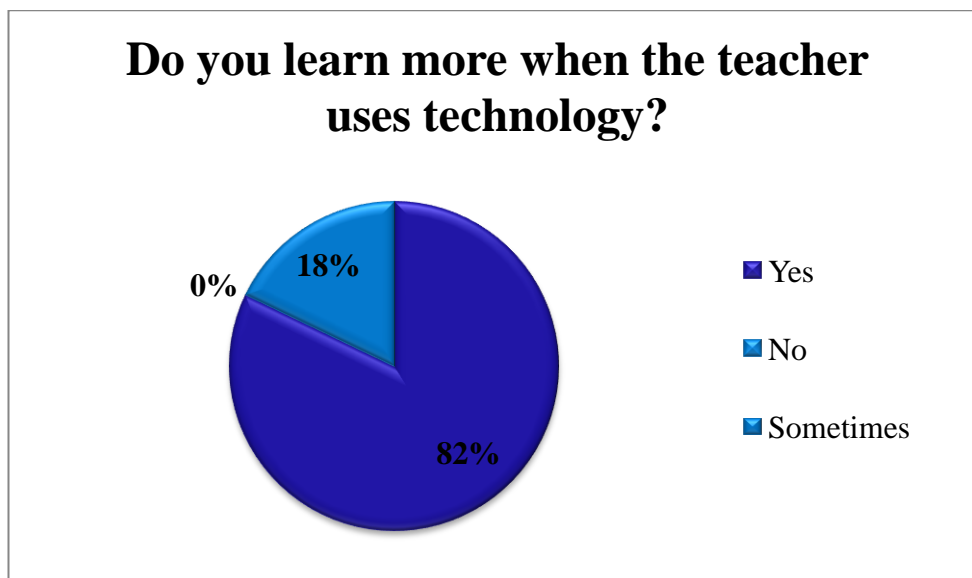


Fig. 4.11: Teaching using technology

Analysis of the quantitative data of the questionnaire stated that twenty six of the twenty eight participants enjoyed lessons using computer technology all the time, while the other two participants said that they enjoy using computers some of the time. This view was echoed by Focus Group A2. All respondents in this focus group stated that they enjoy lessons which incorporate technology. “Because they’re different” (Focus GroupA2, Student 25), “more fun” (Focus GroupA2, Student 9) and use “better

pictures” (Focus GroupA2, Student 2) were some of the reasons given by the students in the focus group for enjoying the use of technology. Lessons which involve using technology are “easier in a way cause there’s like PowerPoints and it’s more interesting when there’s colours and things” (Focus Group A1, Student 2).

In the focus group sessions students elaborated on their enjoyment of lessons which include technology. Some reasons cited by Focus Group A1 for enjoying lessons that use technology included, typing “instead of having to write everything down in the copy”(Student 11) and the fun involved in doing projects “on the laptops instead of doing maths and learning subjects” (Student 10). Twenty three of the participants ‘believe that they learn more when the teacher uses technology in lessons. All participants thought that the teacher using technology enhances the lessons and learning in some way (Fig. 4.11).

4.3.4 How can technology be integrated with traditional methods in the primary classroom?

Twenty one respondents thought that the teacher using technology was the best method of teaching, while only seven of the twenty eight respondents believe that the teacher teaching without using technology is the best method of teaching. Therefore, seventy five percent of the overall study group favour the integration of technology in their education. No respondents believe that a method of teaching using only technology is the best method (Fig. 4.12).

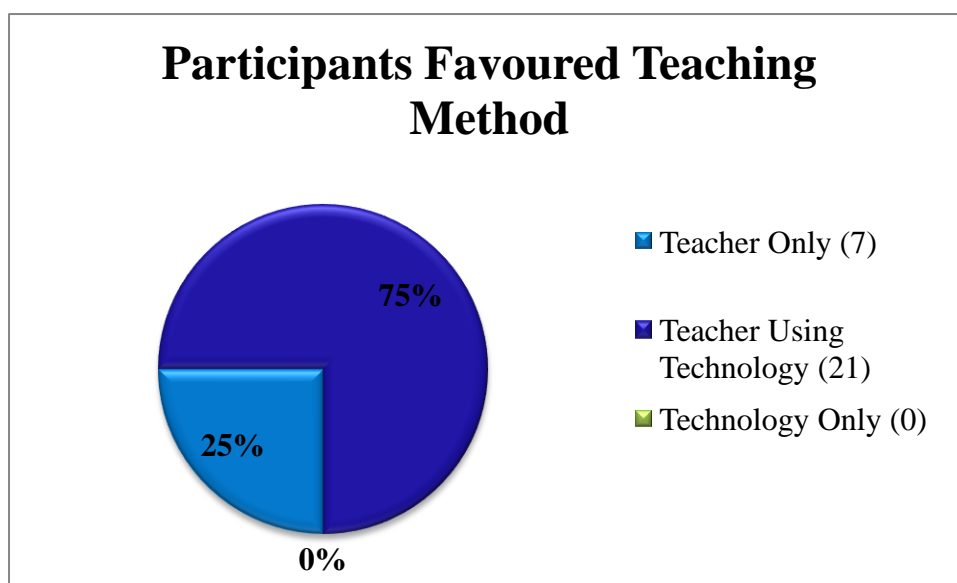


Fig. 4.12: The teaching method participants believe most successful.

Ninety three percent of the respondents believe that this could be achieved by their teacher making more use of technology in lessons. (Fig. 4.13).

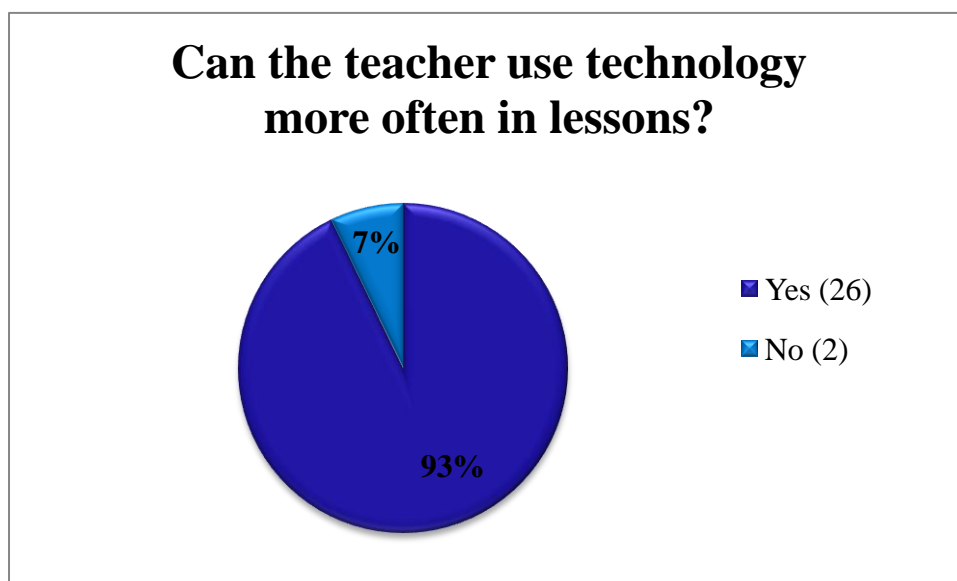


Fig. 4.13: Participants view on teacher use of computers in lessons.

Respondents indicated ways that this might be achieved including more frequent use of the school “laptops for project work”, watching “DVDs to learn about things”, “cameras to take pictures”, “Skype to chat to others people in different countries” and “Google Earth to see the places [being discussed] in geography.” Three students recommended taking part in “Maths Week”, an internet based, interactive maths resource. Using the internet to search for information was suggested by nineteen participants, while five participants proposed using language translators on the internet.

4.4 Summary

The findings presented in this chapter indicate that computer technology can be beneficial in the teaching of Irish grammar. There is no indication that a computer-only method of teaching Irish grammar clearly outshines the teacher-only approach to teaching. Participants using the computer-only method for the preposition “Chuig” scored lower on average in the post-test than those being taught the same topic by the teacher. However, participants using the computer-only method for the preposition “Roimh” scored higher on average in the post-test than those being taught using the teacher only method.

The opinions of the participants, as expressed in the questionnaire and focus group sessions indicate that students prefer teacher input in lessons. The participants also indicate that they do not find the computer-only method of learning as enjoyable or beneficial as when feedback from their teacher is available. The majority of participants in this study believe that computer technology can be used more often during lessons, yet none of the participants believe that learning using only technology is the best way to learn.

The findings of the research will be discussed in the next chapter in context of the literature review.

Chapter 5

Discussion

5.1 Introduction

The previous chapter presented the findings of the case study research. This chapter will discuss these findings in depth, in the context of current literature as presented in Chapter 2.

5.1.1 Overview of the Case Study

The aim of this study was to examine whether computer technology can be an effective tool for teaching Irish grammar. The study took place in an all-Irish primary school in an urban setting. The twenty eight participants of the study were a sixth class group from the school. The participants were of mixed gender, came from urban, suburban and rural areas and were from varying socio-economic backgrounds. All participants are being educated through the medium of Irish but only one of the participants' L1 is Irish. The L1 of the other twenty seven participants is English. The participants' computer skills are quite good with all participants having;

- basic keyboard skills,
- the ability to create, store and edit files and folders,
- capacity to use the internet to search for information,
- extensive experience of using CD-ROMS, DVDs and external storage devices.

Eighty two percent of the participants claim to use computers at home every day and eighty six percent claim to use computers at school every day. According to information provided by the participants none of them use computer technology less than once per week.

In order to investigate the benefits of computer technology in teaching Irish grammar the researcher designed a pre-test which tested the participants' knowledge of Irish prepositions. The participants were then placed in two groups, Group A and Group B. Each group consisted of fourteen participants with varying academic abilities. Group A was taught the preposition "Roimh" using the software "Na Réamhfhocail" while the

preposition “Chuig” was taught to them by the researcher. On the same dates Group B were taught the preposition “Roimh” by the researcher and taught the preposition “Chuig” using the software “Na Réamhfhocail”.

