Title

Information Communication Technology and Newly Qualified Primary Teachers Ireland:

School and classroom experience

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Abstract

This research explored the school and classroom experiences of thirteen newly qualified primary teachers (NQPTS) in Ireland in relation to Information and Communication Technology. These teachers had access to personal laptop computers as student teachers and participated in the ICT elective module in their final year in college. The research adopted a case study qualitative approach, using semi-structured interviews and observations in the classrooms of the participants. Thirteen in-depth interviews were audio recorded in the participants' schools, transcribed and later analysed using Nvivo. Further evidence was gathered through unstructured and unrecorded conversations with the principals of the schools along with documentary evidence from the NQPTs inspectors' probationary reports. As a result, this thesis examined the issues faced by these young teachers as they attempted to integrate ICT into their daily professional lives. The research further explored the role of the ICT school co-ordinator, the principal teacher, the community, the school inspectorate and the national ICT advisory service and how they supported or hindered the NQPTs in relation to ICT classroom use.

The main findings of this study indicated that these thirteen NQPTs:-

- Were striving to integrate and infuse ICT into their daily work;
- Were satisfied with their pre-service experience of ICT, including the laptop programme;
- Argued that more time be allocated to ICT classroom management issues during pre-service;
- Suggested that ICT integration should play a more prominent role during teaching practice;
- Suggested that teaching practice supervisors be more supportive of the role of ICT;
- Acknowledged the support of their head teacher and school based ICT co-ordinator regarding ICT integration;
- Questioned the lack of support they received from the school inspectorate during their probationary year in relation to ICT;
- Had very little support from the national ICT advisory service during their probationary year.

The thesis concludes with six recommendations, posed as questions, relating to the role of the National Centre for Technology in Education (NCTE, Ireland), the role of the school inspector, in particular during the young teacher's probationary year, the role of the school's ICT policy, the role of the colleges' of education supervisors in Ireland during teaching practice, the value of laptop technology during pre-service and finally what form of ICT in-service is relevant to NQPTs and how these recommendations may support young teachers in future years.

Introduction

The origin of this paper lies in the personal interest of the author in using Information Communications Technology (ICT) as a teaching and learning tool in the primary classroom. As a lecturer in ICT in Primary Education at a University in Ireland the author has a deep interest in how Newly Qualified Primary Teachers (NQPTs) are equipped to use and integrate ICT while in College and how they exploit this learning during the early years as classroom teachers. The author was also interested in any barriers that may exist for these NQPTs in their schools and in how the people they meet in their professional lives assist or hinder their use of ICT in the classroom.

Context

In Ireland, Information Communication Technology (ICT) has become a major concern in the Irish education system with the result that substantial expenditure has been invested in hardware, teacher training in the use of ICT, software and networking in all schools both primary and secondary. In 1997 the Department of Education and Science (DES) launched the *Schools IT2000 Policy Framework* (DES 1997). This initiative involved public expenditure of over €50 million over a three-year period with the promise of further funding in the following years. All schools were supplied with at least one multimedia PC and a dedicated internet phone line, with an hour a day free internet use. As part of the Schools IT2000 programme, the DES established the National Centre for Technology in Education (NCTE) in Dublin. The aims of the NCTE were clearly defined by the DES. These aims included teacher training in the use of ICT, software

evaluation, web design, multimedia production and networking. The training was offered under three specific initiatives:

- Technology Integration Initiative (TII)
- Teaching Skills Initiative (TSI)
- Schools Support Initiative (SSI)
    - ScoilNet (Dedicated website for schools and teachers)
    - School Integration Project (Various ICT projects in selected schools).

Listed under the heading 'Objectives, Goals and Strategies' of the Schools IT2000 document are the following regarding pre-service education primary;

- *The introduction of pre-service training in the use of ICTs in education for all student teachers* (p.3)
- *To support colleges and schools of education in developing the integration of ICTs in pre-service teacher training* (DES, 1997 p.19)

From the outset of this initiative, the Government wanted to ensure primary student teachers were prepared fully to integrate ICT into their teaching on graduation. The National Council for Curriculum and Assessment (NCCA), the government agency with responsibility for devising the National Curriculum for primary and secondary schools in Ireland, promotes the use of ICT in learning and teaching.

