National Council for Curriculum and Assessment
An Chomhairle Náisiúnta Curaclaim agus Measúnachta

ICT Framework

A structured approach to ICT in Curriculum and Assessment

Report on the school based developmental initiative

November 2007

Contents

Introduction

During the 2006/2007 school year, the NCCA worked with 49 teachers to gather feedback on the ICT Framework in schools. This report describes the NCCA's school-based developmental initiative from its design to completion. The report is organised in three sections as follows:

Section 1, overview of the initiative provides information on the design of the initiative including its purpose and participants. The professional and technical supports provided to schools are described and the three phases of the initiative are briefly outlined.

Section 2, the ICT Framework in schools presents findings from the initiative. The sub-section on *context evaluation* captures the teachers' experiences with ICT prior to participating in the initiative. It also includes contextual information on each school's ICT infrastructure and teacher access to ICT resources. This information is relevant to the interpretation of findings and the applicability of the conclusions drawn. The information was gathered through direct engagement with teachers in school visits, and teacher workshops, and completion of teacher surveys and response sheets.

The sub-section on *formative evaluation* captures the experiences of teachers with the Framework in their classrooms. It presents findings for the key questions of accessibility, usability, and feasibility—including the supports and resources required for its successful implementation based on teachers' engagement with the ICT Framework over time.

The sub-section on *outcome evaluation* describes the outcomes and impacts of the ICT Framework experience, on teachers and students.

Section 3, conclusion and recommendations, describes revisions to the structure and content of the ICT Framework in response to findings from the initiative. Recommendations are outlined—for NCCA and for the system—in relation to the successful implementation of the ICT Framework in schools.

Section 1: Overview of the initiative

The ICT Framework offers schools **a structured approach to using ICT in curriculum and assessment** by identifying the types of learning with ICT (including knowledge, skills and attitudes) appropriate for students during the period of compulsory education. The ICT Framework is **not a curriculum area or a syllabus**. It is not presented as an *add-on* to teaching and learning but as a tool to help teachers to integrate ICT in teaching and learning. The Framework provides **a guide to teachers** for embedding ICT in curriculum and assessment across curriculum subjects. It is **an enabling Framework**.

The Framework is premised on the belief that ICT can add value to teaching and learning when it is used purposefully and with appropriate resources. Use of ICT Framework will vary from school to school depending on a range of school factors including access to ICT equipment and resources, teacher competence and confidence with ICT, and a school's level and stage of planning for ICT in curriculum and assessment.

The ICT Framework was developed to support teachers in achieving Council's vision of ICT Literacy for all students during compulsory education. This vision is described in the discussion paper, *Curriculum, Assessment and ICT in the Irish Context* (2004) as follows:

> *Our students will leave school as capable independent learners, able to use ICT confidently, creatively and productively, able to communicate effectively, able to work collaboratively, and to critically evaluate, manage and use information (p. 29).*

The ICT Framework was developed with the support, direction and guidance of the ICT Technical Working Groups and the ICT Steering Committee. It followed extensive review of international approaches to teaching and learning with ICT. The ICT Framework was also subject to an external review by two internationally renowned experts on ICT in education. One expert noted that

> *…this framework is very well conceived and developed. It does not only reflect some of the best thinking in this area internationally, but also contains many innovative ideas that can lead international trends. I once reviewed ICT standards and policies about ICT in education from 8 states in the US and 14*

> *countries. I am also very familiar with the national ICT standards in the US and China. In comparison, I must say that the ICT Framework you have developed is excellent on a number of critical dimensions. (ICT Framework, external review)*

The draft ICT Framework was approved by Council in September 2006. Key components of the Framework include four areas of learning with ICT. These focus on the use of ICT to develop students' foundational knowledge, thinking and learning, creativity and collaboration, and critical understanding of the role of ICT in society. These are the four objectives of the Framework. Learning outcomes are identified for all students (regardless of level) across the four objectives. Learning Opportunities are described for each learning outcome across three levels of progression (lower primary level, upper primary level and lower second level). The updated contents of the Framework are provided in the *Revised ICT Framework* document which accompanies this report.

The NCCA commenced a school based developmental initiative to evaluate the draft ICT Framework in November 2006. An interim report on the initiative was presented to Council in May 2007. This report discusses the initiative from it's inception to its completion in May 2007.

Purpose

The purpose of the initiative was to work with teachers to gain feedback on the accessibility, usability and feasibility of the ICT Framework based on classroom practice. This information was gathered both to inform revisions to the Framework and to prepare advice on requirements for its successful implementation in schools.

Questions

Key questions asked *to what extent and to what effects is the ICT Framework*

1. **accessible** to teachers in terms of its language, structure and content
2. **useful** to teachers in planning for and using ICT in curriculum and assessment

3. **feasible** for adoption at class and school levels, including the resource and support requirements for its successful implementation in schools.

Design

School sample

A sample of primary and post-primary schools ranging from low to high ICT use[1] was identified to include a cross section of school contexts and types including, large, small, junior, senior, urban, rural and disadvantaged. A Gaelscoil, and Gael Choláiste were also included in the school sample. The classification of school type and size is described in Appendix 2.

For logistical purposes five primary schools in Dublin and seven post-primary schools in Cork, Limerick and Kildare, were selected. Each school nominated a number of teacher participants (from three to six depending on school size). Within each school, the cohort of participating teachers represented varied levels of access to and experience with ICT. Teachers also varied in their professional and pedagogic uses of ICT in the classroom.

Participation

The 12 schools participated in the initiative over the course of one school year. The initiative had both a *developmental* function and an *evaluative* function. From November 2006 to May 2007, two NCCA Education Officers supported teachers in engaging with the ICT Framework through seminars, on-site meetings and ongoing telephone and email communications. Given that teachers are the point of access and entry to school-based learning opportunities for students, and given the resource limitations within this project, the voices of students were not accessed directly, but via teacher report.

Teachers used the ICT Framework with their own classes and documented their experiences as well as the outcomes for themselves and their students. The Education

[1]See Appendix 1 for a description of the categorisation of high and low ICT use.

Officers worked closely with the teachers to explore their classroom experiences with the ICT Framework. Site visits provided a key opportunity to focus on the teacher's classroom practices and beliefs as central to the process of school change with ICT.

Teachers also received school-based support from the local ICT Advisors. Under the auspices of the National Centre for Technology in Education (NCTE), regionally based ICT Advisors located in each of the full-time Education Centres play a key role in supporting teachers' use of ICT in schools.

In recognition of the schools' involvement in the initiative and to support the engagement of teachers with the ICT Framework, the NCCA provided a range of ICT equipment to each school. This equipment focused on the needs of schools in engaging with the kinds of learning described in the Framework, and included a laptop, digital video camera, data projector, and a range of ICT peripheral tools. The list of equipment is provided in Appendix 3.

Articles on the initiative and the draft ICT Framework were included in two editions of *info@ncca* (September 2006 and January 2007) to raise schools' awareness of the ICT Framework.

Phases of the Initiative

As noted, the purpose of the initiative was essentially to gather feedback on the ICT Framework in schools. Therefore the Framework itself became the object of an implementation and assessment by schools, and an evaluation by the NCCA. Given the focus on *depth* rather than *breadth* of experience with the ICT Framework, qualitative methods were used to collect and analyse findings.

This initiative comprised three overlapping and interdependent phases. The first, *context evaluation,* concerned schools' prior and current practice with ICT at the time the initiative began. Teachers' experiences using the ICT Framework over time provided the focus of the second phase *formative evaluation*. The *outcome evaluation* focused on the outputs, outcomes and impacts of using the ICT Framework in schools. Findings from these three phases provided feedback on how the ICT Framework could

be improved (key questions 1 and 2) and the further support needs of schools using the Framework (key question 3).

These three phases of the evaluation of the ICT Framework in schools are described below. Key questions and methods of gaining feedback are identified in the tables in Appendices four, five, and six.

Phase 1: Context evaluation

The purpose of this first phase was to describe the different contexts of participating schools and to gain a picture of teachers' current approaches to, and use of ICT in the curriculum. Information gained from this phase of the evaluation includes descriptions of each school's ICT infrastructure, policy and practice and teachers' hopes, aspirations and expectations for their classroom use of ICT. Ultimately, the context evaluation provides a basis for understanding findings from the next two phases of the evaluation.

Phase 2: Formative evaluation

The second phase involved studying the process of using the ICT Framework in classrooms and schools, documenting teachers' and students' experiences with planning, setting up, and carrying out the initiative in the school. This element of the evaluation provides insights into what happened in each of the schools, how the Framework was used and why it was used in different ways. This information helps us to make decisions on changes required to the ICT Framework, and informs us on what supports are necessary.

Phase 3: Outcome evaluation

The third phase examined the outcomes and impacts of teachers' use of the ICT Framework in the context of their initial aspirations and expectations. It also highlights further or unexpected impacts or findings. As before, this information informs further development of the ICT Framework and the supports required for successful implementation.

Section 2: The ICT Framework in schools

Twelve schools—five primary and seven post-primary—and a total of 49 teachers participated in the initiative. Teachers' experiences using the ICT Framework in their classes were the focus of this inquiry. Feedback was captured at individual teacher level via survey and teacher interview. In addition, feedback was gathered from facilitated teacher discussions at workshops.

Pre-implementation

Context Evaluation

Contextual information was gathered through school and teacher online survey and at the initial workshop sessions with teachers in November 2006. Principals and teachers also provided information in initial discussions with schools. These questions and surveys are available in Appendices 4, 4a and 4b.

This subsection presents information on

- ICT infrastructure in the school
- teacher access to ICT
- teachers' strengths using ICT
- teachers' priorities for ICT support
- teachers' classroom use of ICT.

Findings are presented for primary schools first, followed by post-primary schools.

What ICT infrastructure was available in the schools?

Schools differed in their ICT infrastructure. Tables 1 and 2 present an overview of participating schools including an *ICT use rating* of high/medium/low for each school. Looking across participating schools, it is worth noting that a school's level of ICT equipment is one indicator of the level of ICT use reported.

At **primary** level, two schools reported *high ICT use*, two reported *medium ICT use* and one reported *low ICT use*. It's notable that one of the *low ICT use* schools (school D) was the only primary school which reported not having classroom computers. The total

ICT equipment reported for this school included 3 laptops, 3 printers, 1 digital camera, 1 scanner and a computer room with 12 computers. As Table 1 shows, these were the total ICT resources for a school of 215 children and 23 teachers.

In contrast, both *high ICT use* primary schools reported having significantly more ICT equipment than the other three schools. For example, school A reported having three interactive whiteboards, four laptops, one data projector, two digital cameras, one digital video camera and one scanner (for 422 students and 20 teachers). This school was also equipped with a computer lab with 20 PCs.

Table 1. School ICT Infrastructure: Primary

School Name	Type	Gender	Teachers	Children	Urban/ Rural	DEIS Yes/ No	Broadband	ICT Use High/ Med/ Low
A	Junior	Mixed	20	422	Urban	No	Yes	High
B	Senior	Mixed	21	220	Urban	Yes	Yes	High
C	Junior	Mixed	21	270	Urban	Yes	Yes	Low
D	Vertical	Mixed	23	215	Urban	Yes	Yes	Low
E	Vertical	Mixed	3	60+	Rural	No	Yes	Medium

Table 2. School ICT Infrastructure: Post-primary

School Name	Type	Gender	Teachers	Children	Urban/ Rural	DEIS Yes/ No	Broadband	ICT Use High/ Med/ Low
F	VSS	Girls	40	450	Urban	Yes	Yes	Medium
G	VEC	Boys	20	200	Urban	Yes	Yes	Low
H	VSS	Mixed	21	500	Urban	No	Yes	Low
I	VSS	Boys	21	250	Rural	No	Yes	Medium
J	VSS	Girls	23	350	Urban	Yes	Yes	Low
K	VSS	Mixed	48	650	Urban	No	Yes	Low
L	VEC	Mixed	43	580	Rural	Yes	Yes	High

The level of ICT infrastructure in participating **post-primary** schools also varied considerably. Of the seven participating schools, only one was reported as having *high ICT use*, with *medium ICT use* reported for two schools and *low ICT use* for four schools.