Following the teaching sessions both groups were tested using the same test and completed a questionnaire. Group A was split into two focus groups, each of which was interviewed by the researcher. Each focus groups was made up of seven participants of mixed-gender and ability.

5.1.2 Findings of the Case Study

The key findings of this study are:

- Students who were taught using the teacher-only method of teaching were successful in increasing their knowledge of the prepositions “Chuig” and “Roimh”.
- Students who were taught using the computer-only method of teaching were also successful in increasing their knowledge of the prepositions “Chuig” and “Roimh”.
- Students prefer lessons that have human input rather than lessons which are taught solely through the medium of computers.
- Students indicate that they are better motivated in lessons that have some degree of teacher interaction.
- Students believe that technology can play a bigger part in lessons.

This chapter will explore these findings in context of the current literature, under the following headings:

- Benefits of Using ICT to Learn Irish Grammar
- Benefits of Human-Interaction for learning Irish Grammar
- Learner Motivation
- Language
- Difficulties Identified through the Case Study

5.2 Benefits of Using ICT to Learn Irish Grammar

5.2.1 Introduction

In Chapter 2 the importance of using ICT in the classroom was outlined. Kosakowski (1998) proclaims the benefits of the use of ICT and its effects on learners and learning outcomes. “Technology has been shown to have positive effects on the instructional process, on basic and advanced skills” (Kosakowski 1998, online). Becta (2009) noted that in research, the use of ICT in the classroom was found to positively affect students’ learning outcome, students’ attitudes and motivation towards learning and students’ absenteeism levels. Shields and Behrman (2000) also highlight the benefits of ICT in education but gave cautionary advice that exposure to ICT should be supervised, structured and contextual, for these benefits to be attained. Roschelle et al (2000) support this view, stating that “the mere presence of computers in the classroom does not ensure their effective use” and ICT can be “potentially disruptive or misguided in some of its uses and in the end may have only marginal effects” (pp.76-77).

The development and improvements of CALL technologies since the 1960’s have mirrored and reflected the progress made in the area of language learning theories, from a behaviourist theory of learning to a constructivist theory of learning. Research by Warschauer and Healey (1998) outlines this development as a shift from “drill-and-practice” CALL, which corresponds with behaviourist style instruction, to learner-centred, explorative CALL which encompasses constructivist ideals.

Research suggests that the use of ICT in education is becoming a predominant feature of the classroom. By accepting this and working with the ICTs, educators “can ensure that children acquire the necessary skills to navigate the digital world effectively and responsibly” (Shields and Behrman 2000, p.23).

5.2.2 The Effectiveness of ICT in the Classroom

Mulkeen (2003) found that the inclusion of ICT in the curriculum proved relatively successful in primary schools pointing out that integrating ICT into curricular subjects rather than using it as a separate entity is central to this success.

Research carried out by Conway and Brennan-Freeman (2009), McGarr (2009) and Gleeson et al (2001) agree that an integrative approach to ICT is by far the best way to ensure successful learning through ICT. To successfully implement a system of ICT

integration action needs to be taken at school level, through planning, support and training (Tondeur et al 2008).

Moseley and Higgins 1999; Sabieh 2001; Mumtaz 2000 and many more have acknowledged that the successful integration of ICT lies mainly with the educator. The personal development of the educator plays a key role in this as highlighted by Martin et al (2010). Woods (2001) goes as far as to suggest that integration should begin at the software development stage so that programs designed for use in the classroom are designed by the educators that will use them. The software, “Na Réamhfhocail” was created by the researcher specifically for the age-group and abilities of students at the same learning stage as the participants of this study.

The participants of this study have had a great deal of exposure to ICTs in the classroom. Since second class - age seven onwards – their tuition has incorporated the use of overhead projectors, interactive whiteboards and laptops. They have all been involved in the production of computer-based material such as PowerPoint, Excel and Word projects. The participants are proficient in their use of the internet as a resource and also have extensive experience of using CD-ROMs, DVDs, picture editing software and Skype technology. From the researcher’s observations, none of the participants had difficulty using the software. Only one of the fourteen participants indicated that s/he required any assistance while using the software, “like the CD. Maybe one time it wouldn’t have a file on it. Some CD’s wouldn’t work” (Focus Group A2, Student 2). This referred to a blank disk which the researcher mistakenly gave to Student 2 but replaced with a disk containing “Na Réamhfhocail”.

5.2.3 The Effectiveness of ICT in Language Teaching

The use of ICTs in teaching has been greatly developed since the 1960’s, developing from a behaviourist model of teaching to a constructivist approach. Research by Martin et al 2010; Wood 2001 and Warscheur and Healey 1998 show that this is especially true of the development of CALL technologies.

The researcher took into consideration the various learning styles of the participants when deciding to use the software “Na Réamhfhocail” for this study. Dunn and Dunn’s learning style model was carefully considered before the software was used. Mayer’s

Principles of multimedia design were also deliberated upon in order to assure that the software was appropriate to the participants' abilities and needs. As the class teacher, the researcher understood that the content which was the subject of the teaching in this study was suitable both at a class and a language ability level.

As outlined in Chapter 4, the post-test results show that twenty seven of the twenty eight participants were successful in achieving a score of at least one out of seven after computer-only tuition had taken place. Participants in Group A, having used the computer-only method to learn the preposition "Roimh" scored on average 3.57143 out of seven in the post-test. Participants in Group B, using the computer-only method to learn the preposition "Chuig" scored an average of 2.928571 out of seven.

5.2.4 The Effectiveness of ICT in Irish Grammar Teaching

The Irish Primary Curriculum (1999) highlights the importance of using the Irish language as a living means of communication (DES 1999b). The DES (1999d) also places an emphasis on the need to integrate ICT with all subjects in the curriculum. It is therefore essential that the Irish language curriculum integrates ICT. During the focus group sessions the students expressed that their experience of learning Irish was a positive one. However, students were reluctant to over-endorse the use of technology as a methodology to enhance the learning of Irish. One student stated that it was "a possibility" (Focus Group A2, Student 25) while another said "maybe a little bit" (Focus Group A2, Student 2). However some students thought that using the computer to access an online dictionary was the principal way that the computer and technology could enhance their learning of Irish.

5.2.5 Learner Autonomy

To learn is to develop relationships between what the learner knows already and the new knowledge presented to him, and this can only be done by the learner himself
(Barnes, cited in Gardner 2011).

During the study the participants were afforded a great deal of independence and control over their learning, particularly whilst taking part in computer-only teaching sessions. The participants had absolute control over the pace at which they worked through the material. They were also able to revisit the material as often as they required within the prescribed thirty minute time-slot. Through observing these sessions the researcher noted that the students worked at varying rates but that all students revisited the information at least once and appeared comfortable using the technology. Research

shows that learners of all academic abilities can benefit from CALL technologies. Lee (2000) states that,

shy or inhibited students can be greatly benefited by individualized, student-centered collaborative learning. High fliers can also realize their full potential without preventing their peers from working at their own pace

(online).

However, in the focus group sessions some learners stated that they were more easily distracted when using the technology. One student observed that “you can be distracted when you use the laptops and you don’t really learn” (Focus Group A2, Student 9) while another stated that “you might be distracted by the computers” (Focus Group A1, Student 15). None of the twenty eight participants favoured the computer-only teaching method (Fig. 4.11).

5.2.6 Classroom Management

CALL technologies have the benefit of teaching a large number of students of varying learning styles and abilities all together (BrainPop 2008). A considerable hurdle faced by many educational settings when preparing and implementing ICT policies, is the availability of hardware and software (Lee 2000). There was no such obstacle in this study. The study was carried out in a school which has ample equipment and widespread use of ICT in teaching and learning. Mumtaz (2000) cited the availability of resources as one of three important factors for successful computer use. The classroom in which the learning took place is equipped with a new computer, overhead projector and speakers. All classrooms in the school are similarly equipped. The participants had the use of a laptop computer, a copy of the software “Na Réamhfhocail” and a set of headphones each.

Another important factor in the successful performance of ICT is the school policy on ICT (Mumtaz 2000). The school in question’s policy advocates informal introduction of computers for Junior Infants classes, through observing and assisting the teacher, progressing to more active participation in first and second class, through use of laptops for writing exercises. Computer-based project work is encouraged for students from third class onwards. As a result the participants in this study are comfortable and confident when using computers. When comparing the participants’ home use of computer technology (Fig. 4.9) with the students’ school use of computers and technology (Fig. 4.10) there is no significant difference in the frequency of use between

home and school, with twenty three of the twenty eight students claiming to use computers and technology at home every day and twenty four using computers and technology at school every day. These statistics illustrate the fact that the teacher uses technology with the class on a regular basis, which is the third factor central to the successful use of ICT in the classroom according to Mumtaz (2000).

Lee (2000) cites the accessibility of resources as another benefit of using CALL technology. The software used during this study can be used by all the students of a class at the same time on the laptops available to them or alternatively can be used by a teacher using an overhead projector and interactive whiteboard. To produce a similar print version of the software would take a considerable amount of time and financing. It would also be difficult to maintain the interactive element of the software in a print version.

The software's self-correction and self-guidance offer the teacher the opportunity to spend more time supporting and assisting students with difficulties who might otherwise fall behind without the teacher's knowledge.

5.3 Benefits of Human-Interaction for Learning Irish Grammar

5.3.1 Introduction

Communication is the process of expressing ones' ideas, attitudes and feelings. The primary means of human communication is language and as language plays a central role in all education, its development is paramount (DES 1999c).

The Irish Primary Curriculum encourages the teaching of Irish as a living communicative language. Research has shown that the teaching of a language in isolation leaves little chance for the development of fluency and limited opportunity for communication (Hinton as cited in Fleming and Debski 2007). An increase in the number of Irish medium schools has been fuelled by interest and belief in immersion in the Irish language (Murtagh and Van der Slik 2004).

5.3.2 The Role of the Teacher in Language Teaching

The DES (1999c) states that it is the teacher who creates the setting, contexts and possibility for communicating through the medium of Irish and the learning of the Irish language.