Participants and Setting

The participants for this research were thirteen NQPTs, competent and confident users of ICT. The data collection took place in their schools which are scattered throughout the country and range from large city schools to (two teacher) rural schools through the Autumn of 2005 and Spring 2006. It was important to have a cross section of school types in this study to illuminate the differences between the facilities and needs of the

rural and urban teacher. Interviewing the participants in their own classrooms enabled the author to get a first hand glimpse of the real classroom and not a teaching practice setting where participants might feel under pressure to put on a performance. The author also hoped, through interviews and observations, to gather data and stories to pass on to his present and future cohorts of students on how these NQPTS are integrating ICT into their teaching. All the participants were personally known to the researcher as he had worked closely with them while they were undergraduates in the University.

The Research Aims and Questions

The principal aim of this research study was to explore

- How newly qualified primary teachers (NQPT), competent and confident users of technology, integrate ICT into their teaching during their initial teaching career.

The researcher is assuming that these NQPTs are ICT competent and confident having completed the fifty-hour ICT elective module as undergraduates and having had access to personal technology by means of owning their own laptop while in college.

The study aimed to further explore the following sub themes:

- How does the ethos of the school impact on newly qualified primary teachers, competent and confident users of technology, use of ICT in their classrooms during the early years of their teaching career?
- How has the laptop programme and pre-service ICT training at Mary Immaculate College, equipped the NQPTs to integrate and infuse ICT into their teaching?

- How has the use of technology, while at Mary Immaculate College contributed to the integration or lack of integration of ICT during their initial career?
- What are the perceived barriers to ICT use in their schools?

Methods

For the purposes of this study, the researcher adopted a qualitative approach in line with the thinking of Creswell who states that the goal of qualitative research *is to rely as much as possible on the participants' views of the situation being studied* (Creswell 2003, p. 8). A qualitative case study approach using qualitative methods for the collection of data was chosen. The study adopted an inductive process whereby the researcher gathered information, asked open ended questions, analysed the data to create themes and patterns and generated generalisations. Along with this non-positivist approach, the research could be described as constructivist, that is to say the researcher interpreted what he saw and heard and constructed or generated meaning from it. The study could also arguably be described as taking an advocacy approach in that the findings might, as discussed by Kemmis and Wilkinson cited in Creswell *contain an action agenda for reform that may change the lives of the participants* (Creswell 2003, p. 10). The researcher's own experience with the phenomenon under study assisted in creating what Stake (1994) calls *naturalistic generalizations* (p.240). The focus is on the participants' own perceptions and experiences. As the primary data collection instrument, the researcher's own beliefs were taken into account and this introspection or reflexivity acknowledged the biases, values and interests of the researcher.

Background to ICT in Irish Primary Education

The Department of Education and Science, (DES) Ireland, initiated a pilot project, *Computers in Education*, on ICT in primary schools in 1984. A total of thirty two schools, one percent of all primary schools in the country, were involved in the programme. Following this project, the Irish National Teachers Organisation (INTO), published a report suggesting that the DES pilot programme *succeeded in raising the profile of computing at primary level and showed there was a positive role for IT in the education of children at primary level* (INTO 1996, p. 3) and listed a number of recommendations. However, concerns were expressed at the failure of the DES to implement the recommendations of the INTO 1996 report. Following on the launch of the European Commission's Action Plan, EU (2001), *Learning in the Information Society*, in 1996, the DES set about establishing an ICT programme for education in Ireland.

Schools IT2000

In 1997 the DES, Ireland published its first ICT policy document and programme known as *Schools IT2000, A Policy Framework for the New Millennium* DES (1997). This document outlined the plans for ICT use in primary and secondary education up to the year 2001. The Government proposed to spend €50 million with additional funding from private corporations over three years on providing all schools with at least one multimedia computer and internet connection. Funding was set aside for the training of teachers in the use of the new technology. The DES established the National Centre for Technology in Education (NCTE) with the aim of organizing training programmes

through the network of Education Centres throughout Ireland, with further courses in schools and third level colleges. The courses on offer included basic skills, (Phase One and Two) basic skills, ICT and Curriculum Integration for primary schools, Maths in second level schools, basic web design, multimedia using Hyperstudio, troubleshooting and ICT and classroom management. By the end of 2000, Mulkeen (2003) states, 84% of primary teachers had attended at least one of these courses. Other initiatives put in place by the NCTE included School Integration Projects (SIPs). This scheme, according to Mulkeen, involved 248 schools in 48 national and international projects, ranging from software use in subject areas to internet and e-mail programmes, Galvin (2002) outlined the successes and failures of these SIP projects and addressed the issues of technical support, ICT integration in the classroom and the need for further research in this area. Two web sites were put in place to assist schools and teachers in integrating ICT, www.scoilnet.ie and www.ncte.ie.