In most cases teachers reported that computers were only available in ICT labs and specialist rooms, with limited computer availability in ordinary classrooms. As with primary schools, all participating post-primary schools reported having broadband

connectivity. In addition, three post-primary schools had wireless networks in specific areas of the schools.

The trend for lower ICT use in schools with a limited ICT infrastructure, noted in participating primary schools, is equally noted in participating post-primary schools. For example, one post-primary school with *low ICT use* had an ICT lab with over 30 computers all of which were over five years old. This school had a wireless network in one section of the school.

A post-primary school with *medium ICT use* had an ICT lab with 30 computers less than three years old as well as two interactive whiteboards, digital cameras and some curriculum software. While the school had at least one internet access point in all the classrooms, not all classrooms had computers. The school had a policy of providing computers with Internet access to teachers on a phased basis.

In the school which reported *high ICT use* (School L), all students and teachers had their own self-funded laptop computers. Procurement and maintenance of the school's ICT equipment was based on partnership with a multinational provider. Benefits to the school included low-cost laptops, each with a five year warranty and four year coverage for accidental care. The level of infrastructure in this school far surpassed that of the other participating schools. The school was also expanding its specialist ICT equipment in a variety of areas including data-logging, digital video and music technology. Students had access to the Internet, a selection of curriculum software (e.g. CAD, language software) and digital resources created by their teachers. Data projectors were installed in specialist classrooms, with further equipment available for teachers to use in non-specialist classrooms.

Did participating teachers have access to ICT in the school?

Teachers were asked to respond to questions concerning access to ICT (for teachers and students) within the school. This included the availability of pooled or shared resources on a timetabled basis. The questions are provided in Appendix 4b. All schools were represented in the responses, although fewer than 100% of teachers provided feedback.

Nineteen out of 20 teachers representing the five **primary** schools responded to the survey. Teachers were asked which ICT tools and peripherals they had access to

either for their class or in a resource room. The type and location of ICT equipment, peripherals and connectivity reported by primary school teachers are in Table 3, with corresponding data for post-primary teachers in Table 4. The five most frequently reported items are shaded for these and subsequent tables.

Table 3. ICT location: Primary schools

ICT	Location		Total
	Classroom	Resource Room	
Broadband	15	6	21
Digital stills camera	10	10	20
Desktop computer	12	5	17
Digital video camera	7	10	17
TV and video	11	5	16
Laptop	10	6	16
Data projector	8	7	15
Inkjet printer	4	9	13
DVD player and writer	7	5	12
Scanner	2	8	10
Laser printer	4	5	9
Laptop (mobile cart)	1	8	9
Webcam	3	2	5
Interactive whiteboard	3	1	4
Digital microscope	1	1	2
MP3 player	2	0	2
Data logging sensor	0	0	0
Personal digital assistant (PDA)	0	0	0

Table 4. ICT location: Post-primary schools

ICT	Location				Total
	Classroom	ICT Lab	Specialist Room	Storeroom	
Computers	4	21	10	0	35
Data Projectors	1	15	3	14	33
Broadband	3	21	5	0	29
Printers	1	21	5	0	27
Digital Cameras	6	3	17	0	26
Laptops	4	4	5	12	25
CD Burners	3	13	5	0	21
Scanner	1	15	2	0	18
Digital Video	0	2	0	12	14
Head Sets	0	3	2	0	5
Data logger	0	0	4	0	4
Interactive Whiteboard	0	0	2	0	2
Microphone	0	0	2	0	2
MIDI Keyboard	0	0	1	0	1
Control technology	0	0	1	0	1
Mobile Classroom	0	0	0	0	0

Primary teachers reported having access to some computers both in the classroom and in a resource room (Table 3). Of the 5 primary schools, three reported having a computer room/lab. ICT equipment/peripherals such as printers, digital cameras and video cameras were generally available in a shared space (e.g., computer lab/resource room).

All participating **post-primary** school teachers reported having access to computer labs with broadband connectivity in their school. Fifteen teachers reported the permanent availability of a data projector in the ICT labs. However, over half of the teachers who responded, reported having inadequate access to ICT labs. In these cases ICT labs were usually timetabled for 'computer classes', LCA, LCVP and Transition Year students.

It was noteworthy that the majority of post-primary teachers did not have access to ICT in their classrooms for their subject. Those teachers who reported having access to ICT resources in specialist rooms taught science, technology subjects, art, music, languages and learning support. Teachers also reported that data projectors, laptops and digital cameras were available to borrow from the storeroom and ICT lab, but over half of teachers reported they did not use these because of set up time in the classroom.

It is interesting to note the difference between primary and post-primary schools in relation to location of equipment. All of the primary teachers had access to at least one computer and broadband connection in the classroom, while in the majority of post-primary schools computers were located in labs or specialist rooms.

How did teachers rate their levels of access to ICT resources?

Teachers were asked to rate their satisfaction with the ICT resources currently available to them. Primary teachers expressed dissatisfaction with the number of computers available and the age and quality of these. Post-primary teachers most frequently reported dissatisfaction with access to the ICT lab and the lack of subject specific software. Teacher responses are summarised in Tables 5 and 6 on the next page.

Table 5. Access to ICT: Primary schools

Elements of ICT access	Rating				
	Not Available	Minimal	Adequate	Good	Excellent
Location of equipment	0	1	10	3	5
Number of computers	0	10	3	4	2
Availability of technical support	4	5	4	2	4
ICT for teacher planning	1	2	5	7	4
ICT for teaching	1	4	6	6	2
Reliability of equipment	0	6	8	4	1
Reliability of broadband connection	0	4	6	6	3
Appropriate Software	0	2	6	10	1

Table 6. Access to ICT: Post-primary schools

Elements of ICT Access	Rating				
	Not Available	Minimal	Adequate	Good	Excellent
ICT Lab	2	11	4	2	2
Fixed computer and data projector	0	5	10	4	2
Laptop	8	2	3	5	2
Data projector	7	2	3	6	3
Digital camera	4	2	5	5	5
Technical support	4	5	6	4	2
Subject software	10	1	3	5	2

What were teachers' perceived strengths with ICT?

Teachers were asked to describe their current strengths or successes in relation to ICT use in the classroom. The questions are available in Appendix 5b. Teacher rankings of areas of greatest strength in order of frequency are presented in Tables 7 and 8.

Table 7. Success using ICT: Primary teachers

Strengths	Rating	Strengths	Rating
Accessing resources	17	Project work	9
Digital camera	16	Software: drill and practice	9
Preparing lessons	10	Digital video	3
Email	10	Presentations	3

Table 8. Success using ICT: Post-primary teachers

Strengths	Rating	Strengths	Rating
Preparing lessons	18	Presentations	8
Accessing resources	14	Teaching ICT skills	6
Project work	9	Engaging students	5

There were similarities in the strengths teachers reported with ICT at primary and post-primary levels. Using ICT to prepare lessons and access resources, were reported as strengths across both groups of teachers. Across both cohorts of teachers, reported strengths focused more on lesson preparation (professional use of ICT) than classroom use with students (pedagogical use).

Some minor differences are evident across the two groups. For example, more post-primary teachers reported success with *presenting to a class* than primary teachers. Primary teachers identified use of the digital camera as a success, while it wasn't mentioned by post-primary teachers in this context. Two successes noted by post-primary teachers—*teaching ICT skills* and *engaging students*—were not mentioned by primary teachers.

Findings suggest that teachers' requirements for support in using ICT span the breadth of their professional and pedagogical practice with greater success reported by teachers for professional rather than classroom use of ICT.

What areas did teachers' prioritise for ICT support?

Teachers were asked to identify the areas in which they needed greatest support in their use of ICT in the classroom. Teacher priorities for ICT support are presented in Tables 9 and 10.

Table 9. Priorities for ICT support: Primary teachers

Priorities	Rating	Priorities	Rating
Presentations	11	Digital camera	6
Digital video	10	Email	2
Image Editing	9	Internet: finding resources	1
Data Projector	8	Digital camera	0
Interactive Whiteboard	8		

Table 10. Priorities for ICT support: Post-primary teachers

Priorities	Rating	Priorities	Rating
Subject-specific software	21	Digital video	7
Creating resources	18	Image editing	7
Internet: finding resources	12	Interactive whiteboard	6
Digital camera	10	Technical uses	6
Multimedia authoring	10	Data projector	5
Collaborative projects	8	Video editing	5
ICT communication tools	7	Basic ICT skills	3

There is a marked difference in the support requirements identified by primary and post-primary teachers. It is interesting to note that no primary teachers expressed a need for support in finding educational resources on the Internet, compared with 12 teachers at post-primary level. Post–primary teachers also expressed an interest in subject-related software unlike their primary colleagues. In general, primary teachers' requests for support represent more open-ended uses of ICT e.g., use of images and digital video to support learning.

These findings would suggest that generic skills-based courses may be of limited use to teachers. It is clear that these teachers, representing different levels and different subjects, have different needs and requirements for support directly related to their teaching role.

How were teachers using ICT in curriculum and assessment when the initiative began?

Teachers were asked to describe their own use of ICT in the classroom at the beginning of the initiative.

Primary teachers reported using ICT to

- support group and class work depending on the subject
- make signs and notices
- help children type their news and insert/create images
- reinforce or extend work completed with the whole class
- research topics (e.g. finding information and/or images)

Teachers also reported on the types of ICT resources they used including

- software programmes to aid phonics and specific maths areas
- talking books and interactive reading schemes for literacy.

Post-primary teachers reported that they used ICT in class to

- present and demonstrate curriculum material
- allow students to undertake research on the Internet
- help students prepare and present project work for school/state examination
- promote active problem solving

Six of the 21 post-primary teachers reported that they taught ICT as a subject. Five teachers reported that they never used ICT in the class prior to involvement in the ICT Framework initiative.

The purpose of the context evaluation was to gain a picture of the participating schools and teachers' use of ICT prior to the initiative. While there was significant difference in the levels of infrastructure between schools, the difference between primary and post-primary schools' access to and use of ICT is also noteworthy.

ICT equipment in post-primary schools was generally located in labs which were timetabled for certain subjects and not available for others. Teachers reported using ICT in the classroom to present to the class, with very little student-use of ICT reported. Use of ICT in computer labs generally focused on ICT skills based lessons.

In primary school teachers reported having access to computers and broadband connectivity in their classrooms. While at times they expressed dissatisfaction with the age and quality of these resources, they reported using ICT for a range of activities including searching for resources, for drill and practice, word processing and paint and draw activities. In contrast to their post-primary counterparts, primary teachers reported active engagement of students with ICT.

It's reasonable to suggest that across both groups of teachers, the uses of ICT reported do not adequately reflect the breadth or depth of ICT use envisaged in the ICT Framework.

Implementation of the initiative

Formative Evaluation

This sub-section captures teachers' experiences using and reviewing the draft ICT Framework within their classes. This information was gathered from feedback forms and discussions with teachers. Information was also gathered from teacher commentary provided on lesson templates throughout the initiative. The lesson template is available in Appendix 5a; feedback forms and questions on usability and feasibility are in Appendix 5b, 5c and 5d respectively.