Whilst taking part in the teacher-only teaching sessions, participants were encouraged to ask questions and were asked regularly if they understood the content of the lessons. The participants were asked to repeat what they were being taught and were given the opportunity to use the new terms/vocabulary to create their own sentences. They wrote sentences in a copy and presented them orally to their peers and the researcher. Through peer- and teacher-input they corrected their errors. A number of students cited “teacher on its own” (Focus Group A1, Students 11, 15, 19 and 20) as their preferred methodology. Students claimed that they learned best from “the teacher” (Focus Group A2, Students 1, 25 and 9) -only method. One student expanded on this view, stating “She [the teacher] makes sure you know it” (Focus Group A2, Student 13) while another student stated that “You [the teacher] get us to say sentences and that makes it easier” (Focus Group A2, Student 2). One participant emphasised the importance of writing stating that “when you write it down it’s easier” (Focus Group A2, Student 25).

5.3.3 The Role of the Teacher in using CALL

Woods (2001) suggests that the quality of interaction between teacher and student in a language lesson is superior to the interaction that occurs between ICTs and the student. However, if the teacher can form an understanding of the technology and be comfortable using it, the value of the technology can be realised (Sabieh 2001). Extensive research by Baek et al 2008; Drent and Meelissen 2008; Tella et al 2007; Ager and Kendell 2003; Laffey and Espinosa 2003 and Mumtaz 2000 reiterate the importance of the teacher in the use of CALL technologies.

Seven participants claimed that their favoured teaching method is the ‘teacher only’ method while the other twenty one participants prefer the ‘teacher using technology’ method. None of the twenty eight participants had a preference for the ‘technology only’ methodology (Fig. 4.11).

The participants stated that the teacher taking part in the computer lesson would have had an effect on the lesson “because you learn more from the teacher when she’s talking than the computer” (Focus Group A1, Student 19). This view was also express by another student claiming that the teacher needs to be involved in the computer lesson because when you’re doing the software on your own it’s there but you don’t... like there’s no teacher there to tell you that you have to learn it”

(Focus Group A2, Student 1).

This may demonstrate that the students have not completely taken control of their own learning.

Twenty three of the twenty eight participants of this study believe that they can learn more when the teacher uses technology and the other five participants believe that the learning will only be enhanced some of the time (Fig. 4.11).

As ICT becomes a pervasive facet of our lives (Livingston 2002), the teacher should strive to embrace it and the possibilities it offers (Cook 2003). Becta (2009) proposes that the relationship learners develop with technology is likely to affect future educational success. Research shows that the school and the teacher are central figures in ensuring that a positive relationship between student and ICTs are fostered and promoted (Tondeur et al 2008; Mulkeen 2003).

5.4 Learner Motivation

5.4.1 Introduction

As discussed in Chapter 2, motivation can be categorised as either intrinsic or extrinsic motivation. Intrinsic motivation can be described as the desire to do something out of interest or enjoyment, while extrinsic motivation is driven by an outcome or tangible reward (Ryan and Deci 2000).

5.4.2 Multimedia Motivation

Kosakowski (1998) claimed that courses which incorporate CAI have the effect of increasing the learning achieved in a shorter period of time. Research by Becta (2009) found that when ICT usage in the classroom was increased, truancy and absenteeism dropped, while learning outcomes and self-confidence increased.

Much of learning is reliant upon intrinsic motivation, therefore a learner-centred approach to multimedia design should be adapted to enhance the learning (Mayer 2001). The researcher considered Mayer's Principles of Multimedia Design (Mayer 2001) when choosing to use the software "Na Réamhfhocail" which includes animation, narration and text. A variety of activities available to the learner increases motivation in CALL (Lee 2000).

5.4.3 Feedback

Multimedia learning such as CALL allows the learner to progress at their individual pace (Lee 2000). The presence of reward or feedback has the effect of strengthening or weakening the learner's response (Forrester and Jantzie 1998). The software "Na Réamhfhocail" used during this case study tests the learner's knowledge at the end of each section and provides instant corrections. This removed any embarrassment which the participants might feel when being corrected by the teacher before their peers, thus allowing children with learning difficulties to progress without this added pressure.

Integrative CALL can present the learner with the opportunities to use language in meaningful ways (Warschauer and Healey 1998).

5.4.4 Self-directed Learning

Self-directed learning is

a process in which individuals take the initiative, with or without the help from others, in diagnosing their learning needs, formulating goals, identifying human and material resources, choosing and implementing appropriate learning strategies, and evaluating learning outcomes

(Knowles, cited in Loyens et al 2008, p. 414).

Intrinsic motivation plays a considerable role in this process and learning cannot be guaranteed unless the learner can regulate their learning (Winters et al 2008). Shields and Behrman (2000) advise that all ICT usage should be monitored to ensure that the safety of the students is not compromised.

During this study the participants engaged in self-directed learning during the computer-only sessions. The participants were given the opportunity to use the software "Na Réamhfhocail" without any interference from the teacher or their peers. The participants had the facility and ample time to go backwards and forwards through the program, thus allowing students who may have difficulties the chance to rehear and recheck those areas causing difficulty. In order to ensure that the participants remained on task, the researcher was present during the computer-only sessions with all the laptops within view.

5.5 Language

5.5.1 Language and ICT

The Irish Primary Curriculum highlights the central role language plays in the learning process and in the overall growth of students (DES 1999). Since the mid 1990's the

DES has also been instrumental in the development of ICT in schools. Lee (2000) and Warschauer and Healey (1998) discuss the benefits and possibilities offered by CALL technologies but also give cautionary advice against a reliance on the technology alone. Copart 2004 (cited in Chinnery 2006)

emphasizes the importance of developing the language learning environment before deciding on the role of mobile technologies and further emphasizes focusing on the learner ahead of the technology
(p.9).

Findings from this study suggest that although the participants achieved positive learning outcomes while using CALL, they preferred lessons that involved teacher interaction suggesting that these lessons were of greater value. One student declared that “that learning we did with the laptop. The teacher was a lot better than the laptop” (Focus Group A1, Student 1), while another student stated that

like on the laptop they just tell you the word and tell you where you could put it in a sentence but whereas the teacher tells you what it means and what tense it's in and things
(Focus Group A1, Student 1)

5.5.2 Irish and CALL

Vygotsky's theory states that language is attained in a social context before it can be internalized (Emerson 1983). The importance of human interaction in learning a language is therefore a vital element. Of the twenty eight participants in this study only one participant speaks Irish regularly outside the school and is considered to be a native speaker of Irish. As it is a minority language Irish is not widely used in the social contexts of twenty seven of the twenty eight participants. Therefore the provision of meaningful social contexts and opportunities to use the Irish language is the responsibility of the class teacher (DES 1999c). When considering the software to use for this research the researcher found that there is limited CALL software for the Irish language on the market. During the focus group interviews, one participant suggested that the teacher might improve Irish lessons by allowing students to “play fun and games instead of just like making them write essays about a story” (Focus Group A1, Student 11). While another student stated that they like the way the teacher teaches Irish and would prefer if the teacher was involved in the CALL lessons.

5.6 Difficulties that arose during the Case Study

5.6.1 Laptop Reliability

Computer-only sessions for this case study research were carried out using the school laptops which is a resource available to nine class groups during allotted times. The researcher did not have control over how the computers were used by other classes and whether the users shut down the computers or inserted the charger after use. During the first computer-only session, when the participants retrieved the laptops from the storage area and tried to switch them on they discovered that five of them were shutting down and had to get another laptop. This wasted valuable minutes that the participants might have spent on task.

5.6.2 Class Commitments and Interruptions

The sixth class group in this case study were chosen as they were being taught by the researcher. The group was selected by the researcher mainly for ease of access but also as the software suited their age range. On many occasions during the study when the researcher had planned to conduct a particular part of the research, day-to-day interruptions occurred, which delayed the research schedule.

As the class were preparing for Confirmation much time was spent practicing music with a pianist who often arrived without notice for rehearsals. On more than one occasion the schedule of sessions had to be altered as students were obliged to attend secondary school appointments. Further to this, during late-Spring and early-Summer the participants had football and hockey matches which were also organised at short notice.

During the focus group interviews it was found that even though a 'Do Not Disturb' sign had been placed on the door there were many interruptions. At the beginning of one focus group a person walked into the classroom and began talking. Recording was stopped and restarted at a later stage.

Interruptions can occur in any class but as sixth class students have far more extra-curricular activities that infringe on the school day, a fifth class group may have been more appropriate when carrying out a case study.

5.6.3 Limitations of the Case Study

A case study research approach allows the researcher to use a variety of sources, types of data and methods which lead to an in-depth analysis of a specific topic. However, when using this approach the researcher must take care not to generalise or distort data (Denscombe 2007; Bell 1999).

The researcher found that when collating the findings a third teaching group using a combination of teacher and computer would have provided some extra insights into the use of CALL for Irish language teaching.

As this study was carried out with a small research group by an individual who is familiar to the participants, there could be a risk of ‘the observer effect’, when the researcher alters their behaviour to accommodate some of the participants in the study (Denscombe 2007).

One must be cautious when considering the specific area of the Irish language focused on in this research. While this study provides a valuable reflection of the use of CALL in Irish language teaching, a much broader study is required to make a thorough assessment.

Chapter 6

Conclusion

6.1 Introduction

Information technology is central to working, living and communicating in the real-world and the value of using ICT in schools should not be underestimated. Therefore appropriate integration of ICT into all aspects of the school curriculum is vital. This case study set out to investigate whether the Irish language and ICT are being integrated at primary school level and how technology can be utilised to support the teaching of Irish grammar.

This chapter will present the key findings of the case study, as well as making recommendations for further research.

6.2 Relevance

Computers and ICT have become an integral part of all aspects of people's lives in recent years. People rely on ICT for work and leisure and the growing belief that the integration of ICT and education is central to the child's development and preparation for the real-world, has had a significant effect on how governments, policy makers and educators view ICT. The DES has identified the need for ICT usage and invested heavily in the integration of ICT into the primary school curriculum. Since the 1990's this integration has been sustained by the Irish government through the NCTE, which has supported the use of ICT in education by providing training and advice. The Irish Primary Curriculum advocates the use of ICT throughout the entire curriculum.