First National Evaluation

In 1999, the National Policy Advisory and Development Committee (NPADC) undertook the first major national study on the impact of the Schools IT2000 programme. The findings of the NPADC survey relating to ICT and primary education are presented here.

Infrastructure

On infrastructure, the report noted an average of 15 computers per primary school, a pupil-to-computer ratio of 19.6:1 and that over 79% of primary pupils had access to the internet. All of these figures showed an increase from a previous study completed in 1998

by Telecom Eireann, the national communications company. In relation to ICT and software use, the NPADC report stated that 83% of primary principals and 67% of primary teachers were using ICT on a regular basis (Cotter 2001). The software packages most commonly used by primary teachers and principals were age appropriate word processors along with reference software, problem solving and educational games.

Training

Cotter (2001) shows that 75% of primary teachers and 88% of primary principals have undertaken training in ICT since the launch of IT2000. The NCTE Phase One and Two courses were successful in familiarizing teachers with the technology, with the majority of teachers opting for training within their own school. Overall, while teachers welcomed the IT2000 initiative, fundamental issues emerged from the report:

- The need for more training;
- The need for more funding for equipment;
- The need for more technical support.

In its closing recommendations, the National Policy Advisory and Development Committee (NPADC) highlighted many issues but specifically the need for training in the pedagogical uses of ICT in the classroom and the promotion of postgraduate research in the use of ICT. The NPADC report paid particular attention to the area of pre-service teacher education by suggesting that the DES *must provide appropriate and dedicated funding for ICT at pre-service* (Cotter 2001, p.11).

Stage Two of Government ICT Initiative

In 2001 the DES launched the second initiative on ICT for Education. This replaced the IT2000 programme and was published as the *Blueprint for the Future of ICT in Irish Education, Three Year Strategic Action Plan 2001-2003*. In this plan the DES promised a further €107.92 million towards capital expenditure and support services including teacher training. This initiative highlighted specifically the role of the principal and the Education Centres in promoting ICT in schools and the provision of Broadband access for all schools DES (2001). Following the publication of the Blueprint strategy, the DES announced, in February 2004, a further investment of €18 million providing Broadband connectivity to all primary and secondary schools in Ireland. This is a joint venture between the private and public sector. It is, however, significant to note that ICT and pre-service education was not mentioned in this three year strategic action plan.

Evaluation Two 1998-2002

A progress report on ICT in Irish schools was published in 2004. This report outlined the work of ICT in primary, post-primary and special schools since the introduction of the IT2000 initiative in 1997 and the follow on Blueprint for ICT in Irish Schools in 2001. Overall the report showed an increase in the number of computers and peripherals in all sectors but in particular the primary sector. According to Mulkeen (2004), the ratio of computers per pupil in primary schools had fallen from 19.6:1 to 12:1. The most recent figures published by the NCTE show a ratio of 9.06:1 in Irish primary schools (Shiel and Flaherty 2006). This figure places Ireland above the EU average of 9.3:1 computers per

child in the education system. On ICT training and skill development, the Mulkeen (2004) report highlights an increase in primary teachers use with up to 80% of teachers reporting ICT usage at work. Further courses in ICT curriculum use (64.5%), digital media (75%) and basic troubleshooting (64%) were requested by primary teachers (Mulkeen 2004). This shows that teachers had moved on from basic skills to more curriculum based usage in their schools. Table 1 below shows the usage of ICT in subject areas in the primary school. Primary teachers use ICT mostly in the core subjects of the curriculum and in learning support.