This section presents teachers' responses under the following areas

- ICT Framework: Profile of use
- Accessibility of ICT Framework
- Usability of ICT Framework
- Feasibility of ICT Framework

ICT Framework: Profile of use

This section identifies the areas and levels of the Framework which teachers used and their reasons why.

How did teachers use the Framework?

All primary and post-primary teachers involved in the initiative completed lessons and projects using the ICT Framework. The activities comprised a number of sub-lessons and typically took place over a number of weeks. Most teachers began this work by identifying a particular curriculum activity and exploring opportunities for ICT to support that activity. The most frequently reported use of ICT in **primary** schools was in the curriculum subject, English with particular reference to developing children's oral language and reading skills. Teachers also reported that the ICT Framework provided opportunities for cross curricular work especially in Social Environmental and Scientific Education (SESE) History, SESE Geography, Drama and Visual Arts.

Teachers reported a change in the way they used ICT in curriculum and assessment when they began to work with the ICT Framework. The majority of teachers working with the junior **primary** classes reported using ICT equipment (e.g., digital camera) to design open-ended learning activities with ICT. Teachers noted that these activities contrasted with their focus on drill and practice software and more limited uses of ICT, prior to this initiative.

Which areas of the Framework did teachers use?

The ICT Framework is presented in four areas, *Foundational knowledge skills and concepts (Area F), Creating, communicating and collaborating (Area C), Thinking critically and creatively (Area T),* and *Social and personal impact of ICT (Area S).* An analysis of the lesson activities which teachers reported completing, shows that teachers used outcomes from across the four areas.

Across teachers and curriculum areas, the most frequently cited use of the Framework was Area C, *creating and communicating*. For example, two **primary** teachers who collaborated on making interactive books with their classes reported they used outcomes from Areas C, F, T and S. Most teachers also reported using outcomes from Area F, particularly *F1.demonstrate functional knowledge and skills in the use of ICT* as an intrinsic part of the lessons. **Post-primary** teachers also reported using outcomes from Area S, *Social and Personal Impact of ICT* in a general way.

Some difference emerged in the types of Framework outcomes which teachers reported using. Some teachers tended to focus on functional aims for their use of ICT, for example, *the development of specific ICT skills by pupils*. In particular, teachers who rated themselves as low prior users of ICT tended to concentrate on functional uses. For example, teachers of the junior **primary** classes most frequently reported using *F3.2 engage in safe habits when using the digital camera (e.g. strap around neck, correct grip, etc).* Other teachers reported using ICT for higher order uses such as to foster language development, communication, or collaborative learning. An analysis of the profile of participants in relation to their reported level of ICT access shows that teachers with low access reported more limited functional uses of ICT with the ICT Framework.

While starting with the curriculum was the favoured approach, a number of **post-primary** teachers expressed concerns about their ability to cover the range of learning outcomes of the ICT Framework without an overall planned approach in the school. As one teacher stated

> *… a wide range of curriculum areas were being covered, there was a fierce overlap in the ICT learning outcomes covered in our classes. Some ICT learning outcomes appeared in every activity while some ICT learning outcomes might not be addressed...there should be some way of monitoring what ICT learning outcomes are being covered. Perhaps during planning meetings, we should look at the ICT Framework and teachers from different subject areas should agree to cover certain ICT learning outcomes.*

Some **post-primary** teachers in planning to use ICT in their classes started with the ICT Framework and selected specific ICT learning outcomes that they wished to address.

Which levels of the Framework did teachers use?

The majority of teachers in **primary** schools used Level one of the Framework. Teachers also used some outcomes from Level two. The majority of teachers in **post-primary** schools initially attempted to access Level three of the ICT Framework. However, as they progressed through this initiative, many teachers considered that Level two learning outcomes (or even Level one) were more appropriate to their students' needs.

Findings showed that teachers engaged with the Framework from a variety of different starting points. Teachers identified both their previous engagement with ICT, and levels of ICT resourcing in the school environment, as key factors influencing their point of access and entry into the Framework and their use of same during the school year. It is clear that teachers' perceptions of the role and value of ICT in the curriculum—grounded in classroom experience—and their access to ICT were critical factors determining how they used ICT to support student learning.

Accessibility of ICT Framework

Teachers were asked about the accessibility of the Framework in terms of its layout, language and usefulness to teachers. The questions are included in Appendix. 5b

Was the layout and structure accessible for teachers?

Teachers welcomed the structured approach (including content areas and levels of progression) in the Framework as a useful guide to what they should be doing. One teacher commented that, *it's good to have a framework now and be able to see what I've done and check it off… to see that I know I've done that.*

Another teacher commented,

> *The ICT Framework is a great idea. It is great having a structure and an outline of what students should be doing with ICT. It will be a great help for planning the integration of ICT across the curriculum.*

One teacher commented that she found *the Framework helpful as a guide to keep 'on track', regarding objectives to be achieved.*

In most cases, teachers responded well to the structure of the ICT Framework in terms of the four areas of learning with ICT. As one teacher stated *I like the structure of the Framework in terms of the four inter-related areas. It is very coherent. I like the focus of each of the areas.*

Teachers welcomed the ICT Framework online. They expressed a desire for a readily accessible format:

> *We don't want something that will be put on a shelf and you will never look at. There are constantly things coming in to the class, and you never look at them. ….The whole idea of ICT –it should be visual.*

Was the language of the Framework accessible for teachers?

Both **primary** and **post-primary** teachers commented that the language register of the Framework might not be accessible to teachers who are **inexperienced** users of ICT.

> *The language of the Framework assumes a level of knowledge on the part of the teacher about ICT.*
>
> *It's not easy to read for most teachers. A more graphical interface with hyperlinks rather than volume of text…. Would it be better to have the Exemplar first?*
>
> *If teachers don't understand the lead-in description, they may not undertake the activity.*

Teachers reported that much ICT specific terminology (also referred to as *ICT jargon*) should be reduced, simplified and/or further explained. As one teacher noted, *there is too much jargon in the terminology.*

There was some evidence that the language may be more accessible at particular levels and for particular cohorts. This becomes obvious in the following statements:

> *I found the language very accessible, even approaching it with a slight fear of all ICT! I think all items in Level 1, which I was working from, were very clearly laid out and easy to understand and follow.*
>
> *The language was easy enough to follow though at times perhaps a little technical for teachers with little ICT experience.*

Teachers also expressed interest in having short examples to explain what was meant in each of the statements.

> *It might be more accessible if there were exemplars which illustrated how various activities and projects will develop the various skills.*

The responses to the questions on accessibility indicate that while teachers welcomed the content and the structured approach and layout of the Framework, some had difficulty with the language register.

Usability of ICT Framework

Teachers were also asked to comment on the usability of the Framework. (See questions in Appendix 5b.) Feedback was recorded at teacher workshops, from teacher's written responses and via online survey. The responses are grouped in relation to teacher comment on the appropriateness of, and the scope of, the content of the Framework, and the support it provided teachers in planning for integration of ICT across the curriculum.

Was the content of the Framework appropriate?

The content and depth of the Framework were welcomed by teachers. Teachers commented favourably on the principles guiding the Framework, e.g., *it is important to know that it [the Framework] is supported by a strong foundation.*

Teachers also spoke about the Framework as a support to the curriculum. As one teacher stated:

> *The Framework cuts across a range of curriculum subjects. My lesson on the snowman was really simple but it covered so much of the curriculum – music, feelings in SPHE, movement in PE and dancing, oral language in English and Drama… I thought it was really useful for integration – to kind of see it really.*

Teachers also considered that the Framework covered important areas for students learning. As one teacher commented:

> *I really liked Area S, the focus on the personal and social impact of ICT. It is so important today; the learning outcomes are so relevant*

Was the content clear and comprehensive?

Teachers welcomed the Framework but made suggestions in relation to its usability for teachers.

> *It is a super framework but there's just so much in it and we already have so much to do! It may discourage teachers from integrating ICT into general subjects if they see it as huge big thing with a meaty document to go with it.*

Teachers sought greater clarification or direction in relation to the use of the outcomes and the explanatory examples. Introductory statements guiding teacher use of the Framework outcomes and explaining whether they were mandatory or suggested would be welcomed by teachers.

> *We need to make clear that the ideas and examples are suggestions, it is not exhaustive, it is there to explain what is meant, not that you have to do them all.*

> *The statements are general and broad enough but may be losing the clarity of what is involved- what exactly you have to do.*

Post-primary teachers noted that some of the level three outcomes might be too technical. As one teacher commented

> *There is too much emphasis on technical issues in the Framework, 'using different operating systems', 'upgrading software' and there's too much technical jargon, 'undertaking Boolean searches' etc . . .Too technical!*

Teachers also questioned the expectations in the outcomes in some of the levels.

> *Is there too much for primary? There is life after. Could we be expecting too much for this level?*

> *Is there any way of grading where the examples are at?*

Was the Framework useful as a planning support?

Teachers commented on the support the ICT Framework provided in planning for the integration of ICT across the curriculum. As one teacher commented

> *The ICT Framework is a great idea. It is great having a structure and an outline of what students should be doing with ICT. It will be a great help for planning the integration of ICT across the curriculum.*

Another teacher commented:

> *Looking at the ICT Framework has made me really think about my teaching methodologies. ICT provides great opportunities on how I present things to students. More importantly, I see great potential in providing more active experiences for my students. Planning will be important though, 40 minute classes are very short.*

Another teacher reported on its usefulness for planning collaboratively with colleagues, saying:

> *I really found it useful planning with another teacher so that we planned the two projects together*.

One teacher commented on the benefits of *having specific projects in which I wanted to use ICT and then using the framework to identify the skills and concepts being developed.*

Teachers also made some recommendations to support teachers' planning.

> *For widespread adoption, a format that is going to be quick and easy to use to select the different learning outcomes must be developed. This should be template driven to make it easier for teachers.*

Teacher responses to the questions on usability of the Framework indicate positive support for the quality of the content. They also welcomed the Framework as a planning support, to keep on track in relation to what they should be doing.

Teachers also indicated that in some cases the expectations of student outcomes might be too high. Post-primary teachers also pointed to the need for clarity concerning the components of the Framework which each was responsible for, in the context of their own subject.

Feasibility of ICT Framework

Teachers were asked to comment on the feasibility of the ICT Framework in their own classroom contexts. Findings in this section draw on teacher surveys and feedback and discussion at teacher workshops in February and May. Findings are organised according to two key questions. The first concerns *constraints* or impediments to using the Framework experienced by teachers. The second focuses on *supports* which teachers experienced in using the Framework.

Were there any constraints in teachers' use of the Framework?

Both **primary** and **post-primary** teachers highlighted a number of constraints in their use of the ICT Framework. In order of frequency of response these were

- Lack of access to ICT and availability of sufficient ICT resources
- Issues with quality, reliability and age of ICT equipment
- Absence of technical support
- Lack of time
- Inadequate Teacher Professional Development
- Lack of clarity on the status of the ICT Framework

While all teachers shared concerns on these issues, differences emerged. **Primary** teachers' concerns focused on equipment and resources, and practical supports for implementing the Framework. **Post-primary** teachers concerns related to the feasibility of including ICT in current curriculum and examination structures. The issues emerging are described in detail below.

1. Lack of access to ICT and poor availability of sufficient ICT resources

Both primary and post-primary teachers cited issues with access to technology as a major hindrance in their use of the Framework with their classes. As described in the context section, most primary teachers had at least one computer in the classroom, while post-primary teachers generally reported accessing technology at timetabled periods in computer labs.