Investment by the DES to improve ICT infrastructure in Irish schools since 2009 alone has reached €92 million. However the realisation of adequate ICT integration is the responsibility of individual schools, through their own policy and technical support systems and also that of the individual teacher, through training and usage.

The official language of Ireland is both Irish and English. Both languages are taught at primary and secondary level with the majority of Irish children learning both languages for at least thirteen years of their formal education. However, Ireland has the unusual position that Irish is taught as the L.2 of most students. Schools which provide

instruction through the medium of Irish have Irish as the L.1 of instruction but many of their students' L.1 is English. The Irish Primary School curriculum recommends that Irish should be taught as a living communicative language and as ICT is an integral part of society today it should play a role in achieving this.

All language teaching can benefit from a range of teaching styles and tools. The use of CALL technologies and the use of ICT in education has developed almost in parallel. As computers and computer systems have improved so too have CALL technologies. Early CALL technologies relied largely on a behaviourist approach to teaching with the teacher central to the lesson. In recent years CALL technologies have taken a constructivist teaching approach with the learner central to the teaching. As such CALL technology has been found to play a beneficial role in language learning by being interactive, motivational, entertaining, individualistic and interesting. However, the research advises caution when using CALL, advocating teacher involvement in the design, creation and use of such software.

The importance of the human interaction in CALL cannot be undervalued. For CALL to be completely successful, the designer and the user need to remember the significance of the human. As CALL technology deals specifically with the area of language learning it is important that the software, programs and systems used be appropriate to the needs, styles and abilities of the learner. The software must also suit the teaching methodology of the teacher. Research has shown that teacher development and training is central to the successful implementation of any educational technologies. Teachers' understanding of and ability to use technology is a factor which can positively or negatively affect the integration of the technology. Martin et al 2010; Conway and Brennan-Freeman 2009 and Sabieh 2001 are but a few who claim that technology is more successful when teachers take a part in its design and development. Therefore teachers are central to the effectiveness of CALL technologies for teaching the Irish language.

6.3 Outcomes of this Case Study

This study set out to investigate the following questions:

- Can software as a stand-alone teaching tool be successful in teaching Irish grammar?
- Are traditional teaching methods more beneficial when teaching Irish grammar?

- What are the participants' views towards the role of ICT in learning?
- How can technology be integrated with traditional teaching methods in the primary classroom?

The findings of the study show that:

- The participants involved in computer-only teaching achieved similar test results to those involved in teacher-only teaching.
- The participants believe that ICT has a very important role to play in education and real-world situations.
- The participants stated that teacher-only method is their preferred teaching method in the context of the case study.
- Human interaction plays a fundamental role in teaching, therefore teacher involvement in lessons using ICT is vital.
- The participants perceive ICT as a tool for entertainment, fun and games. ICT usage should therefore be entertaining as well as educational.

6.4 Recommendations

To ensure the successful use of CALL technologies for learning Irish Grammar:

- The technology being used must be interactive and entertaining, whilst suiting the target students' learning styles and abilities.
- The teacher must play an active role in the learners' use of the technology, providing focus, support and feedback.
- While learning a language the student should have opportunity to speak that language. This can be successfully achieved by grouping or pairing students, instead of having them working independently when using CALL technology.
- Teaching professionals should be active in the design and development of CALL software.

6.5 Conclusion

While examining the role CALL technology can play in the teaching of Irish grammar at primary school level, this study found that CALL can be effective in teaching Irish grammar. However, it was found that CALL technology cannot replace the teacher completely as human interaction is vital for all learning to occur. Teachers have an important role to play in the development of CALL software so it is appropriate to their

needs and the needs of their students. As this study was carried out with a limited number of students in an environment which extensively supports the integration of ICT in teaching and learning, it may not reflect an overall picture of how effective CALL can be in all primary schools. Further research with a much larger group from different educational settings is therefore needed to ascertain if the findings of this study are specific to the school and class or are representative of all primary schools. Research focusing on teachers' views, attitudes and experiences of using technologies could also demonstrate how individual teachers and their approaches influence the effectiveness of technology in the classroom.

Bibliography

Ager, R. and Kendall, M. (2003) "Getting it Right from the Start: A Case Study of the Development of a Foundation Stage Learning and ICT Strategy in Northamptonshire, UK", in *IFIP Working Group 3.5 Conference: Young Children and Learning Technologies*, Parramatta: Australian Computer Society Inc., 3-11.

Ambler, S. (2001) "User Interface Development Throughout the System Development Lifecycle" in Chen, Q., ed. *Human computer interaction: issues and challenges*, London: Idea Group Publishing, 11-28.

Baek, Y., Jung, J. and Kim, B. (2008) "What makes teachers use technology in the classroom? Exploring the factors affecting facilitation of technology with a Korean sample" *Computers and Education*, 50(1), 224-234.

Becta (2007) *Quality principles for digital learning resources*, [online], available: <http://webarchive.nationalarchives.gov.uk/20110130111510/http://news.becta.org.uk/display.cfm?resID=42470> [accessed 11 Feb 2011].

Becta (2009) *The Impact of digital technology: A review of the evidence of the impact of digital technologies on formal education*, [online], available: <http://webarchive.nationalarchives.gov.uk/20110130111510/http://publications.becta.org.uk/display.cfm?resID=41343&page=1835> [accessed 11 Feb 2011].

Bell, J. (1999) *Doing Your Research Project: A guide for first-time researchers in education and social science*, 3rd ed., Buckingham: Open University Press.

Belkin, G. S. and Gray, J. L. (1977) *Educational Psychology: An Introduction*. Dubuque Iowa: Wm. C. Brown Company Publishers.

Blaxter, L., Hughes, C. and Tight, M. (2006) *How To Research*, Berkshire: Open University Press.

Brace, I. (2008) *Questionnaire Design: How to Plan, Structure and Write Survey Material for Effective Market Research*, 2nd ed., London: Kogan Page Limited.

BrainPOP (2008) *Understanding Multimedia Learning: Integrating multimedia in the K-12 classroom*, [online], available:

http://s4.brainpop.com/new_common_images/files/76/76426_BrainPOP_White_Paper-20090426.pdf [accessed 11 Feb 2011].

Bryman, A. (2008) *Social Research Methods*, 3rd ed., New York: Oxford University Press Inc.

Burger, A. J. and Blignaut, P. J. (2007) "Predicting the outcome of a Computer Literacy Course Based on a Candidate's Personal Characteristics" in Jacko, J. A. (ed.) *Human-Computer Interaction: HCI Applications and Services 12th International Conference, HCI International 2007 Beijing, China, July 2007 proceedings, Part I*, Berlin: Springer, 173-182.

Card, S. (2004) "Foreword" in Dix, A., Finlay, J. and Abowd, G. *Human computer interaction*, 3rd. ed., London: Pearson Education Limited.

Carr, W. and Kemmis, S. (1986) *Becoming Critical: Education, Knowledge and Action Research*, London: Routledge.

Carusi, A. and Mont' Alvão, C., (2007) "An Essay About the Relevance of Educational Interactive Systems in the Learning Process" in Jacko, J. A. (ed.) *Human-Computer Interaction: HCI Applications and Services 12th International Conference, HCI International 2007 Beijing, China, July 2007 proceedings, Part I*, Berlin: Springer, 183 – 189.

Chapelle, C.A. (2009) "The Relationship Between Second Language Acquisition And Computer-Assisted Language Learning" *The Modern Language Journal*, 93, 743-753.

Chapelle, C.A. (2010) "The spread of computer-assisted language learning" *Language Teaching*, 43(1), 66-74.

Chen, M., Healy, J. M., Resnick, M. J., Lipper, L. A., Lazarus W. and Dede, C. J. (2000) "Five Commentaries: Looking to the Future" *The Future of Children*, 10(2), 168-180, [online], available:

http://www.futureofchildren.org/futureofchildren/publications/docs/10_02_Commentaries.pdf [accessed 11 Feb 2011].

Chen, Q. (2001) *Human computer interaction: issues and challenges*, London: Idea Group Publishing.

Chinnery, G. M. (2006) 'Emerging Technologies, Going to the MALL: Mobile Assisted Language Learning' *Language and Learning Technology*, 10(1), 9-16.

Clifford, R. and Granoien, N. (2008) "Applications of Technology to Language Acquisition Processes" in Holland, V. and Fisher, F., eds., *The Path of Speech Technologies in Computer Assisted Language Learning: From Research Toward Practice*, New York: Routledge, 25-43.

Cohen, L., Manion, L. and Morrison, K. (2007) *Research Methods in Education*, 6th ed., New York: Routledge.

Conrick, M. (1998) 'Computer Based Education: more than just a package' *The Australian Electronic Journal of Nursing Education*, 4(1), available: http://www.scu.edu.au/schools/nhcp/aejne/archive/vol4-1/mconrickvol4_1.html [accessed 14 Mar 2011].

Conway, P.F. and Brennan-Freeman, E. (2009) "National Policies and Practices on ICT in Education", in Plomp, T., Anderson, R.E., Law, N. and Quale, A., *Cross-National Information and Communication Technology: Policies and Practices in Education*, 2nd ed., USA: Information Age Publishing, 383-402.

- Cook, V. (2001) 'Using the first language in the classroom', *Canadian Modern Language Review*, 57(3), 402–423, [online], available: <http://utpjournals.metapress.com/content/5482v66743955633/?p=b8b4d0eb284f4115abd276cfb24d463d&pi=2> [accessed 11 Feb 2011].
- Cook, V. (2003) *The effects of the second language on the first*, Clevedon: Multilingual Matters.
- Cook, V. (2005) 'Basing teaching on the L2 user', in Llurda, E. (ed.), *Non-native language teachers: Perceptions, challenges and contributions to the profession*, New York: Springer, 47–61.
- Costello, P. J. M. (2003) *Action Research*, London: Continuum.
- Crook, C. (1998) "Children as Computer Users: The Case of Collaborative Learning", *Computers and Education*, 30(3/4), 237-247.
- Cullingford, C. and Haq, N. (2009) *Computers, Schools and Students: The Effects of Technology*, Surrey: Ashgate Publishing Ltd.
- Davis, H., Arnold, M., Gibbs, M.R. and Nansen, N. (2010) "Time, Technology, and the Rhythms of Daily Life", in *2010 IEEE International Symposium on Technology and Society (ISTAS)*, [online], available: <http://ieeexplore.ieee.org.proxy.lib.ul.ie/stamp/stamp.jsp?tp=&arnumber=5514606> [accessed 13 May 2011].
- Denscombe, M. (2007) *The Good Research Guide: For Small-Scale Social Research Projects*, 3rd ed., Berkshire: Open University Press.