Usage of ICT in subject areas in Irish primary schools

	% using ICT in this subject occasionally or more 2002	% using ICT in school monthly or more 2002
English	98	78
Learning support/remedial	90	72
Mathematics	97	66
Geography	96	48
ICT skills classes	92	46
Extra curricular projects	85	44
History	94	43
Science	86	35
SESE	68	22
Arts Education	71	20
Gaeilge	61	18
SPHE	54	10
Religion	39	6
Modern Languages	18	5
Physical Education	13	2

Mulkeen (2004)

Eurostat is a European statistical agency that surveys all European countries at the same time and using the same instruments. Figures taken from Eurobarometer Flash 118 (2002) and European Youth into the Digital Age, a report based on Eurobarometer Flash 101 and 102 (2001).

Fig 1.

Other major issues discussed in the report are lack of ICT maintenance, need for more and updated equipment i.e. computers, peripherals, access to the internet, placement of

computers in schools and further training on ICT and curriculum specific subject content plus the need for more digital resources produced specifically for the Irish school system. While the initial IT2000 policy of 1997, the NPADC report of 2001 and the report on preparing primary teachers for the 21st century (DES 2002), highlighted the need for further investment in ICT and pre-service teacher education, no mention of this topic was discussed in this progress report or the Blueprint document of 2001. Further evidence of this lack of interest in ICT at pre-service and newly qualified teacher level is highlighted in the most recent report of the inspectorate on *Beginning to Teach*, where ICT receives a mere three mentions in an eighty four page report (DES 2005).

ICT and the Irish Curriculum: National Council for Curriculum and Assessment and ICT

The National Council for Curriculum and Assessment's (NCCA) role in curriculum and assessment is clearly outlined within the Education Act (1998). While the NCCA advises the Minister for Education and Science on matters relating to Curriculum and Assessment, it should be noted that ICT does not form part of the curriculum in the Irish Education system. So how and why does the NCCA get involved in matters relating to ICT and schools? Following the launch of the IT2000 initiative in 1997, the NCCA formed a working group to examine the issues surrounding the introduction of ICT into schools. The working group recommended that the NCCA produce a set of guidelines for teachers and establish a steering committee with responsibility for ICT policy and provision in schools. The steering group proposed that the NCCA's work should be based on the following principles

- *ICT should be used actively by learners from junior infants onwards;*

- *all learners should use ICT in relevant curriculum contexts;*
- *by the end of compulsory education all students should have achieved a defined; level of ICT competence.*

(NCCA 2004, p.4).

Investment in ICT

In its annual report for 2004, the National Centre for Technology in Education, Ireland (NCTE) shows an expenditure of €7,510,755 on promoting ICT usage in Irish primary and secondary schools. This, along with the millions of Euro already invested in ICT in education in Ireland since 1997, should show some improvement in ICT integration and in overall standards in schools.

Success or failure of ICT in schools

Much of the literature on ICT in primary education talks optimistic rhetoric, the hopes and the reality, what makes the difference, attainment at primary level and children's use of ICT. Selwyn suggests that '*much educational research continues to take the form of small/ medium scale surveys and case studies'* (Selwyn 2000, p.94) of ICT schools perceived to be successful and examines the reasons why this is the case. Roberston (2002) argues that most of this positive rhetoric is driven by commercial interests and cites the findings of the Apple Classrooms of Tomorrow (ACOT) as a prime example of this propaganda. However, while acknowledging pockets of successful integration at primary level academics are still undecided whether ICT is actually changing teaching and learning styles across all schools. In summary, the evidence suggests that ICT is gaining momentum in a limited way, the ratio of computers to children is improving, numerous success cases are reported, interactive whiteboards, (Smith *et al.* 2005), are making inroads into schools with encouraging results. Nichol & Watson propose that the

IMPACT2 evaluation of the NGfL ' *does not give grounds for optimism'* (Nichol & Watson 2003, p. 136). According to (Loveless 2003; Sime and Priestly 2005; Barton & Haydn 2006), there is no compelling evidence in the current literature to suggest that ICT is gaining a strong foothold in most primary classrooms throughout the world.