Primary teachers reported that their own access to ICT resources was the greatest challenge and it limited their use of the ICT Framework. As one teacher remarked

> *The one-computer classroom is a challenge: you must organise a rota of students.*

Another cited *the lack of resources in the school and available to me* as the greatest problem.

Primary teachers also noted that lack of regular access to ICT was a barrier to the development of the outcomes described in the Framework. One teacher stated, *there needs to be a recognition that the skills being developed will depend on the level of ICT equipment available to the teacher on a daily basis.* Some primary teachers noted school factors in relation to organisation and use of equipment by different classes as a hindrance, e.g., *there is a difficulty with access to the technology. We need to organise things better in the school so that all have access to technology.* …..

Some **post-primary** teachers argued that teachers' should not have to share such basic and essential equipment, e.g., *teachers require personal access to ICT resources at home and at school, for planning, preparing and professional development. Some type of a laptop for teachers' scheme should be put in place.* It's of note that School L (for which a high level of ICT use was reported in the context evaluation) recommended that all teaching staff should have access to laptops following from their own experience:

> *Four years ago, all of our staff invested in notebooks [at reduced cost]. This is by far the most significant and revolutionary thing that has happened for us. If the government is serious about ICT in schools, the very first thing, the most fundamental thing to be done, is to get the technology into teachers' hands. It's easy to motivate the learners when the educators are motivated themselves.*

Similarly, **post-primary** teachers spoke about access to the computer room for certain classes.

> *The ICT Room is almost fully timetabled for 'Computer Classes', it is very difficult to gain access for other subjects*

> *There are generally no computers in the classroom, going to the computer room is very often not worth the hassle, especially when you are not guaranteed that everything will be working*

Teachers also commented on the lack of subject-specific curriculum resources. As one **post-primary** teacher explained, *I teach art, I would really like to have good art packages available to me, for example painting, animation, imaging editing, video editing, graphic design etc.*

2. Issues with quality, reliability and age of ICT equipment

Teachers reported problems using the ICT Framework due to lack of equipment, or due to equipment which was unreliable or out of date. This was especially noted by the **primary** teachers, e.g., *the old computers won't take a memory stick or a printer, so you are very limited in what you can do…* As one teacher explained:

> *The machines in my class are too old, they don't have a USB drive. So I was going around after school with a floppy disc to move the children's writing from each computer to the new one…. and then that doesn't have a floppy drive! So we can't print their work or do anything with it!!*

Teachers in all twelve schools identified the absence of upgrading and maintenance of equipment as an impediment to using the ICT Framework. As one teacher explained, *we have a mixture of dinosaur computers, about 11 or 12 are in working order but old, running Windows 98. You can't run some software on them.* Another teacher commented

> *I was trying to load up Norton antivirus on some of the computers, but they didn't have enough memory. (Windows 98) So I had to say to those teachers, you can't use the internet in your class. They have broadband, but they can't go on the internet!*

3. Absence of technical support

Teachers cited the absence of technical support and the cost of repairs and maintenance of ICT equipment as significant barriers to their use of the ICT Framework. *Unavailability/breakdown of equipment* was cited frequently. In one school a teacher reported that, *last year we had a bill for € 18,000 for a computer technician… We don't have the money to ring and get a technician in who is charging €80 an hour to fix it.*

Additionally teachers reported regular technical failures with ICT. In the words of one teacher, breakdown of IT equipment (video camera and data projector in particular) and not knowing how to fix the problem, it drove us all mad! It is worth noting that in School L (high level of ICT use), maintainance of ICT equipment was described as a key priority by the school:

> *Our initial priority was to get a maintenance system in place that would work. This is a nettle that has never been grasped in any school. There's not enough expertise out there about 'how to'. Schools are being fleeced. They're being resold and resold solutions where a national system for this could save a lot of pain. We've just hired a systems engineer to do this [maintain ICT equipment]. I was doing this job up till now. The school is privately funding him.*

4. Lack of time

Teachers reported that using ICT required additional time and effort both in terms of planning, set up and classroom management routines. As one **primary** teacher commented, *the major thing is the time. The learning we have to do, setting up the digital projector, breakdowns etc. It puts people off.*

Teachers reported on difficulties with organisation and time. Typical comments included

> *It was very time consuming working with each small group to model and supervise techniques, having only 3 computers at any 1 time.*
>
> *It was difficult to do with whole class and therefore I decided to do it in small groups which worked more effectively.*

Teachers identified issues with classroom management citing *difficulties of maintaining the rota/timetable as originally organised* and the additional workload in using ICT. One teacher found that *doing a number of other lessons involving the use of ICT proved to be overwhelming* and remarked that *in future I will space out ICT projects!*

Post-primary teachers had additional concerns about the challenges presented by current timetabling structures, where most class periods are approximately 40 minutes long. There is limited or no scheduled time allocated for planning or co-ordination. As one teacher stated

> *No time to plan or share ideas, 40 minute classes, along with access difficulties to ICT resources, no recognition of ICT, overloaded subject syllabuses. This makes you ask the questions, 'Is it worth it?', 'Can we justify the time?'*

5. Lack of Teacher Professional Development

A majority of teachers identified the need for professional development as a key impediment to further integration of ICT in curriculum and assessment. As one teacher noted, *teacher confidence and ICT skills need to be greatly enhanced if the ICT Framework is to be successfully implemented.*

Both primary and post-primary teachers related this to subject professional development. One **primary** teacher commented that, *people who haven't much background would need a guide, for example, 'How would I teach through ICT, what would I do if I wanted to do ICT in English. How would this work?'*

Post-primary teachers also requested *in particular, professional development related to the use of ICT in your own subject areas.*

While welcoming the ICT Framework for students, many teachers noted that it highlighted their own needs. As one teacher noted, *the ICT Framework is focused on students and not teachers. We need an ICT Framework for teachers first. Outlining what the teachers should be able to do.*

6. Lack of clarity on the status of the ICT Framework

Both primary and post-primary teachers questioned the status of the ICT Framework viz-a-viz curriculum subjects and approaches to assessment. Some differences emerged in relation to teachers' concerns, across the two groups of teachers.

Primary teachers acknowledged that ICT should be included in curriculum (consistent with the role for ICT outlined in the *Primary School Curriculum*, 1999). Some teachers identified ICT as a right and entitlement for all students. As one teacher stated:

> *At the moment a teacher could do all of this or nothing… It is a big disadvantage for children now not to have exposure to ICT in school. Some are going through the system without any ICT at all because it is not requirement on a teacher to do it. It should be required for all.*

One teacher expressed the view that

> *It is very valid to teach ICT as a stand alone subject. It is like language, it is a tool. It is a very important tool, like language, which you can use to do other things later on.*

Teachers expressed concerns in relation to the detailed description of outcomes within the Framework, and whether this implied that ICT would now be viewed as a subject in its own right. In the words of one teacher, *will it be an obligation that all children are expected to know this by the end of primary school?*

During the initiative, the NCCA Education Officers continually emphasised the role of the ICT Framework as a cross-curricular tool—a scaffold—for ICT in curriculum and assessment, and not an additional curriculum area or a syllabus. The Education Officers explained that the ICT Framework was developed to support teachers in planning and providing opportunities for students to develop their ICT literacy across the curriculum and that teaching ICT solely as a stand alone subject would not achieve this vision. Teachers' concerns about the amount of content within the Framework

shifted focus to the lack of time provided for curriculum planning at school and classroom levels.

Some **primary** teachers also expressed confusion over whether to use the Framework as a *planning* tool or as a *reflective* tool to codify *what you had done*. At the same time, teachers were fearful of the additional workload involved. One teacher remarked, *this can be daunting, where do you start? A lot of examples are needed. Where do you start if you have third class, for example?*

Post-primary teachers considered that including/referencing ICT learning outcomes within subject syllabuses would *illustrate the appropriate uses of ICT within subjects and at the same time would give status and recognition to the use of ICT*. One history teacher commented

> *There is too much content in Junior Certificate and Leaving Certificate subject syllabuses. The amount of content should be cut down to provide more room for skills development. For example, information processing, using ICT. This is not just for the sake of using ICT but because using ICT adds value to the subject, it's a life skill; it's how things are done today.*

The lack of recognition of ICT use for the purposes of state examinations was articulated as a significant issue by **post-primary** teachers, with comments such as, *unless the ICT learning outcomes are in some way valued in the state examinations, teachers will not use ICT in the classroom.*

In particular, **post-primary teachers** raised the issue of the recognition of ICT use for second assessment components in the state examinations. As one teacher commented:

> *I saw great opportunities for students using ICT in their Geographical Investigation- for research, recording, gathering, analysing and interpreting results and in preparing the report. Needless to say, I, and the students were devastated when the circular arrived stating that the report for the geographical investigation had to be handwritten. The photographs taken by students on their fieldtrip, the graphs they had generated using a spreadsheet and the report they had commenced typing up would not be allowed!*

Were there any supports for teachers' use of the Framework?

Teachers highlighted the value of the supports provided by NCCA during the initiative. ICT equipment was cited as a key resource. A list of ICT equipment provided to participating schools is listed in Appendix 3. The following is a typical teacher-response to the equipment provided to schools, *without doubt, the best inspiration for trying out different parts of the Framework was having ready access to equipment, e.g. digital camera, video camera, laptop computer in classroom.*

Teachers also welcomed participation in the workshops, which provided an opportunity for them to work with colleagues in their own school as well as teachers in other schools, local ICT Advisors, and NCCA Education Officers. As one teacher noted:

> *The arrival of new equipment and attendance at the workshop were of great motivational value. They encouraged me to find the time to make use of ICT and to develop my own skills and confidence with it.*
>
> *I found that the ICT seminars (workshops) gave me a clearer understanding in ways to which I can apply ICT to my teaching. Before the seminars I thought that my class wouldn't be even capable of closing files, or using the mouse or even finding the location of keys however the Framework gave me an understanding of simple processes I could use in teaching my class. A lot of my students now have an understanding of how to exit files and log off.*

Teachers also welcomed the resources provided by NCCA for the ICT Framework including the structured lesson templates. As one teacher noted, *the lesson template that I used contained the exact areas of the Framework that I would be concentrating on so that helped a great deal.*

Finally, teachers welcomed the support provided by NCCA Education Officers during the initiative. One teacher explained, *support and ideas from our NCCA advisor… was very helpful and encouraging when I wasn't sure if I was going in the right direction with the Framework.*

The next part of this section focuses on the supports and resources which teachers identified as necessary for successful implementation of the ICT Framework in schools.

Supports and resources required

Teachers were asked about the kinds of supports and resources which would enable them to use ICT in the ways envisaged in the Framework. Teachers identified a number of key factors which would support their ongoing use of the ICT Framework.

Some factors related to changes required to the **Framework** itself (points 1-4) and are of particular interest to NCCA. Other factors related to **school and system level supports** (points 5-9). The factors are described separately below starting with the Framework supports.

How could the ICT Framework be improved by NCCA to facilitate teacher use?

1. Accessible language and the removal of ICT jargon from the ICT Framework were cited as priority measures by teachers. This issue is discussed in the previous section on usability.