Department of Education and Science (1997) *Schools IT 2000. A policy framework for the new millennium*. Dublin: Department of Education and Science.

Department of Education and Science, (1999a) *Primary School Curriculum, English*, Dublin: The Stationary Office.

Department of Education and Science, (1999b) *Primary School Curriculum, Gaeilge*, Dublin: The Stationary Office.

Department of Education and Science, (1999c) *Primary School Curriculum, Gaeilge; Treoiríníte do Mhúinteoirí* Dublin: The Stationary Office.

Department of Education and Science, (1999d) *Primary School Curriculum, Introduction*, Dublin: The Stationary Office.

Department of Education and Science (1999e) *Your Child's Learning: Guidelines for Parents*, Dublin: Department of Education and Science.

Department of Education and Science, (2008) *ICT in Schools: Inspectorate Evaluation Studies*, Dublin: Evaluation Support and Research Unit Inspectorate.

Dix, A., Finlay, J. and Abowd, G. (2004) *Human-computer interaction*, 3rd. ed., London: Pearson Education Limited.

Drent, M. and Meelissen, M. (2008) "Which factors obstruct or stimulate teacher educators to use ICT innovatively?" *Computers and Education*, 51(1), 187-199.

Drommi, A. (2001) "Interface Design: An Embedded Process for Human Computer Interactivity" in Chen, Q., ed. *Human computer interaction: issues and challenges*, London: Idea Group Publishing, 1-10.

Duffy, T. M. and Cunningham, D.J. (1996) *Constructivism: Implications for the Design and Delivery of Instruction*, [online], available:

<http://iris.nyit.edu/~kkhoo/Spring2008/Topics/Cons/ConstructivismImplications.pdf>

[accessed 13 May 2011].

Dunn, R. (2000) “Capitalizing on College Students’ Learning Styles: Theory, Practice, and Research”, in Dunn, R. S. and Griggs S. A. (eds.) *Practical approaches to using learning styles in higher education*, Westport: Greenwood Publishing Group, 3-18.

Emerson, C. (1983) ‘The Outer Word and Inner Speech: Bakhtin, Vygotsky, and the Internalization of Language’, *Critical Inquiry*, 10(2), 245-264, [online], available:

<http://www.jstor.org/stable/1343349> [accessed 10 Sept 2011].

Fleming, A. and Debski, R. (2007) “The Use of Irish in Networked Communications: A Study of Schoolchildren in Different Language Settings School of Languages and Linguistics”, *Journal of Multilingual and multicultural Development*, 28(2) 85-101.

Forrester, D., Jantzie, N. (1998) *Learning Theories*, [online], available:

http://www.acs.ucalgary.ca/%7Egnjantzi/learning_theories.htm [accessed 12 July

2011].

Gardner, D. (2011) *Fostering Autonomy in Language Learning*, Zirve University

[online], available: <http://ilac2010.zirve.edu.tr> [accessed 8 Sept 2011].

Garnett, S. (2005) *Using brainpower in the classroom: five steps to accelerate learning*, Oxon: Routledge.

Geis, G. L. and Chapman, R. (1972) 'Knowledge of Results and Other Possible Reinforcers in Self-Instructional Systems' in Berman, M. L. (ed.) *Motivation and Learning: Applying Contingency Management Techniques*, New Jersey: Educational Technology Publications, 100-136.

Goorhuis-Brouwer, S. and de Bot, K., (2010) "Impact of early English language teaching on L1 and L2 development in children in Dutch schools", *International Journal of Bilingualism*, 14(3), 289–302.

Greenbaum, T. L. (1998) *The Handbook for Focus Group Research: Revised and Expanded*, 2nd ed., London: Sage Publications.

Greenwood, D. J. and Levin, M. (2005) Reform of the Social Sciences and of Universities through Action Research in Denzin, N. K. and Lincoln, Y. S., eds., *The Sage Handbook of Qualitative Research*, 3rd ed., London: Sage, 43-64.

Han, C. C. W. (2003) "Challenges of Using ICT in Hong Kong Early Childhood Settings", *IFIP Working Group 3.5 Conference: Young Children and Learning Technologies*, UWS, Parramatta, July, Australian Computer Society, Inc., 49- 52.

Harris, J. (2005) "The Role of Ordinary Primary Schools in the Maintenance and Revival of Irish" in Cohen, J., McAlister, K.T., Rolstad, K. and MacSwan, J. eds., *Proceedings of the 4th International Symposium on Bilingualism*, 964-977 MA: Cascadilla Press.

Horst, M., White, J., and Bell, P. (2010) "First and second language knowledge in the language classroom," *International Journal of Bilingualism*, 14(3), 331-349, [online], available: <http://ijb.sagepub.com.proxy.lib.ul.ie/content/14/3/331.full.pdf+html> [accessed 11 Feb 2011].

Hubbard, P. (2006) "Evaluating CALL software", in Ducate L. and Arnold N. (eds.) *Calling on CALL: From theory and research to new directions in foreign language teaching*. San Marcos: Calico, 313–33.

Hung, D. (2001) Theories of Learning and Computer-Mediated Instructional Technologies, [online], available: http://edweb.sdsu.edu/Courses/ED795A/Hung_Theories.pdf [accessed 13 May 2011].

Illeris, K. (2007) *How we learn: learning and non-learning in school and beyond*, 2nd ed., New York: Routledge.

John, P. (2004) *Teaching and Learning with ICT New Technology, New Pedagogy?* http://www.interactiveeducation.ac.uk/out_joh.pdf [accessed 5 Jan 2010].

Kecskés, I., & Papp, T. (2000) *Foreign language and mother tongue*, Mahwah, NJ: Lawrence Erlbaum Associates.

Kemmis, S. and McTaggart, R. (2005) Participatory Action Research: Communicative Action and the Public Sphere in Denzin, N. K. and Lincoln, Y. S., eds., *The Sage Handbook of Qualitative Research*, 3rd ed., London: Sage, 559-604.

Kent, T. W. and R. F. Mc Nergney (1999) *Will Technology Really Change Education?: From Blackboard to Web*, London: Sage.

Kirkwood, A. (2009) 'E-learning: you don't always get what you hope for', *Technology, Pedagogy and Education*, 18(2), 107–121.

Kosakowski, J. (1998) *The benefits of information technology*, ERIC [online] available: <http://www.jeteye.com/jetpak/ee4e732a-9602-4533-af1a-423d60590d54/> [accessed 4 Jan 2011].

Laffey, J. M. and Espinosa, L. M. (2003) "Appropriation, Mastery and Resistance to Technology in Early Childhood Preservice Teacher Education: Case Studies", *IFIP Working Group 3.5 Conference: Young Children and Learning Technologies*, UWS, Parramatta, July, Australian Computer Society, Inc., 77- 82.

Lambert, L., Walker, D., Zimmerman, D. P., Cooper, J. E., Lambert, M. D., Gardner, M. E. and Szabo, M. (2002) *The Constructivist Leader*, 2nd ed., New York: Teachers College Press.

Lee, K. (2000) 'English Teachers' Barriers to the Use of Computer-assisted Language Learning' *The Internet TESL Journal*, 6(12), [online], available: http://iteslj.org/Articles/Lee-CALL_barriers.html [accessed 3 Dec 2010].

Lehtinen, E. (2010) *Potential of teaching and learning supported by ICT for the acquisition of deep conceptual knowledge and the development of wisdom*, Portland Press Limited [online], available: <http://www.portlandpress.com/pp/books/online/wg85/085/0079/0850079.pdf> [accessed 10 Sept 2011].

Litosseliti, L. (2003) *Using Focus Groups in Research*, London: Continuum.

Livingstone, S. (2002) *Young People and New Media: Childhood and the Changing Media Environment*, London: Sage.

Loyens, S. M. M., Magda J. and Rikers, R. M. J. P. (2008) 'Self-Directed Learning in Problem-Based Learning and its Relationships with Self-Regulated Learning' *Educational Psychology Review*, 20 (4), 411-427.

Luitel, B. (1999) "Behaviourism and Mentalism: Opposing Theories of Language Learning and Their Attitude towards Learner's Errors", *Journal of NELTA*, 4(1-2), 34-40, available: <http://www.nepjol.info/index.php/NELTA/article/view/3772/3229> [accessed 14 Mar 2011].

Macaro, E. (2001) 'Analyzing student teachers' codeswitching in foreign language classrooms: Theories and decision making', *The Modern Language Journal*, 85(4), 531-548, [online], available: <http://onlinelibrary.wiley.com.proxy.lib.ul.ie/doi/10.1111/0026-7902.00124/pdf> [accessed 11 Feb 2011].

Macaro, E. (2005) 'Codeswitching in the L2 classroom: A communication and learning strategy' in Llorca, E. (ed.), *Non-native language teachers: Perceptions, challenges and contributions to the profession*, New York: Springer, 63-84.

Martin, W., Strother, S., Beglau, M., Bates, L., Reitzes, T. and McMillan Culp, K. (2010) "Connecting Instructional Technology Professional Development to Teacher and Student Outcomes" *Journal of Research on Technology in Education*, 43(1), 53-74.

Mayer, R. E. (2001) *Multimedia Learning*, Cambridge: Cambridge University Press.

Mazrui, A.M. (2003) 'Maintaining linguodiversity: Africa in the twenty first century' in Tonkin, H. and Reagan, T. G., *Language in the 21st Century*, Philadelphia: John Benjamins, 99-114.

McGarr, O. (2009) "The development of ICT across the curriculum in Irish schools: A historical perspective", *British Journal of Educational Technology*, 40(6), 1094-1108.