Theoretical Framework for this study

In order to get a clearer understanding of the ethos of the schools the study adopted '*An Activity Theory Framework'* as used Lim and Hang in their study of ICT integration in Singapore schools. Using this framework allowed a more detailed analysis of *the whole configuration of events, activities, contents and interpersonal processes taking place in the context that ICT is used* (Lim & Hang 2003, p. 50 This activity framework provided the study with a conceptual map of the learning environment along with information on other stake holders within the school setting including details on the external factors, such as the Inspector, the DES, the local community and the ethos of the school. This information informed the evidence regarding how the activity of one group within the system affects the other either being a barrier or a help to the NQPT integrating ICT into his or her classroom. This framework involved all the actors in the study, the children in their class, the ICT co-ordinator both local and national, the principal, the school ICT policy, the school inspector and the inspectors' reports on the NQPTs.

Activity Theory Framework

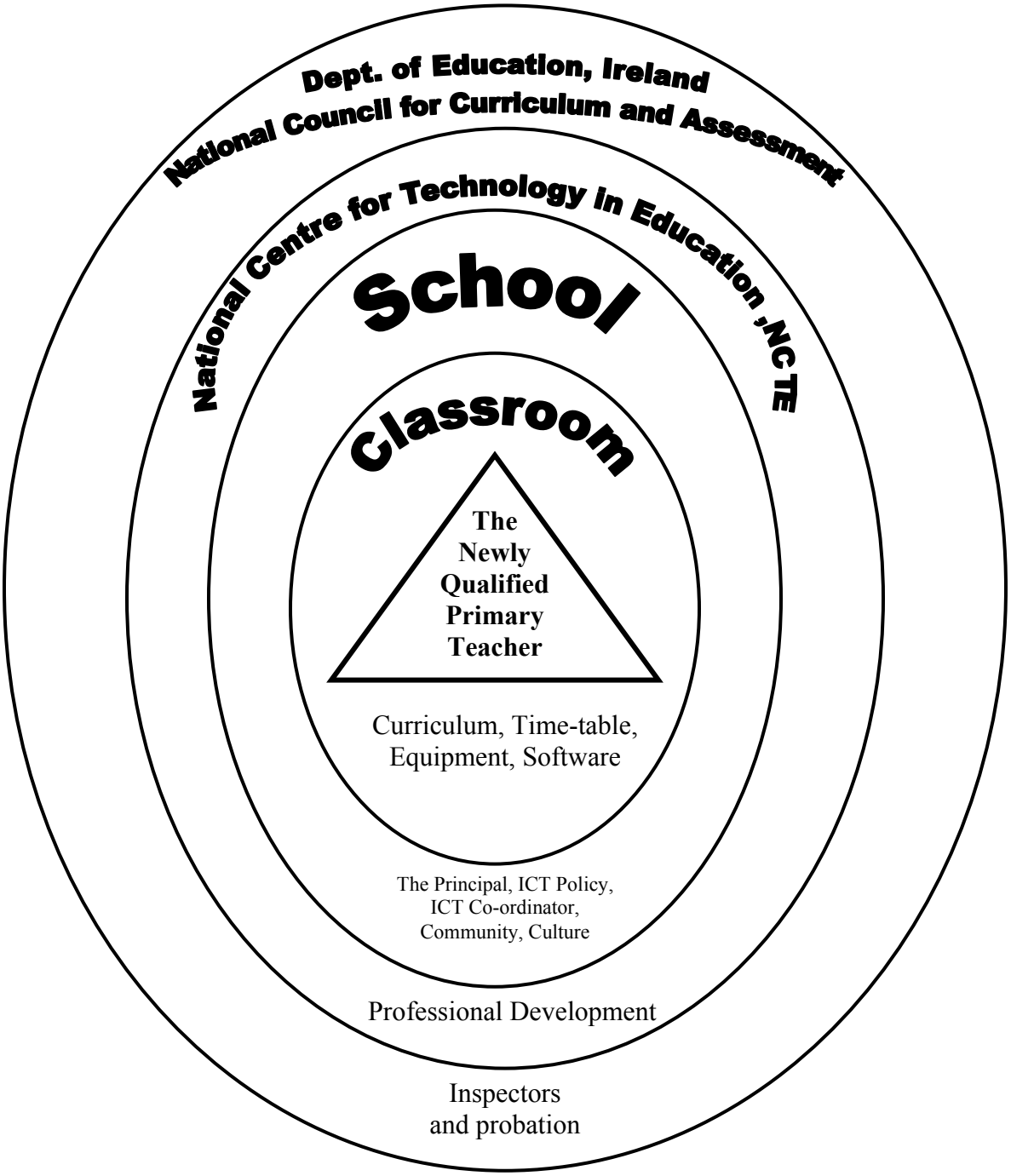

Fig. 2 The Activity Theory Framework adapted from Lim and Hang (2003)

Analysis procedure

All interview transcripts were imported into NVivo. The data from each interview was read and re-read and a set of free codes emerged based on the original interview schedule and the general discussion during the interviews. This was achieved by reading each interview in turn and identifying key words and phrases. The following themes emerged from the data.