2. Guidelines on the inclusion of ICT in subjects and for different classes were requested by both primary and post-primary teachers. Teachers suggested that the Framework should be *supplemented by practical advice for embedding ICT in subject areas.* Teachers suggested that these guidelines could support teachers who lacked experience using ICT in the classroom. As one teacher explained, *people who haven't much background would need a guide, for example, 100 ideas for infant teachers.* Another teacher suggested providing, *lots of examples for people who aren't sure…they really need somewhere to start.* Suggestions for such a 'guide' included, *simple steps, bullets… quick pointers… try this... like tip sheets.* Teachers concluded that *having a bank of lesson exemplars available would be very useful.* Post-primary teachers highlighted the need to *include ICT in syllabuses* as a priority.

3. An online interface to the Framework to support classroom planning was requested by many teachers. As one participant noted, *teachers need a simple way of accessing the Framework [such as] tick boxes to select targets from the Framework and from curriculum documents that will be exported to a word document or html file for printing.* Following from requests for NCCA to develop guidelines (point 2, above), teachers suggested, *electronic/online lesson plan makers [which would be] integrated*

with the curriculum and the ICT Framework. Other suggestions for presenting the Framework online included*, an interactive planner - where a teacher could click on the statements to generate a planning document.* In conclusion, teachers noted that, *it has to be easy to use!*

4. Identification of starting points for different classes was suggested especially by teachers of the junior primary classes. As one teacher noted, *if you are going to expect teachers to use ICT, you have to give them a starting point.* Teachers expressed concerns in particular about managing the great difference in the capability of children from infants to second class given that levels one (and two) at primary each encompass a four-year span. Teachers made suggestions indicating what was required including the following: *level 1 skills need to be broken down into what a child should be able to do during each of the four years - a progression in developing skills.* In addition, teachers noted that there were many ways to develop the kinds of skills envisaged in the Framework. One teacher called for, *a recognition that initially many of the skills will be developed through modelling by the teacher and through group/whole class activities rather than individual work.*

How could the school and wider system support teacher use of the Framework?

5. Teacher professional development was cited again and again by teachers as a critical support factor. As one teacher stated, *the teacher has to have skills themselves first before they can do it with the children.*

Teachers presented their ideas on the format for such professional development, noting that it should relate to both subjects and pedagogy. Primary teachers requested support on ICT specific methodologies for particular subjects. For example one teacher asked, *how would I teach through ICT… what would I do if I wanted to do ICT in English? ...how would this work?*

Post-primary teachers also reported identified the need for ICT support related specifically to their subjects. As one teacher stated

> *Years ago, I attended NCTE Phase 1 and Phase 2 ICT courses. While they were good, the courses in no way related to what I am doing in class. So I did not apply anything I learned. I recently attended a course specifically for Geography teachers. We used some of the same software as we did in the*

> *other courses, Word, Powerpoint etc but this time in the context of Geography. We also looked at geography resources on the net and we got a taste of GIS software. I am already using what I learned in class.*

Teachers also spoke about the need for professional learning and in–school supports. Based on their use of the Framework working with a team of colleagues, teachers spoke about the value of the collaborative approach to their learning. In the words of one teacher, *I learned to use the projector, and the video camera. I was shown how to use it by other teachers in the school.* Similarly, another teacher explained:

> I *really found it useful planning with another teacher so that we planned the two projects together. We had different lessons but we had the same planning base. So the Infant lessons had some progression and sequence from Junior to Senior.*

Teachers expressed an interest in support for specific classroom management issues such as how to set up ICT in a timely and effective fashion and how to manage group learning with ICT. Teachers noted that, *it was time consuming when setting up the over head projector and often I had to abandon it.* In addition, planning for all students to use ICT proved difficult, in the words of one teacher, *some pupils wanted to do everything. It was difficult to do with the whole class and therefore I decided to do it in small groups which worked more effectively.*

6. ICT resources to support teaching and learning were identified as essential to implementation of the ICT Framework. This issue is documented fully in the feasibility section under the heading, lack of access to ICT equipment and availability of ICT resources. Teachers made suggestions regarding the types of equipment which they found most useful in this initiative. For example, one teacher suggested that*, the data projector is a key piece of technology – particularly with Junior students as the teacher can guide the students collaboratively, develop communication skills.*

Teachers also had very definite ideas on the added value or potential of certain ICT equipment to support teaching and learning. As one teacher explained:

> *Whiteboards would be very useful in order to visually engage the students. At the moment, the Teacher does a very useful exercise like brainstorming, and then have to erase it: with the whiteboard this 'good work' could be retained and reviewed.*

Teachers suggested looking at other existing models of support that seemed to work effectively. One teacher explained:

> *They really appear to have got it right with the introduction of the [new and revised] technology subjects at Leaving Certificate in terms of ICT. Sufficient funding to provide 1:1 computer access for students taking Design and Communication Graphics, funding for additional resources such as data projectors, printers, funding which may be used for provision of computers for teachers. The same software being provided to all schools in the country pre-installed on the computers, with licenses for teachers and students… technical support and a comprehensive teacher professional development programme…*

Teachers also wanted more specific support in relation to curriculum and subject software.

> *It would be great if we had a suggested list of software we should use for different subject areas. For example, I teach Music. I know there is a variety of music software out there for composition and scoring but I am not quite sure what to buy.*

7. Technical support was highlighted by all teachers as a vital support. This item is described fully in the preceding section on feasibility. As one teacher noted, *access to equipment and technical support are essential. Without these, all the planning in the world is pointless.* In addition teachers made suggestions on the type and focus of this support, e.g., *I'm suggesting something like the broadband help desk should be put in place at National level. The problems I encounter will be replicated by many teachers in other schools.*

8. School leadership was highlighted by teachers as an important support in integrating ICT. Teachers were very aware of the importance of a school culture promoting ICT for teaching and learning. As one teacher noted, *leadership within the school is so important. Our principal is right behind us in this.* Another teacher explained,

> *Our principal is very supportive… She was delighted for us to participate in this initiative. She has told us if we need any additional resources to support the project, she will do her best to provide them.*

9. The role of ICT in assessment and examinations has been discussed to some extent earlier in this section. Post-primary teachers suggested that acceptance and endorsement of the use of ICT in the preparation and presentation of second assessment components for state examination purposes would be key to successfully embedding a culture of ICT use at second level. As one teacher explained:

> *The students really love using ICT, their work looks so good. They are very proud of it. The JCSP [Junior Certificate Schools Programme] students use it a*

> *lot preparing their ESS [Environmental and Social Studies] projects. It is allowed. Students should be allowed use ICT in all project work for examinations. It's crazy the way it is, in this day and age- filling out booklets, where is the opportunity to draft and redraft and improve.*

Across the data concerning the feasibility of the ICT Framework in schools, it's clear that the biggest issue for teachers in this initiative focused on lack of access to *adequate, reliable* equipment and resources and the absence of technical support.

Teachers' comments showed they had difficulty connecting the Framework to particular subjects, and they sought direction on how to approach this. As the initiative progressed it was clear that teachers had a growing awareness of the need to enhance their own professional development in the use of ICT in teaching and learning and they had a greater understanding of the type of professional development they needed.

Thus, absence of dedicated, focused professional development, and adequate time to engage in local planning for ICT in curriculum and assessment, were described as key impediments to successful implementation of the ICT Framework. Classroom organisation and timetabling issues also emerged as significant barriers to ICT use, with lack of time for 'set-up' as a major drawback.

At post-primary level, teachers identified recognition of ICT use in state examinations as critical to it's adoption in curriculum and classroom assessment.

It is clear from the strength of teacher commentary throughout these responses on feasibility that the teacher use of the Framework was contingent on the level of support provided within their school (e.g., leadership), and the level of support from outside the school (e.g., ICT equipment, dedicated workshops and advice and direction from NCTE ICT Advisors and NCCA Education Officers.

Post-implementation

This sub-section describes the outputs, outcomes and impacts of the initiative. Information was gathered from principals, from teachers at school visits and workshops and from teacher commentary provided on the lesson templates used by teachers throughout the initiative. Teachers completed lesson templates describing the ICT activities they engaged in with their classes. They used these as both a record and a reflection tool to evaluate their experience with the Framework. The lesson template is available in Appendix 5a, and questions on feasibility are in Appendix 5c. The overview of outcome evaluation questions is in Appendix 6.

Outcome evaluation

Teachers described their successes, challenges and priorities in their use of the ICT Framework with their classes. Using the lesson templates provided, teachers documented each lesson or activity using ICT describing the outcomes, the highs, the lows and the things they would do differently. The lesson template is available in Appendix 5a.

Outcomes and impacts

Teachers reported a number of successes based on their engagement with the ICT Framework. These are described under two headings – benefits for students' learning and benefits for teachers.

What were the outcomes for students?

In the discussion paper, *Curriculum, Assessment and ICT in the Irish Context*, 2004, NCCA identified a number of principles of learning with ICT. These principles provided the foundation for the development of the ICT Framework. The principles state that ICT is most effective with students when it supports

- active involvement in learning
- development of higher order thinking skills
- learning in authentic environments
- interest and engagement in learning
- differentiated learning

- collaborative learning
- assessment of and for learning

An analysis of teacher responses, using the principles of learning with ICT serves two purposes. Firstly, it enables us to assess the value of the Framework in supporting Council's vision for ICT in curriculum and assessment. Secondly it provides an opportunity for looking for practical application of Council's vision in the reported classroom experiences for teachers and students.

Does the Framework support active involvement in learning?

An analysis of data collected from teachers indicates that they reported using more active learning methods when they used the Framework. A number of teachers noted the changing dynamic between the teacher and the students and amongst students themselves resulting from the use of ICT in the classroom. One teacher stated:

> *I would provide further opportunities for peer teaching as this really worked well with the small number of computers and the digital camera while at the same time providing brilliant opportunities for developing co-operation skills, taking turns etc. I feel the children benefited a lot from this approach.*

Another teacher reported:

> *The students knew much more than I did when it came to using ICT. One student in particular was very good, so she taught me and the rest of the class how to use the digital video camera, the internal webcam on the laptop etc. It was great for her confidence and created a fantastic atmosphere in the class.*

An example of this active learning is well described by two teachers of junior and senior infant classes who worked with the children to create movies of their stories using play toys. The children created stories and mini dramas using their toys as characters. They collected items from home and the classroom as props. The teachers spoke about the children using a combination of imaginative play and their real life experiences. For example, in one story *A trip to Belfast*, the children used their toy cars, train, and dolls, and narrated the dialogue based on a day out with their parents.

Does the Framework support the development of higher order thinking skills?

None of the respondents directly mentioned higher order thinking skills in relation to students' learning with ICT in the initiative. However, an examination of the lessons and activities documented by teachers provides some insights.

For example, one teacher used the digital camera effectively to support children's understanding of seasonal change over time. The children had planted spring bulbs. They took photos of these bulbs growing at specific dates one month apart. The teacher then asked the children to compare the February photos and the March photos and to document what had changed, and why they were different. Seven year old children as in this class usually cannot recall what environmental phenomena were like in a previous month, as their concept of the passage of time and the seasons has not yet fully developed. The teacher felt that the use of the artefact of the photo in this activity helped to develop the children's understanding of the concept of growth and changes over time.

Does the Framework support learning in authentic environments?

Teachers reported doing activities and lessons with their classes which involved the students engaging with real world resources or issues. Teachers also reported organising lessons and activities which involved the students' learning in the environment and recording and communicating this learning using ICT.

For example, one teacher of first class wanted to focus on inclusion and to reinforce the children's learning of the safe cross code. She took the children on a walk outside where they recorded photographs of the crossing points, the different traffic signals and the safe places to cross using the digital camera. Back in the classroom, the children aided by the teacher made an interactive book 'Bi slán' using the photos, and recording the children's voices to reinforce their learning of the safety code.