- McKenna, P. and Laycock, B. (2004) 'Constructivist or Instructivist: Pedagogical Concepts Practically Applied to a Computer Learning Environment' in *ITiCSE '04 Proceedings of the 9th annual SIGCSE conference on Innovation and technology in computer science education*, [online], available: http://delivery.acm.org.proxy.lib.ul.ie/10.1145/1010000/1008041/p166-mckenna.pdf?ip=193.1.100.108&CFID=43496928&CFTOKEN=75200250&acm=1316191594_c419760daecdb13ef820e9bf7c6ca60d [accessed 12 Jan 2011].
- McKernan, J. (1996) *Curriculum Action Research: A Handbook of Methods and Resources for the Reflective Practitioner*, 2nd ed., London: Kogan Page Ltd.
- McNiff, J. and Whitehead, J. (2006) *All you need to know about Action Research*, London: Sage.
- Moseley, D. and Higgins, S. (1999) *Ways Forward With ICT: Effective Pedagogy Using Information and Communications Technology for Literacy and Numeracy in Primary Schools*, London: Teacher Training Agency, [online], available: <http://www.leeds.ac.uk/educol/documents/00001369.htm> [accessed 12 Jan 2011].
- Mulkeen, A. (2003) 'What can policy makers do to encourage integration of information and communications technology?', *Technology, Pedagogy and Education*, 12(2), 277–293.
- Mumtaz, S. (2000) 'Factors Affecting Teachers Use of Information and Communications Technology: a review of the literature', *Journal of Information Technology for Teacher Education*, 9(3), 319-341.
- Murtagh, L. and Van der Slik, F. (2004) 'Retention of Irish skills: A longitudinal study of a school-acquired second language', *International Journal of Bilingualism*, 8(3), 279-302.
- Nation, I. S. P. (2001) *Learning vocabulary in another language*, Cambridge: Cambridge University Press.

National Centre for Technology in Education (2001) *Annual Report 2001*, [online], available:

<http://www.ncte.ie/documents/NCTEAnnualReport2001.pdf> [accessed 23 Oct 2010].

National Centre for Technology in Education (2002) *Annual Report 2002*, [online], available:

<http://www.ncte.ie/documents/NCTE2002AnnualReport.pdf> [accessed 23 Oct 2010].

National Centre for Technology in Education (2003) *Annual Report 2003*, [online], available:

<http://www.ncte.ie/documents/NCTE2003AnnualReport.pdf> [accessed 23 Oct 2010].

National Centre for Technology in Education (2004) *Annual Report 2004*, [online], available:

<http://www.ncte.ie/documents/NCTE2004AnnualReport.pdf> [accessed 23 Oct 2010].

National Centre for Technology in Education (2005) *Annual Report 2005*, [online], available:

<http://www.ncte.ie/documents/NCTEAnnualReport2005English.pdf> [accessed 23 Oct 2010].

National Centre for Technology in Education (2006) *Annual Report 2006*, [online], available:

<http://www.ncte.ie/documents/NCTEAnnualReport2006English.pdf> [accessed 23 Oct 2010].

National Centre for Technology in Education (2007) *Annual Report 2007*, [online], available:

<http://www.ncte.ie/media/NCTEAnnualReport2007English.pdf> [accessed 23 Oct 2010].

National Centre for Technology in Education (2011a) *ICT Policy*, [online], available:

<http://www.ncte.ie/AbouttheNCTE/ICTPolicy/> [accessed 15 Jan 2011].

National Centre for Technology in Education (2011b) *Home*, [online], available: <http://www.ncte.ie/> [accessed 15 Jan 2011].

National Centre for Technology in Education (2011c) *What is the NCTE?*, [online], available: <http://www.ncte.ie/AbouttheNCTE/> [accessed 15 Jan 2011].

National Council for Curriculum and Assessment (2011) *Primary School Curriculum*, [online], available: http://www.curriculumonline.ie/en/Primary_School_Curriculum/ [accessed 15 Jan 2011].

National Council for Curriculum and Assessment (2004a) *Information and Communication Technology (ICT) in the Primary School Curriculum: Guidelines for Teachers*, available: <http://www.ncca.ie/uploadedfiles/Publications/ICTPrimary.pdf> [accessed 19 Oct 2010].

National Council for Curriculum and Assessment (2004b) *Curriculum Assessment and ICT in the Irish Context: A Discussion Paper*, available: <http://www.ncca.ie/uploadedfiles/Publications/CurriculumAssessmentandICT.pdf> [accessed 19 Oct 2010].

Oppenheim, A. N. (1992) *Questionnaire Design, Interviewing and Attitude Measurement: New Edition*, London: Continuum.

Orum, A.M., Feagin, J.R. and Sjoberg, G. (1991) "The Nature of the Case Study" in Feagin, J.R., Orum, A.M. and Sjoberg, G., eds, *A Case for the Case Study*, North Carolina: The University of North Carolina Press.

Papert, S. (1993) *Mindstorms: children, computers, and powerful ideas*, 2nd ed., New York: Basic Books.

Rauterberg, M., Menozzi, M. and Wesson, J. (eds.) (2003) Human-computer interaction: Interact '03, Amsterdam: IOS Press.

Roschelle, J. M., Pea, R.D., Hoadley, C. M., Gordin, D. N. and Means, B. M. (2000) “Children Learn in School with Computer-Based Technologies” *The Future of Children: Children and Computer Technology* 10(2), 76-101.

Ryan, R. M. and Deci, E. L. (2000) ‘Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions’ *Contemporary Educational Psychology*, 25(1), 54–67.

Sabieh, C. (2001) “The Cloud around Development and Exploiting CALL Material” in Cameron, K. *Call and the Challenge of Change: Research and Practice* Exeter: Elm Bank Publications, 15-20.

Shields, M.K. and Behrman, R.E. (2000) “Children and Computer Technology: Analysis and Recommendations” *The Future of Children: Children and Computer Technology* 10(2), 4-30.

Stake, R. E. (1995) *The Art Of Case Study Research*, London: Sage.

Stewart, D. W., Shamdasani, P. N. and Rook, D. W. (2007) *Focus Groups: Theory and Practice*, 2nd ed., London: Sage Publications.

Tapscott, D. (1998) *Growing Up Digital: The Rise of the Net Generation*, Meridian [online], available: http://www.ncsu.edu/meridian/jan98/feat_6/digital.html [accessed 5 May 2011].

Tella, A., Tella, A., Toyobo, O. M., Adika, L. O. and Adeyinka, A. A. (2007) “An Assessment of Secondary School Teachers uses of ICT’s: Implications for Further

Development of ICT's use in Nigerian Secondary Schools", *The Turkish Online Journal of Educational Technology*, 6(3), 5-17.

Tondeur, J., Van Keer, H., Van Braak, J. and Valcke, M. (2008) "ICT integration in the classroom: Challenging the potential of a school policy" *Computers and Education*, 51(1), 212-223.

Valentine, C. G. (1972) 'Learning Environments' in Berman, M. L. (ed.) *Motivation and Learning: Applying Contingency Management Techniques*, New Jersey: Educational Technology Publications, 180-188.

Volman, M., van Eck, E., Heemskerk, I. and Kuiper, E. (2005) "New technologies, new differences. Gender and ethnic differences in pupils' use of ICT in primary and secondary education", *Computers & Education*, 45 (1), 35-55, [online], available: <http://www.sciencedirect.com.proxy.lib.ul.ie/science/article/pii/S0360131504000727> [accessed 10 Sept 2011].

Wai-wan, G. (1996) "The Implications of Implementing the Target Oriented Curriculum (TOC) for Teacher Education", *Journal of Primary Education*, 6 (1-2), 37-44, available: <http://sunzi1.lib.hku.hk/hkjo/view/48/4800040.pdf> [accessed 5 May 2011].

Warschauer, M.; Healey, D. 1998 Computers and Language Learning: An Overview Language Teaching *The International Abstracting Journal for Language Teachers, Educators and Researchers*, 31(2), 57-71.

Weinreich, D. M. and Mendez, J. (2009) 'A Philosophical Foundation for Multimedia Design in Gerontology and Geriatrics' in *Annual Review of Gerontology and Geriatrics*, Vol. 28, New York: Springer, 149-164.

Winters, F. I., Greene J. A. and Costich, C. M. (2008) 'Self-Regulation of Learning within Computer-based Learning Environments: A Critical Analysis' *Educational Psychology Review*, 20 (4), 429-444.

Wood, J. (2001) "Can Software Support Children's Vocabulary Development" *Language Learning and Technology*, 5(1), 166-201.

Zeichner, K. M. and Liston, D. P. (1996) *Reflective Teaching: An Introduction*, New Jersey: Lawrence Erlbaum Associates, Inc.

Zuber-Skerritt, O. (2011) *Action Leadership: Towards a Participatory Paradigm*, London: Springer.

Appendix A

Letter to the Board of Management

13 Clonmore,

Kilteragh,

Dooradoyle,

Co. Limerick.

21/03/2011

A Chathaoirligh,

Le déanaí bhain mé amach Dioplóma i Digital Media Development for Education. Cuireann an eolas nua a ghnóthaigh mé i mbun na hoibre go mór leis an tslí a mhúnaim. Táim muiníneach as teicneolaíocht nua a chorpú leis an gcuraclam agus sásta bealaí nua a úsáid go laethúil.

Táim ag leanúint ar aghaidh leis an staidéar agus tá súil agam go mbeidh mé in ann Máistreacht a bhaint amach go luath. Le cead uait agus ó Bhord Bainistíochta na Modhscoile ba bhreá liom breathnóireacht, scrúdú agus ceistiú a dhéanamh leis na daltaí i mo rang féin mar chuid den taighde. Beidh an obair bunaithe ar ghné den churaclam a bheidh á staidéar ag na daltaí. Leanfaidh an obair ar aghaidh mar chuid de gnáth oibre ranga gan am a thógáil ó aon ábhar eile. Ní luafaidh mé ainm, sonraí nó eolas pearsanta faoi aon dalta sa taighde.

Is mise le meas,

Áine Ní Dhochartaigh (Múinteoir Ranga)

Appendix B

Sample Questions for Focus Group Interviews

What do you think of when you hear ICT or digital media being discussed?

Do you use ICT often? Would you use it every day?

How much time do you spend using ICT every week?