- Personal Background;
- Teaching with ICT;
- ICT School and Community;
- Local and National ICT Co-ordination;
- ICT and the Inspector.

General summary of findings from the five themes

Theme One: These NQPTs were influenced by previous teachers and family members to join the teaching profession. The lifestyle offered by teaching allowed them to develop their personal interests in sport, music, drama, language and travel. They all had teaching as number one as their College choice and were recognised in their secondary schools as high achievers. Monetary gain was not a priority. For some, their interest in ICT began at home, school and for others in College. While they all are contented in their chosen profession they expressed concerns regarding the amount of paperwork involved in their daily schedule, accountability and the demands on children in their care. They agreed that the ICT elective and laptop scheme prepared them adequately for integrating ICT but suggested that more need to be done in the areas of classroom management and teaching practice. They needed more classroom experience of ICT while in College and supportive supervisors during teaching practice.

Theme Two. The NQPTs were more comfortable in taking a class in a computer room rather than in the one computer classroom. All subject areas were integrated using ICT and their teaching style was active and child centred. They utilised group work, collaborative project work and role play along with traditional instructive methods of teaching. ICT did not radically change their teaching style as they all agreed they did not have experience of teaching without technology. They all confirmed that ICT has an important role in education and look forward to continuing using it in the future

Theme Three. The principal was found to be a vital cog in the implementation of an ICT programme. The NQPT depends on a strong principal with vision and a willingness to give an opportunity to experiment with technology. Parental support for ICT was active in all schools and the school ICT policy documents were of little benefit to the NQPTs.

Theme Four. The NCTE (National Centre for Technology in Education) advisory ICT service was found to be lacking in support for NQPTs. In general, the school ICT co-ordinators were found to be helpful and encouraging. When the NQPT became the ICT co-ordinator, he/she had the support of the principal.

Theme Five. The inspectorate did not always support the NQPTs in relation to the use of ICT during their probationary year and specifically during the diploma visits.

Findings and Recommendations

The data gathered during the study indicated that ten of the thirteen NQPTs used ICT on a regular basis within their classrooms. The three remaining participants had unusual circumstances that militated against using ICT, two were teaching principals and the third was in a unique multicultural setting requiring much classroom support.

Examples of ICT integration were observed in all areas of the curriculum. Work observed included:

- ICT and Mathematics (junior and senior classes);
- ICT and Language (Both English and Irish);
- ICT to teach basic Irish grammar (senior classes);
- ICT and History;
- ICT and Geography;
- ICT and Music;
- Using ICT to support second language acquisition with foreign nationals;
- ICT and learning support;
- ICT basic skills (junior classes);
- ICT and web design to promote creative Irish writing (senior classes);
- ICT and publishing a class newspaper (senior classes);
- ICT and writing using both word processing and presentation software;
- ICT and personal research using the www;
- ICT for schemes, monthly reports and personal general administrative duties.

The NQPTs' teaching style was active and child centred, allowing children to collaborate in groups and discover for themselves the answers to various problems. LCD projectors were used by eleven of the NQPTs during classroom work. They felt that ICT was not changing their teaching style as they grew up with technology and didn't know any other teaching method. The Internet was used extensively by all in personal research, for day-to-day administration and by the majority of participants in the classroom as a teaching and learning tool.

School Ethos

All participants agreed that the principal teachers in their schools were supportive and were willing to allow the NQPTs freedom in relation to ICT use. As discussed earlier, six of the participants were ICT co-ordinators. The NQPTs felt that most ICT policy documents were of little help and needed regular updating. This concurs with the findings of a recent 2005 census on ICT Infrastructure in schools that highlighted that only 49% of Irish primary schools update their ICT policy on a yearly basis. Parents and the local community were supportive but it was noted that parents from schools in middle class areas were more demanding and wanted to see value for money in relation to fund raising for ICT equipment.