Another teacher used ICT with junior infants to *observe, discuss and identify a variety of animals in different habitats in the immediate environment*, an objective of the SESE: Science curriculum.

> *The children enjoyed working in pairs, using the camcorder and creating their bug book. They got used to being quiet on the set when a recording was being made and enjoyed taking turns being the director, cameraman or sound engineer.*

Does the Framework support differentiated learning?

Teachers reported benefits for different cohorts of learners including young children and those with special educational needs. Several teachers recorded '*to support special educational needs'* as one of the purposes for the use of ICT on their lesson

templates. One teacher mentioned the motivational effect of ICT use for students with special educational needs. Another teacher stated

> *I am a learning support teacher. I use ICT a lot in my classroom. The students love preparing their work using ICT, it looks much better, they can correct mistakes. It is very motivational. They are proud of their work.*

Other teachers noticed these benefit after the fact rather than in as a planned approach.

> *There is a lot of incidental learning. Young children learn a lot by observing the teacher use ICT as part of the life of the classroom…….It can be great for children with particular needs. ….Children are at different stages of readiness*.

Teachers also reported how ICT helped them to explain concepts or 'how to do something' with the whole class, e.g., *I showed children using the data projector how to do some of the reinforcement activities.*

Does the Framework support interest and engagement in learning?

Teachers noted that the students were motivated by using ICT in their learning. As one teacher noted, *the students really love using ICT, their work looks so good. They are very proud of it. The JCSP students use it a lot preparing their ESS projects.* Another teacher explained that, *motivation for children was a high point. I printed out doubles of everything, so they could take them home. The children were so proud of what they did. They told their parents about it.*

Teachers noted students' increasing competence and confidence with ICT during the initiative, e.g., *they were very interested in using the digital camera and began to become competent and confident in using it surprisingly quickly.*

Teachers identified positive benefits in relation to students' engagement in learning also. One teacher noted that, *children paid more attention and were enthusiastic to participate.*

Some teachers linked students' engagement with a reduction in classroom mis-behaviour, e.g., *there is greater engagement from pupils - fewer behavioural problems. Children absolutely love the computer, their eyes light up when they see it.*

Some teachers cited cognitive gains for students using ICT, *e.g., [using] ICT reinforced the children's learning and children gained a better understanding through being actively engaged.*

Does the Framework support collaborative learning?

Teachers noted increased opportunities for collaboration when using ICT in the class. Teachers spoke about *older and younger children working together* and *children's real interest and enthusiasm when using ICT. Pupil's pride in their work, showing it off to their peers and reading and praising each others work!*

Another teacher commented on benefits for cooperative learning skills.

> *..when using the teaching approach of small group and pairs using the computers and laptop to write about the project provided a great opportunity for co-operative learning as the older children in 2nd class and those with a high competence in ICT were able to help others*

Does the Framework support assessment of and for learning?

Teachers cited the use of the Framework as a guide to documenting and reflecting on their lessons, and on the students' learning. In this way, it was a useful support for assessment of learning.

In many of the sample lessons described by teachers, they were incorporating many or all of the principles guiding the ICT Framework. For example, a teacher who wanted to focus on co-operative work and turn taking in the class also incorporated learning in the environment, and authentic learning in a project on the weather. The children created simple weather recording equipment. They used the digital camera to record the process of making the equipment, using the equipment and also to record and observe the varying weather conditions. They created an electronic weather log of daily weather changes.

Examples such as this one highlight the potential of the Framework to support innovative teaching and learning in classrooms. What is worth noting is the vital role of the teacher in understanding the potential of the technology to support this learning, and their willingness and ability to set up these learning environments. Of further significance is the fact that they saw the additional support and equipment provided as an essential resource for those environments.

What were the outcomes for teachers?

Teachers reported benefits for their own learning as well as for their students. Teachers reported that the access to technology provided in this initiative was critical to its success. As one teacher noted, *it [access to computers] has taken away the scariness*.

Participating teachers represented a range of ICT experiences and competencies. All reported increasing competence and confidence in their use of ICT in curriculum and assessment, during the initiative. As one teacher explained, *teachers can underestimate what they do. You do not have to do complex things. Pace yourself. You need to build your own comfort zone first.*

Teachers noted their increased commitment to using ICT to support teaching and learning, as the initiative progressed. As one teacher explained, *using the new camera, there was a lot of trial and error. Learning to persist at things is important for us and the children too.*

Teachers also reported supporting each other's learning through sharing and collaborating. As one teacher noted, other teachers asked me questions so I showed them how to use the projector. There is a long term benefit that can spread within the school. Similarly, another teacher added, *it got the other teachers interested [my lesson with the ICT Framework]. I had other teachers asking me to help… to walk them through it.*

Teachers also reported that they found the sharing of ideas most beneficial, for example *talking to the other teachers involved in the project about what they were doing.* Another teacher reported

> *I teach French and Irish. I was delighted to be asked to participate in this initiative, as I really believe in using ICT to support teaching and learning. I got great ideas from the people involved, particularly on using the Internet to access up to date news and resources of interest to students, and to using email, web cam, instant messaging and Skype.*

What were the impacts of the initiative on teachers and students?

Teachers considered that they had developed their own skills and had started to think more about their own pedagogy and how they could use ICT in the classroom.

Teachers reported that participation in the initiative made them think about how ICT might be used to support teaching and learning in their subject areas and in some cases resulted in them using ICT equipment that was already in the school but was not being used.

> *I had data logging equipment for years, never used it. Data logging is mentioned in the ICT Framework. For this initiative, I pulled it out, brought it home, taught myself how to use it. It took a long time but I must say I really enjoyed using it in class. It greatly enhanced the science lessons. The lads loved it, their learning was much deeper.*

Teachers made some additional comments on priorities for the inclusion of ICT. Other teachers in the school had also started to use ICT more regularly in their classes as a result of their colleagues' involvement in the initiative. Three of the primary schools decided to expand their ICT infrastructure in the coming school year, 2007/2008 by purchasing additional interactive whiteboards.

There was also evidence that teachers were beginning to reflect in a more critical way on the rationale for the inclusion of ICT in the curriculum. Teachers expressed concerns about the growing digital divide between students who have access to ICT at home and those who do not. As one teacher commented:

> *There is substantial variation between pupils in terms of their skills and prior exposure to ICT - the quality of some pupils' research* (was) *inaccurately presented because of limited ICT skills.*

Another teacher commented on the importance of using modern day technologies to support learning in schools.

> *It really puts it up to us as teachers to use modern technologies in everyday activities in the classroom in a creative and productive way. It is about time schools were encouraged to join the 21st Century! All these things promote both written and oral communication in an environment which is authentic and highly motivational*.

Another teacher extended the share of responsibility to policymakers for making regular classroom use of ICT a reality by suggesting that

> *There's a huge opportunity here. Teachers were never as primed to adopt technology – this is what their students know and what they use and what they're familiar with. What's needed now is simply policy and political will to put the technology in schools to make it happen.*

All in all, teachers were very positive in their reports on the benefits of the ICT Framework for student learning. The support provided by NCCA and in the workshops got teachers started in reflecting on their own practice, and they developed interesting and innovative ideas for using ICT in lessons which they saw supported student learning in many ways. What is noteworthy is that through engaging in the initiative teachers actually changed their practice with ICT moving from typical previous uses which reflected an ICT skills approach, to a more curriculum and learning focused approach. With a certain amount of direction and some ideas teachers were quite quickly able to conceive of innovative uses of ICT to support their curriculum goals.

The value placed by teachers on the support of colleagues and the benefits of collaborative work in their own learning is another key point, and an indicator of the type of professional development most useful to teacher learning.

Section 3: Conclusion and recommendations

The purpose of this initiative was to inform the further development of the ICT Framework and to advise on the supports required for its successful implementation in schools. Findings presented in the preceding sections of this report point both to revisions to the ICT Framework itself, and requirements for its successful implementation in schools. These are discussed below, beginning with revisions to the Framework itself.

Revisions to the Draft ICT Framework

Following from the findings presented in the previous section of this report, the draft ICT Framework has been restructured and edited in order to make it more usable and feasible for teachers. Essentially, the structure of the Framework has been simplified. The four areas are now classified as **objectives**, as outlined in Table 11.

Table 11. ICT Framework: From Areas to Objectives

ICT Framework Areas	**ICT Framework Objectives** *The objectives of the ICT Framework are to enable teachers to support students in…*
▪ Area C: Creating, communicating and collaborating	▪ exploring the potential of ICT to create, communicate, and collaborate in organising and producing information.
▪ Area F: Foundational knowledge, skills and concepts	▪ understanding and applying knowledge of the functions of ICT including safe practice, maintenance and ergonomics.
▪ Area T: Thinking critically and creatively	▪ using ICT for thinking and learning including managing enquiry, assessing information, solving problems, and expressing ideas across a range of curriculum areas.
▪ Area S: Social and personal impact of ICT	▪ developing a critical appreciation of the role of ICT in society and habits which reflect ethical and responsible use of ICT.

The objectives for the ICT Framework have been aligned with the statement of objectives in revised syllabuses at Junior Cycle. Further detail on the components of each objective is provided in the **learning outcomes** which represent what is important

for students to know in relation to each objective. There are now fifteen outcomes within the ICT Framework (condensed from 18 outcomes at the beginning of this initiative with schools). The learning outcomes are presented in Table 12.

Table 12. ICT Framework: Learning outcomes

Area C	**Creating, communicating and collaborating**
Students should be enabled to	
C1	draft, format and revise text using ICT
C2	create, manipulate and insert information in a variety of different formats (images, sound, video) using ICT
C3	gather, organise, manipulate and analyse data using ICT
C4	communicate and collaborate locally and globally using ICT
C5	plan, design, create and present information using ICT
Area F	**Foundational knowledge, skills and concepts**
Students should be enabled to	
F1	demonstrate and apply functional knowledge and understanding of ICT
F2	develop skills for maintaining and optimising ICT
F3	understand and practice healthy and safe uses of ICT
Area T	**Thinking critically and creatively**
Students should be enabled to	
T1	research, access and retrieve information using ICT
T2	evaluate, organise and synthesise information using ICT
T3	express creativity and construct new knowledge and artefacts using ICT
T4	explore and develop problem-solving strategies using ICT
Area S	**Social and personal impact of ICT**
Students should be enabled to	
S1	demonstrate understanding and critical awareness of the contribution of ICT to the individual and to society
S2	develop independent and collaborative learning and language skills using ICT
S3	demonstrate an awareness of, and comply with, responsible and ethical use of ICT

Learning Opportunities have been outlined for the outcomes above. These sample learning activities are provided for three levels of achievement to correspond with junior classes in primary school, senior classes in primary school, and Junior Cycle. Learning

opportunities are described at these three levels to support teachers in planning upward continuity and progression in students' use of ICT for learning.

These learning opportunities are short statements of what learning would involve, or what it might look like (for each outcome and level). These are flexible rather than exhaustive. As the ICT Framework is designed to be an enabling framework for teachers and students, these learning opportunities are merely a guide to teachers and include reference to specific learning activities and resources which are further elaborated in the glossary.

Work is currently underway to present the ICT Framework in an accessible online format on the NCCA's ACTION Website. ACTION stands for *Assessment, Curriculum and Teaching Innovation on the Net* and it represents the third of the NCCA's websites (following the corporate website and the curriculum online website). The ACTION website has been designed to exemplify teaching and learning in different settings, and to encourage teachers to use this on-line environment for planning and assessing and for teaching and learning. As ACTION's name suggests, this site will concentrate on 'showing' rather than 'telling' the features of effective teaching and learning in different educational settings. The architecture for the ACTION website has been developed and initial work is available at: http://action.ncca.ie/.