Do you have access to technology at home?

What types of technology do you enjoy using most?

Do you think it is important to use technology?

Do you ever use technology at school?

What technology is available to use in your classroom?

Do you use it often?

Do you enjoy lessons more when technology is being used?

Do you think you are more interested in lessons when technology is being used?

Does the teacher using technology help you learn things better?

Do you ever feel that technology gets in the way or doesn't improve a lesson?

Do you think technology can take over from teachers?

Can you all speak Irish?

Do you understand Irish when it is spoken or when you read it?

What are your views on the Irish language?

Do you think that using technology helps when learning Irish?

Do you use technology often when learning Irish?

Would you change anything about the way Irish is taught?

How can teachers make Irish more enjoyable?

Having used software and laptops to learn some grammar recently, do you think you learnt better than you would have from just listening to the teacher?

Did you need any assistance from your teacher when using the software?

Do you think there would have been any difference if the teacher took part in teaching the grammar while you used the software?

When learning other languages have you used any other technology other than software?

Do you believe that other technologies could be of benefit when learning Irish?

Do you know of much technology available through Irish? Websites, etc.

Do you think technology could replace the teacher completely? Why?

Appendix C

Focus Group Interview Transcripts

Focus Group A1

Researcher: Morning all!

All: Morning

Researcher: Ok, what do you think of when you hear ICT or digital media being discussed?

Student 10: Confused.

Researcher: Why is it confusing? Do you not understand the term ICT?

Student 19: No, I don't know what it means.

Researcher: Ok, if I said to you what do you think of when I say technology?

Student 10: Computers and TVs and stuff.

Researcher: Ok, and stuff. What kind of other stuff might you be talking about?

Student 15: Robots.

Researcher: Robots. Excellent. Anything else?

Student 15: Phones.

Researcher: Right and what kind of technology have phones?

Student 19: I don't know.

Researcher: What can you do with them?

Student 19: Text.

Researcher: Text.

Student 28: Call.

Researcher: Anything else?

Student 15: Play games.

Researcher: Anything else?

Student 28: Listen to music

Researcher: Listen to music, excellent. Any other kind of technology you can think of?

Student 15: I-Pods

Researcher: Do you have an I-Pod?

Student 15: Yes

Researcher: Do you enjoy it?

Student 15: Yes.

Researcher: Ok. Now that we know what ICT is - it's Information, communication technologies- what do you use ICT for?

Student 20: Communicating.

Researcher: Communicating with whom?

Student 28: Friends and family.

Researcher: What kind of communication can you do? You've already mentioned one.

Student 19: Talking.

Researcher: Talking or . . . ? What else do we use?

Student 11: Text.

Researcher: Text. Have we other means of communication?

Student 15: E-mail.

Researcher: E-mail.

Student 15: Sign language

Researcher: Would you use technology for sign language?

Student 15: Morse Code.

Researcher: Excellent and what do you use for Morse Code?

Researcher: A board isn't it? Now is Morse Code one of the most up to date technologies that we've got.

All: No.

Researcher: Can you name one of the top of the range technologies that we have at the moment? Kate.

Student 19: Phones

Student 15: Laptops

Researcher: Ok. How much time do you spend, do you reckon with ICT every week? Or every day

Student 15: Six to seven hours.

Researcher: A day?

Student 15: No

Researcher: A week?

Student 15: Yeah

Student 19: Alot.

Researcher: Alot. You're not going to give me a time, no?

Student 19: No

Student 10: Alot.

Researcher: Do you have access to lots of technologies at home?

Student 10: Yep

Student 15: Yeah

Researcher: What?

Student 15: Computers, TVs.

Student 10: Internet

Researcher: Very good?

Student 19: Phone

Researcher: Do you have use of technology at school?

Student 15: Yes

Researcher: What type?

Student 19: The computer and the projector.

Researcher: Ok

Student 28: Camera

Student 11: Camera

Student 15: Laptops

Researcher: How often do you use those laptops?

Student 28: Once a week

Researcher: Do you think it's important to use that technology?

Student 28: Yes.

Researcher: Why?

Student 28: Because you have to. . . . I don't know. You just. . . You do.

Researcher: So you believe it's important but you're not sure why you believe that.

Student 28: Yeah

Student 15: You can communicate with your family and friends and stuff. Keep up to date on the latest gossip.

Researcher: Why do think it's important to use technologies.

Student 19: Cause you'd be bored without it.

Student 11: You find out a lot of information.

Researcher: Do you think technology is better than using old fashioned methods, like books and Morse Code? The newer technology is better?

Student 10: In some ways and in other ways it isn't.

Researcher: What ways aren't they?

Student 10: They're like that learning we did with the laptop. The teacher was a lot better than the laptop.

Researcher: Do you enjoy lessons that use technology more than lessons that don't use technology?

Student 11: Sometimes

Researcher: What times do you enjoy it more?

Student 11: On Monday morning

Researcher: What about Monday morning?

Student 11: When you get to come in and go on the laptops for the teacher and computer learning instead of having to write everything down in the copy.

Researcher: What other times do you enjoy using technology?

Student 10: When we're on the laptops instead of doing maths and learning subjects.

Researcher: Alright, do you think there're any lessons that technology doesn't assist with?

Student 19: Maths.

Researcher: Why?

Student 19: Cause you can't ask a computer a question, kind of.

Researcher: So you think it's important to have a teacher at a time like that?

Student 19: Yeah.

Student 11: There are calculators as well. You can try to figure it out on the calculator.

Student 15: Cheat.

Researcher: It's all part of technology isn't it?

Researcher: Do you think you listen better or pay more attention when technology is being used rather than just the teacher talking?

Student 19: Teacher talking.

Student 28: It depends.

Student 19: Cause she might ask you a question and if you're not listening you've no idea what's going on.

Student 28: It depends if you're sleepy or not.

Researcher: Ok, so sometimes the technology might help wake you up?

Student 28: Yeah.

Researcher: Ok.

Student 11: You can be daydreaming when the teacher is talking but when you've a laptop in front of you, you can't really daydream, you have to really pay attention to know what's happening.

Researcher: Ok. Do you think that technology could take over completely from the teacher?

All: No

Researcher: Why not?

Student 10: Because then the kids in the future would be a lot em, slower.

Researcher: Why?

Student 10: Cause if you don't have like a real person there to answer your questions and actually care for what you're asking instead of a computer, the computer wouldn't have any idea what you're talking about.

Researcher: Conor?

Student 11: No, because teachers have different types of methods or in maths like they like teach us a different way than it does in the book and it's easier. If technology took over it would be the same way as the book.

Researcher: Thank you. Ok. Moving along. Can everybody here speak Irish?

All: Yes.

Researcher: Do you understand Irish when it's being spoken to you?

Student 19: Sometimes.

Student 28: Sometimes. It depends on the person who's talking to us.

Student 15: If Mac Uí Chonchubhair is talking to me. . .

Student 11: I haven't a clue what he says.

Student 10: Depending on the accent.

Researcher: What are your views on the Irish language?

Student 10: It's good.

Researcher: Why?

Student 10: Because it's our like natural language.

Researcher: Do you enjoy it?

Student 10: Depending on what we're doing.

Researcher: Ok. So are you pleased that you're able to speak the language?

Student 10: Yeah.

Researcher: Ok. So are you pleased that you can understand the language?

Student 10: Yeah.

Researcher: Ok. Would you change anything about the way it's being taught?

Student 10: Not really.

Researcher: Nothing at all.

Student 10: No.

Researcher: Anybody else? Would you change the way Irish is taught?

Student 11: No.

Student 28: If it's less writing, yes.

Researcher: Have you found your experience here in this school to be a positive one towards the Irish language?

All: Yeah.

Researcher: Can teachers do anything to make Irish more enjoyable?

Student 11: Play fun and games instead of just like making them write essays about a story.

Researcher: Recently you had to learn a piece of grammar and you used the technology of the laptop and software to learn the grammar. Did you find it easier to learn using this technology than just listening to the teacher?

Student 28: I found the teacher better. It's just cause on the laptop is just too quick. You don't get a chance to actually learn it.

Researcher: Ok.

Student 11: Like on the laptop they just tell you the word and tell you where you could put it in a sentence but whereas the teacher tells you what it means and what tense it's in and things.

Student 10: And what context you can put it into.

Researcher: Ok. So if the software was designed to do all those things like the teacher does, do you think the software would be more effective than the teacher?

Student 11: No.

Student 19: No. Cause then the teacher would be better. That she. . . in the computer. That. . . I'm all stutters. The computer didn't explain it in English but the teacher did so you'd understand it better.

Researcher: Ok. And when you were using laptops, did anyone here need assistance from the teacher?

All: No.

Researcher: It was quite simple to use the software independently without the teacher's help.

All: Yeah.

Student 19: I would use it for like a younger class cause it's too. . .

Researcher: Is it too childish maybe?

Student 19: Yeah.

Researcher: Do you think there would be a difference if when using that software that the teacher took part in the lesson and helped you through the software and you all discussed it together? Do you think that would make a difference to the lesson?

All: Yeah.

Researcher: In what way?

Student 19: Because you learn more from the teacher when she's talking than the computer.

Researcher: Ok. Now, if I were to ask you which one you would prefer teacher on their own, computer on their own or teacher plus computer, which one would you prefer?

Student 20: Teacher on their own.

Researcher: Ok. Yourself?

Student 28: It depends cause we didn't do it with the teacher so I don't know if it'd work or not.

Researcher: Ok.

Student 19: Teacher on it's own.

Student 11: Teacher on it's own.

Student 15: Teacher on it's own.

Researcher: So you weren't overly impressed with using the technology to learn grammar.

Student 15: No because you might be distracted by the computers and stuff and like asking questions.

Researcher: Ok.

Student 11: You just want to get it finished so you can play games on it once you've finished.

Researcher: When you've been learning other languages- like you've Spanish lessons here- have you used any other technology to help in your learning?

Student 11: The computer.

Student 15: Projector.

Researcher: The projector for what? What were you watching using the projector?

Student 15: A DVD

Researcher: Ok. And did you find that beneficial?

Student 11: No

Student 19: No

Researcher: What did you think of it at the time?