Experience at pre-service and laptop programme

Their experience of ICT at pre-service was positive in relation to skills acquisition but lacked practical experience in the classroom. The NQPTs suggested that the attitude of teaching practice supervisors needs to be more positive in promoting ICT use. They further suggested that student teachers need to work with ICT-competent teachers during teaching practice and be placed in schools with a commitment to ICT. The laptop programme was successful in giving them confidence to use technology and this experience was useful in gaining employment.

Perceived barriers to ICT use by NQPTs

As NQPTs, the majority raised concerns regarding the attitude of the DES inspectors to ICT. They viewed this as a major barrier to its use in their probationary year. The

participants had no objections to using ICT during their induction year, in fact a number of the participants would welcome the opportunity to display their work, provided the school had the necessary ICT infrastructure. Likewise, they discussed the lack of support from the national ICT advisory service. Not one participant in this study was contacted directly by the local ICT advisor in relation to using ICT in teaching and learning. The in-service on offer to NQPTs was deemed irrelevant other than a few courses on video use in the classroom along with ICT and special needs. However, classroom management with ICT was cited as major issue by these young teachers. Lack of hardware and software was not an issue which seems to suggest that the Irish Government's initiative programme on supplying hardware to all schools was successful. However, the most recent report on ICT Infrastructure in Schools by Shiel and Flaherty (2006) showed that 29% of computers in Irish primary schools are over six years old.

Recommendations

The findings of this study could develop a long list of practical recommendations. However, it is very doubtful that government or university departments would take the recommendations on board. Further work needs to be undertaken with a larger sample over a longer time frame. Yet the study did illuminate some issues and questions worthy of further discussion.

Question 1

How might NQPTs integration and infusion of ICT in teaching and learning be enhanced by specific support from the National NCTE ICT Advisory Service?

The data suggests that the NCTE is not supporting NQPTs in their first year in the teaching profession. One could theorise that NQPTs, competent and confident users of ICT, are ready and willing to accept support at this point in their career.

Question 2

In what way will DES policy encourage NQPTs to integrate ICT during their probationary year?

At present, there is very little evidence of consistency among the DES inspectors in relation to ICT during the probationary year. Many participants complained of the lack of interest and support they received from the inspectorate during their first year. Would mandatory use of ICT by NQPTs during the probationary year have a long-term effect on their use of ICT during their teaching career?

Question 3

How could ICT school policies have a positive influence on the use of ICT in the classroom?

The participants in this study suggested that the ICT school policy was of little value other than listing available software within the school. Are ICT Policies written to please the bureaucratic system within the DES and how can schools make the ICT policies more effective?

Question 4

How can Colleges of Education be proactive in relation to ICT use during teaching practice and in ICT modules delivery?

This is a very sensitive issue in many colleges, where tried and tested methods have been successful and where the faculty may be unwilling to change. The evidence suggests that Colleges need to change their approach to teaching practice, in relation to ICT use, by student teachers in the classroom. Previous studies on this topic recommend an integrated model be put in place where the students observe skilled practitioners in the classroom and are placed in ICT rich environments during field experience.

Question 5

In what ways, if at all, does access to laptop technology at pre-service level predispose NQPTs to integrate ICT into their teaching during their first years as teachers?

Access to personal laptops seems to have been a positive factor with this particular group. However, it is impossible to generalise from such a small sample. A study involving a group without laptops at college is needed to further investigate this question.

Question 6

What ICT in-service courses should be provided for NQPTs of various levels of ICT competencies

The evidence gathered during this study indicates that NQPTs are in need of courses relating to ICT and classroom management plus courses on ICT and curriculum integration, particularly on subject specific integration.

Endnote

This study attempted to tell the story of thirteen NQPTs and their use of ICT in their early years of teaching. They were a unique group in that they had personal access to technology as students and took the ICT elective module in their final year at college. They left college with positive attitudes and a favourable disposition towards ICT integration and teaching. Their stories seems to suggest that while their principal teachers, the school ICT co-ordinators, their colleagues and school community are supportive, they are not being encouraged by the very agencies entrusted to do so, namely the National ICT Advisory Service, the DES Inspectorate and many of their teaching practice supervisors during their initial teacher training.

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