In addition to publishing the ICT Framework on the ACTION website, sample activities will also be published showing the classroom application of learning outcomes in the ICT Framework. The **sample activities** will present examples from practice of effective use of ICT in curriculum and assessment across the three levels of the Framework, using multimedia including text, video and photographs. These sample activities have been developed by teachers participating in this initiative.

To extend the number of sample activities for the ICT Framework, the NCCA collaborated with the National Centre for Technology in Education (NCTE). Through this partnership, the NCTE invited primary schools who achieved the *Digital School Award* status[2] to generate additional sample activities for the ACTION website.

[2] The Digital Schools Award is an NCTE led initiative that recognises excellence in a school's approach to the integration of ICT in learning and teaching. The scheme is currently limited to

ICT Advisors acted as facilitators of the initiative within their schools for one month, beginning at the end of April 2007. The schools prepared curriculum-based sample activities and materials, referenced to the ICT Framework. A list of the 18 schools, who contributed sample lessons aligned with the Primary School Curriculum (1999) and the Draft ICT Framework (2006), is provided in Appendix 7.

Through this exploratory initiative, the NCCA has developed protocols and resources for gathering sample activities aligned with the ICT Framework. These are valuable tools for the future generation of sample activities through similar initiatives with schools—two such initiatives are underway during the current school year.

The *TeachNet Ireland* project supports teachers in developing and publishing curriculum units that demonstrate meaningful and practical integration of ICT in classroom teaching and learning.[3] All teachers involved in the TeachNet project this year will audit and review their projects against the ICT Framework. Thus the ICT Framework becomes a useful tool for teachers in planning to embed ICT within their curriculum and assessment planning. Similarly, schools in the Digital Hub will use the ICT Framework this year to assess how they are currently using ICT to support teaching and learning. Through this process, they are aiming to generate ideas on future priorities in developing their e-learning plan. In these schools the ICT Framework will be a key tool in planning how a school integrates ICT across the curriculum, and a starting point for identifying additional professional development activities for teachers.

primary schools. Further information including partners, etc. is available on the project website at: www.digitalschools.ie/

[3] TeachNet Ireland is an initiative of St Patricks College Drumcondra, run in association with the Teachers Network New York. TeachNet Ireland is predominantly funded by the Citigroup Foundation, with additional funding from the National Centre for Technology in Education, Microsoft Ireland and The Ireland Funds. The TeachNet Ireland website is available at: www.teachnet.ie

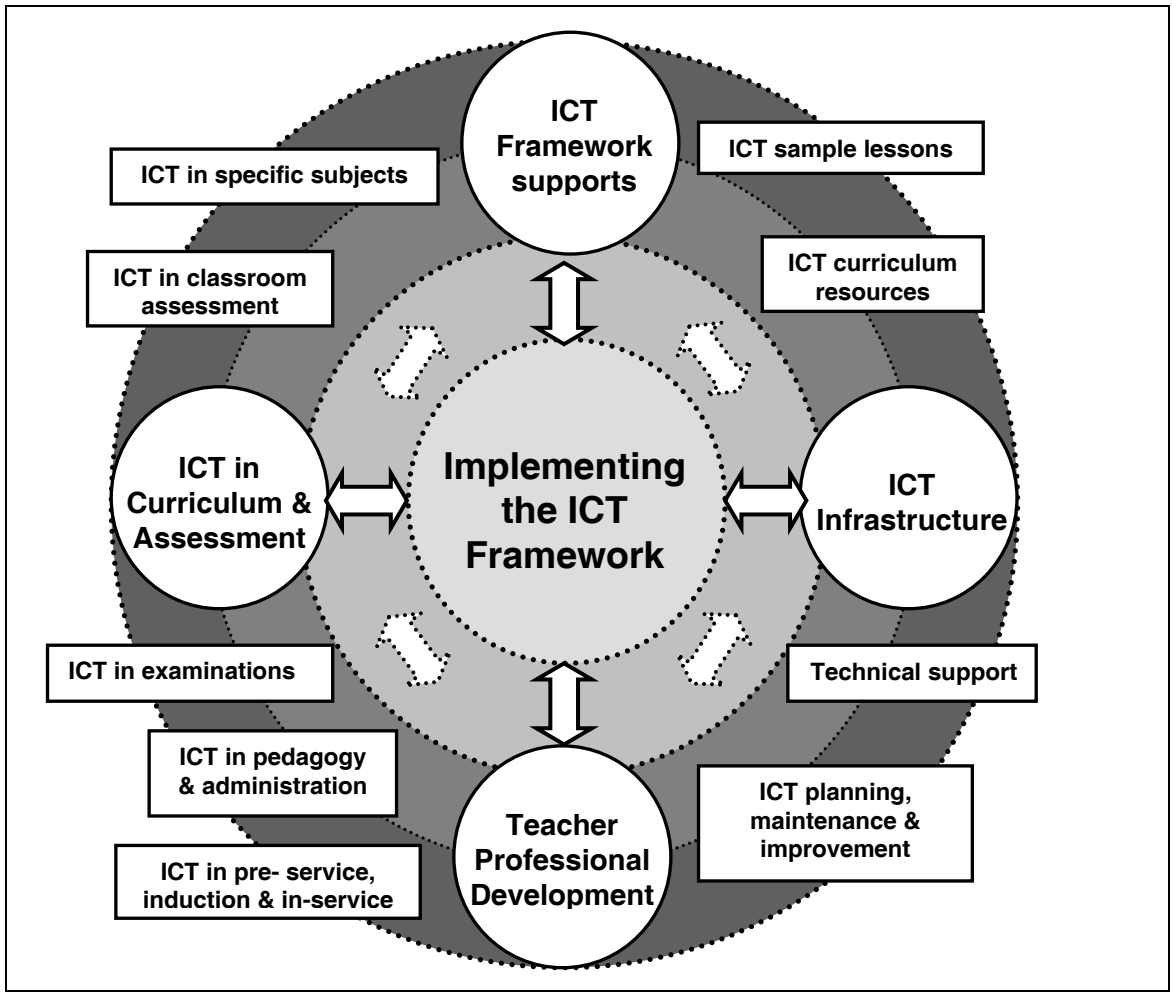
Recommendations

Findings in Section 2 of this report focused on requirements for successful implementation of the ICT Framework in schools. Arising from these findings, four areas of recommendation are identified which focus on:

- ICT Framework supports
- ICT integration in curriculum and assessment
- ICT Infrastructure in schools
- Teacher professional development

Figure 1 presents these four areas of recommendation as a system of support for implementing the ICT Framework. Each area of recommendation has a critical role to play in the implementation process.

Figure 1. ICT Framework Implementation: Four key areas of recommendation



The areas of recommendation to the North and West of Figure 1 focus on the work of Council. These concern ongoing development of support materials for the ICT Framework (including planning tools, sample activities, etc.), and embedding of ICT in curriculum and assessment across subjects and syllabuses. The remaining two areas of recommendation (to the East and South of Figure 1) focus on the work of policymakers concerning school infrastructure and continuing professional development (CPD) for primary and second level teachers. Systemic issues require a systemic and systematic response. Therefore, successful implementation of the ICT Framework can only be achieved when all four areas of recommendation are provided for schools within a phased plan for implementation of the Framework. Each area of recommendation is described in more detail in the following paragraphs, beginning with 'ICT Framework Supports' and moving through Figure 1 in an anti-clockwise direction.

ICT Framework supports

The potential of ICT to support teaching and learning differs in relation to the curriculum subjects in question, the methods of teaching and learning intended, and the ICT equipment available for use. For example, the use of Webquests in history may be of limited interest or value to teachers of/for English. Similarly, one-to-one computing in mathematics, may be at odds with the promotion of group discussion in social personal and health education (SPHE). Digital photography in science may be of only limited use in music.

It is clear from this initiative with schools, that teachers require more specific advice to embed the ICT Framework within curriculum and assessment at school and classroom levels. Dedicated resources for the ICT Framework would help teachers to plan for students to achieve the outcomes in the ICT Framework across a range of curriculum subjects, over a six or three year period (at primary level, or post-primary level). In essence, teachers require further exemplification of what the ICT Framework might look like in practice, across a range of curriculum subjects. The development of *sample activities*—based in curriculum subjects/syllabuses and aligned with the ICT Framework—is key to helping teachers to envisage the Framework *in action* in ways which are meaningful and practical for them. As noted previously, work is currently

underway to publish the ICT Framework online, including the sample activities gathered through this initiative.

Furthermore, a range of initiatives are currently underway by Council, which will show what effective teaching and learning looks like in authentic classroom contexts. These initiatives will be published on the ACTION website, and will, where possible, exemplify the use of ICT and the ICT Framework in curriculum and assessment. For example, the MALL (Mobile Assisted Language Learning) project is one such initiative. It aims to provide direction for teachers on the potential use of ICT in language learning. The NCCA will continue this work to exemplify teaching and learning with ICT in different classroom contexts.

ICT in curriculum and assessment

In June 2002, two approaches to progressing ICT in curriculum and assessment were agreed by NCCA. One focused on the use of ICT as a resource for teaching and learning throughout the curriculum. The other focused on development of student competence using ICT. While the first approach refers more to the development of curriculum and assessment guidelines and the ACTION website, which has been discussed in the previous sub-section, the second approach concerns the embedding of ICT in curriculum subjects and syllabuses and in assessment, as part of the development process. This 'embedding of ICT in curriculum and assessment' is the focus of this second recommendation.

At primary level, initiatives to support the Primary School Curriculum (1999) focus on effective and appropriate uses of ICT to support teaching and learning. For example, the recently published Assessment Guidelines for primary schools describe both administrative uses of ICT (e.g., for recording and storing assessment information) and pedagogic uses of ICT (e.g., for creating electronic portfolios). Similarly, at post-primary level, the role of ICT in curriculum and assessment is a key focus of the NCCA's ongoing review and development of junior and senior cycle education. In reviewing and revising subjects, syllabuses and guidelines continue to be 'ICT proofed' establishing the role of ICT as a teaching and learning tool (e.g. dynamic geometry packages in Mathematics); as an integral part of the curriculum (GIS in Geography) and as an integral part of curriculum and assessment (e.g. CAD in Design and Communications

Graphics). For example, ICT features significantly within the revised Leaving Certificate Design and Communications Graphics syllabus and also in its assessment (particularly the CAD component of the student assignment). It also arises as a focus of learning in the core of the LC Technology syllabus, and is one of five options in this subject from which students choose two for examination.

In addition to findings which point to the need for further embedding of ICT in curriculum and assessment, findings have also called for greater use of ICT in the state examinations, across subjects, for all students. Findings from the previous section of this report have noted the backwash effect of limited embedding of ICT in examinations–while teachers acknowledge the added value ICT can bring to their subjects they consider ICT use a waste of class time when it is not valued in state examinations. Teachers have suggested that ICT will not truly be embedded in post-primary classes until it is valued as part of the examination process. One method of doing this is to require further use of ICT in the preparation, presentation and submission of second assessment components for state examination purposes. Currently, at Junior Cycle, students may use ICT to prepare work for Junior Certificate Home Economics and the technology subjects. Similarly, at senior cycle, ICT may be used in coursework for the Leaving Certificate Applied and the Leaving Certificate Vocational Programmes and for the Leaving Certificate technology subjects. In addition to these uses of ICT, this recommendation focuses on exploring innovative and creative uses of ICT including online examinations, digital video, authentic scenarios, etc., for examination purposes.