Student 15: Amazingly boring!

Researcher: Amazingly boring!

Student 11: It was too complicated.

Student 19: It didn't explain what it means. You just had to like guess what it means itself.

Researcher: Ok. Do you think there's any technologies out there that could help when you're learning Irish? Are there any technologies that could benefit your learning of Irish?

Student 19: Computer

Researcher: In what way?

Student 19: You can look up what it means.

Researcher: Yeah. You could use it maybe as a dictionary source.

Student 19: Yeah.

Researcher: But other than that, any other ways?

Researcher: Do you know is there much use of technology in the teaching of Irish? Is there much available? We'll say like you'd have for English – you'd have lots of websites and stuff like that.

Student 11: No.

Student 10: The likes of Rosetta Stone and all that where you put on headphones and you listen to people speaking the language and you're asked questions about it. If they put that into Irish, I suppose it could help out a bit.

Researcher: Ok. And last time I'm going to ask ye. Do you think that computers and technology can replace the teacher?

All: No.

Researcher: How many no's have I got.

Student 28: No

Student 19: No

Student 20: No

Student 15: No

Student 10: No

Student 11: No

Student 15: No

Focus Group A2

Researcher: Morning all!

All: Morning.

Researcher: Ok. What do you think of when you hear the word ICT or digital media?

Student 1: Technological things.

Researcher: Such as?

Student 13: Camera. Camera.

Student 24: Phones.

Student 13: Computer.

Student 9 & 7: Projectors.

Student 25: I-Pod.

Researcher: I-Pods. Do you use any ICT or digital media?

Student 7: Yes.

Researcher: What do you use?

Student 7: Laptops and phones

Researcher: Would you use them often?

Student 7: Yeah

Researcher: How often, might you say?

Student 7: You'd use your phone every day.

Researcher: How long every week would you spend using technological things?

Student 2: When I come home, nearly all the time. I use the phone, laptop and TV.

Researcher: Ok. Do you have access to much technology in your home?

Student 13: Yeah, I've got access to my computer, Playstation, I-Pod and phone.

Researcher: And yourself?

Student 25: Em, internet, TV, laptop, games, Nintendo DS and stuff

Researcher: OK. What kind of technology do you enjoy the most?

Student 9: TV

Student 13: PS3

Researcher: The PS3.

Student 9: X Box

Student 24: The Wii

Researcher: The Wii. Do you think it's important that we use technology?

Student 2: Yes.

Researcher: Why?

Student 2: Or else we'll go back to dinosaurs.

Researcher: We'll become dinosaurs. Any other reason, bar becoming dinosaurs?

Student 9: You'd get bored more easily.

Researcher: You get bored easily?

Student 2: It gives you information quicker.

Researcher: Do you ever use technology at school?

All: Yeah.

Researcher: Ok. Would somebody tell me what kind of technology they use at school?

Student 7: We use the laptops and projector the computer and the camera.

Researcher: Is there lots of technology available to you in the classroom?

Student 13: Sometimes.

Researcher: Sometimes. What do you mean?

Student 13: Like we've got certain times we can use it at.

Researcher: Ok. And how often would you use it at school?

Student 2: Once or twice a week and we use the computer every day.

Researcher: Do you enjoy lessons that include technology?

All: Yes.

Researcher: Why?

Student 25: Because they're different.

Student 9: More fun.

Student 2: Better pictures.

Student 1: It's different.

Student 25: It's cartoons and stuff.

Researcher: Ok. Do you think lessons are more interesting when there's technology involved?

Student 2: It's easier.. it's easier in a way cause there's like PowerPoints and it's more interesting when there's colours and things.

Researcher: Excellent. Does your teacher using the technology help you in any way?

Student 7: Yeah.

Researcher: Ok. Do you ever feel that technology doesn't improve a lesson?

Has there ever been a situation where you've found that the technology doesn't add anything to the lesson?

Student 1: Sometimes.

Researcher: Why?

Student 1: Sometimes when you look at the teacher like it drums it into your head but like when you're on a computer like you just look at it and it's gone.

Researcher: Ok. Can you all speak Irish?

All: Yes.

Researcher: Do you all understand Irish when it's being spoken?

All: Yes.

Researcher: Can you tell me now – a few of you – what are your views on Irish?

Student 2: I think maths is easier in Irish.

Researcher: Ok.

Student 13: Once you get used to it it's easy.

Researcher: Is it a nice language? Are you pleased you know it?

Student 13: Yeah.

Student 25: Yeah

Researcher: Why? Conor.

Student 9: Cause it's our native language.

Researcher: Ok. Do you think that using technology might help you learn Irish better?

Student 25: A possibility.

Researcher: Have you ever used technology when learning Irish?

All: Yeah.

Student 2: Yeah, like translator for homework. The Google translator

Researcher: Do you find that very good or is it wrong sometimes?

Student 2: It's wrong sometimes but it's ok.

Researcher: It's ok. What would you change about the way Irish is taught in schools or is there anything you'd change?

Student 25: No.

Researcher: Nothing. Do you like the way your teacher teaches you Irish?

Student 25: Yeah.

Researcher: Having used the software on the laptops to learn a piece of grammar, do you think you learned better from the piece of software than you did the teacher?

Student 1: The teacher.

Student 25: The teacher.

Student 9: The teacher is better.

Student 13: She makes sure you know it.

Researcher: Ok. Whereas what happens when you use the computer?

Student 13: You just click on it and it just says a few words and then that's it.

Researcher: Ok. So you believe that the teacher guiding the learning is better than you being in control of it.

Student 13: Yeah

Researcher: Ok. Conor.

Student 9: You can be distracted when you use the laptops and you don't really learn.

Researcher: Do you find that you get distracted by graphics or the thought that if I finish quickly I'll be able to do something else or a bit of both?

Student 9: A bit of both.

Researcher: A bit of both. Anybody else?

Student 2: You get us to say sentences and that makes it easier.

Researcher: Whereas when you're left on your own with the computer?

Student 7: They do it for you.

Researcher: They do it all for you.

Student 25: When you write it down it's easier because it's just... you know where the buttons are so you're pressing them but you're seeing the letters are you're writing them down.

Researcher: Did you need any assistance when you were using that software?

All: No.

Student 2: Sometimes.

Researcher: Ok. What kind of assistance did you need when you used the grammar software?

Student 2: Like the CD. Maybe one time it wouldn't have a file on it. Some CD's wouldn't work.

Researcher: You had to make sure that everything was working properly before you could continue. Do you think there's em... Do you think it would have made a difference if the teacher took more of a part in you using the software?

Student 2: Yeah.

Student 7: No.

Researcher: If the teacher was more involved.

Student 25: Yeah.

Student 1: Because when you're doing the software on your own it's there but you don't...like there's no teacher there to tell you that you have to learn it.

Researcher: Ok. So you like to have the push of the teacher insisting that you learn something.

Students 1&25: Yeah.

Researcher: Insisting that you make up your own sentences.

Student 1: Yeah, cause then you have to do it.

Researcher: Ok. In other languages like Spanish which you've been learning you've used technologies, such as DVDs. Did you find that beneficial to learning the language?

Student 24: No, not really. You're just watching it but you're not...

Researcher: Ok. Do you think other technologies would be helpful in learning Irish?
Do you think other technologies would help in learning Irish? Other than just the CD that you got to use before?

Student 2: Well, like are you able to get DVDs and...?

Researcher: Would they help?

Student 2: Maybe a little bit.

Student 1: On like a car journey or something.

Researcher: Ok. Do you know of lots of stuff that's available through Irish?

Student 7: You can get the Irish translator on the internet.

Student 1: You can listen to tapes.

Researcher: Listen to tapes. Do you think that technology can replace the teacher completely?

All: No.

Student 25: Not really.

Researcher: Why not?

Student 2: We need the teacher to help us with the harder things. To make us learn it.

Researcher: Ok. So the teacher drives you to learn better?

Student 13&25: Yeah.

Researcher: Do you think technology can change, can be on it's own without any teacher?

Student 13: No.

Researcher: No. Why not?

Student 13: Because sometimes you can be wrong and you don't learn it as well as you do if you have a teacher.

Researcher: Ok. Thank you all very much.

Student 7: Your welcome.

Appendix D

Questionnaire

Student No. _____

Questionnaire

1. Do you like using computer technology?
Yes _____ No _____
 - i. Why? _____
2. How often do you use computer technology at home?
Every day _____ A few times a week _____
Once a week _____ Less often _____
3. How often do you use computer technology at school?
Every day _____ A few times a week _____
Once a week _____ Less often _____
4. How often does your teacher use computer technology in lessons?
Every day _____ A few times a week _____
Once a week _____ Less often _____
5. Do you enjoy lessons that involve the use of computer technology?
Yes _____ No _____ Sometimes _____
6. Do you ever use computer technology when learning Irish?
Yes _____ No _____
 - i. If **yes**, how often do you use technology when learning Irish?
Every day _____ A few times a week _____
Once a week _____ Less often _____
 - ii. Do you learn better from Irish lessons that use technology?
Yes _____ No _____
7. Do you think you learn more when the teacher uses technology?
Yes _____ No _____ Sometimes _____
8. Which method of thinking do you think works best?
The teacher teaching without technology _____
The teacher teaching using technology _____
Learning using only technology _____
9. Do you think your teacher could use technology more in lessons?
Yes _____ No _____
 - i. If **yes**, in what ways could technology be used more often?

Appendix E

Post-Test Results

	Student Number	Chuig (Score out of 7) Teacher-Only	Roimh (Score out of 7) Computer-Only
Group A	1	2	2
	2	6	4
	7	4	4
	9	4	3
	10	2	1
	11	1	1
	13	3	2
	15	3	2
	17	3	4
	19	2	2
	20	2	4
	24	4	6
	25	6	5
	28	7	7
		Chuig (Score out of 7) Computer-Only	Roimh (Score out of 7) Teacher-Only
Group B	3	4	5
	4	1	1
	5	3	3
	6	6	5
	8	2	2
	12	5	3
	14	6	5
	16	0	1
	18	2	3
	21	1	3
	22	1	2
	23	3	6
	26	6	3
27	1	3	