Teacher professional development

The successful integration of the ICT Framework in curriculum and assessment for all students both causes and requires change in classroom processes and outcomes for teachers and students. Changed methods and tools of learning have implications for teachers' roles, values, knowledge and skills. It is at this layer of learning that teacher professional development and skills in managing the classroom environment for teaching and learning with ICT are necessary.

A refocusing of the approach to teacher professional learning—towards a pedagogical model of ICT professional development for teachers— is recommended to support the implementation of the ICT Framework in schools. A pedagogical model means a greater concentration on the use of ICT in teaching and learning related to subjects and classroom approaches and methods. It also means a greater focus on teaching and learning, than on ICT itself. This approach differs from a teacher/ICT skill development programme. Thus, ICT becomes embedded to a much greater extent in the work of the support services. In addition, opportunities exist for CPD within learning clusters or networks, both within school and between schools. Pedagogical professional development is not an *add-on*, a *one-off* or a *time-bound* measure.

Pre-service teacher preparation is an important part of the lifelong learning path of the teacher. All institutions and colleges preparing primary and post-primary teachers should develop models which embed ICT in subject areas and in pedagogy, for example in active learning and collaborative learning, etc. Subject specialist personnel in these institutions need to incorporate ICT in the subject methodology, rather than in an ICT skills module delivered separately and remotely from the subject which it aims to support.

ICT Infrastructure in schools

Throughout the report, teachers' frustrations with insufficient, inadequate, outdated, faulty and inaccessible ICT equipment emerged as the most significant barrier to their use of the ICT Framework in curriculum and assessment.

It is vital that as a starting point, all schools should have adequate access to fully-functioning, up-to-date ICT equipment and ongoing technical support in order to develop the kinds of learning environments aspired to and described in the ICT Framework. Minimum equipment specifications—to include computing and peripheral equipment such as digital cameras, digital video cameras, printers and scanners—should be determined as a guide to schools of varying sizes and types. Annual grants should be provided to schools which cover the costs of technical support and, not simply maintenance, but ongoing improvement and upgrading of equipment. Support should be provided for schools to develop annual plans for ongoing development and

improvement of their ICT infrastructure. It is clear that a national/regional technical support service is required for schools as a matter of urgency.
Finally, given that *inclusion* is a key theme of Council's Strategic Plan, the uneven distribution of ICT in the 12 participating schools is of note. The prevailing community-funded/self-funded 'compensatory' models of ICT procurement—while showcasing the significant educational potential of ICT in teaching and learning—also highlight the increasing digital divide in schools.

Conclusion

This report provides clear areas of recommendation for the successful implementation of the ICT Framework in schools.

Teachers in this initiative expressed strong ownership of the vision of ICT literacy for students in compulsory education. They welcomed the ICT Framework and its potential to support them in achieving this vision. They were excited by the principles of learning at the heart of the Framework and responded positively to the objectives, learning outcomes and learning opportunities described in the Framework. Teachers were keenly aware that the approaches envisaged in the ICT Framework represented a development, extension and enrichment of their current practice—and they participated in this initiative in order to learn more and to learn how.

Across all but one school, teachers reported that they lacked the infrastructure to implement the ICT Framework successfully. In contrast with their valuing of the ICT Framework as a structured approach to ICT in curriculum and assessment, they reported an undervaluing of ICT in their classrooms and schools—described in terms of out-dated and inadequate ICT equipment. Post-primary teachers identified the absence of ICT in state examinations as a further signal of systemic undervaluing of ICT.

Innovations in classrooms, including innovations in teaching and learning necessitate the tools required to envision and enact them. The ICT Framework was not designed in response to the question, 'What is possible with the ICT equipment in our schools?' It was designed to answer the question of how best to support teachers in promoting ICT literacy for all students in compulsory schooling, based on recent international

developments and best practice. The ICT Framework will not embed itself in curriculum and assessment, nor can teachers, without the means to do so.

This report identifies four areas of recommendation for implementing the ICT Framework. Significant investment in schools' ICT infrastructure; focused teacher professional development; sample activities to showcase the ICT Framework in action; and ICT-embedded curriculum, assessment and state examinations, are key to successfully implementing the ICT Framework in schools. Without these four supports, the vision of ICT literacy for all students espoused in the Framework will remain aspirational.

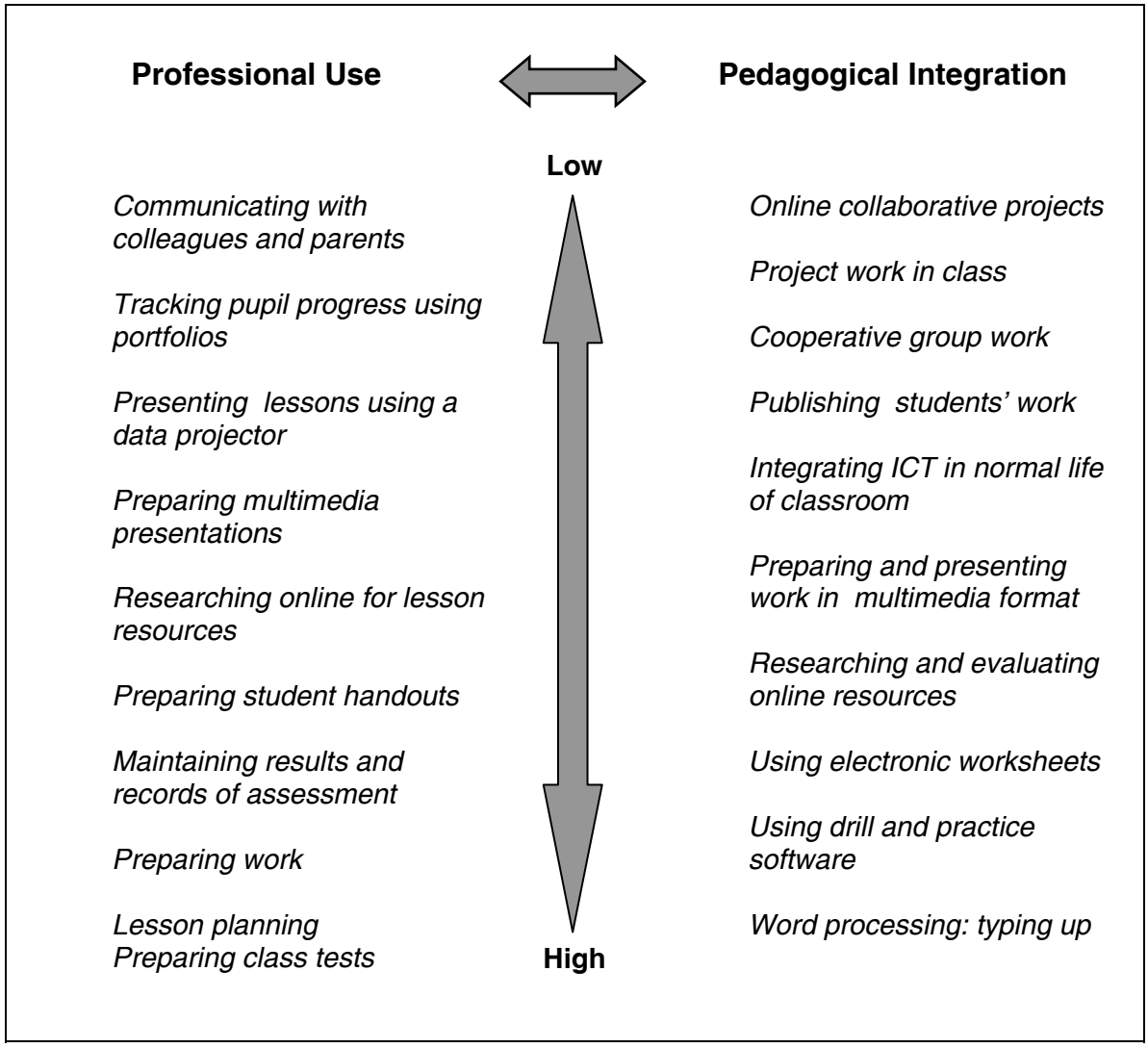
To provide a focus to the recommendations and to illustrate their potential, four scenarios are outlined in Appendix 8. The scenarios describe a pervasive (and almost invisible) use of the ICT Framework as a scaffold for teaching and learning with ICT, when all four areas of recommendation outlined in this document have been put in place.

It is hoped that the report of the *ICT Strategy Group*—appointed by Minister Hanafin in February 2007 to advise on the prioritisation of measures for a planned Government investment of €252 million in ICT in schools from 2007-2013—will provide the impetus for progressing the recommendations outlined in this report.

Appendix 1

This table presents teacher ICT integration in terms of a progression across a range of pedagogic and professional practices. Using ICT in some of the ways described in Table 1 (below) could be classified as high, medium or low end uses.[2]

Table A1. Teacher ICT use continuum



[2] Zucker A. (2004) in *Developing a research agenda for computing in schools* differentiates between teacher use of technology for instruction and where the students are asked to use technology in their learning.

Appendix 2

Table A2. Profile of schools participating in the initiative

Name[3]	Type (junior=J, senior=S, vertical=V Voluntary Secondary =VSS, Vocational =VEC)	Gender Mixed=M, Girls=G Boys=B	School Size No. of teachers & children		Urban =U Rural=R	DEIS Yes=Y No=N	First language English=E Gaeilge=G	ICT Use High=H Medium=M Low=L
School A	J	M	20	422	U	N	E	H
School B	S	M	21	220	U	Y	E	H
School C	J	M	21	270	U	Y	E	L
School D	V	M	23	215	U	Y	G	L
School E	V	M	3	60+	R	N	E	M
School F	VSS	G	40	450	U	Y	E	M
School G	VEC	B	29	200	U	Y	E	L
School H	VSS	M	32	500	U	N	G	L
School I	VSS	B	27	250	R	N	E	L
School J	VSS	G	31	350	U	Y	E	M
School K	VSS	M	48	650	U	N	E	M
School L	VEC	M	43	580	R	Y	E	H

[3] Fictitious school names are used throughout this report.

Appendix 3

Table A3. Equipment Provided

No of Schools	Equipment
9	• 1 High Spec Laptop (5 Windows XP Pro, 4 Mac OSX) • 1 Dataprojector • 1 Digital Video Camera • 1 Speakers • 1 USB Microphone • 1 Headset • 1 Boom Microphone • 1 Tripod • USB Keys for each teacher • MS Office • Inspiration • Video editing software (5 Pinnacle Studio10 Plus, 4 iMovie)
1	• 2 Lower Spec Laptops (Windows XP Pro) • 2 Dataprojectors • USB Keys for each teacher • MS Office • Inspiration
1	• Interactive Whiteboard • Inspiration
1	• Selecting equipment at school level

Appendix 4

Table A4. Context evaluation

Focus of enquiry	Key Questions	Methods
Context *School description*	▪ How is the school described in terms of - size - gender mix - location - catchment area - number of teachers - classes involved etc?	*School visit* ▪ Discussions with principal and staff
Context *ICT Infrastructure*	▪ What is the school's current ICT hardware and software including internet connection status, technical support, etc? ▪ What levels of access do teachers have to ICT resources in school?	▪ School infrastructure Questionnaire. 4a. ▪ Teacher Questionnaire 4b
Practice *ICT use*	▪ Does the teacher currently use ICT - for pedagogical purposes? - for instructional or presentation purposes? - for preparation of lessons?	▪ Teacher Questionnaire 4b
Supports *Teacher current needs /priorities*	▪ What is the teacher's perception of his/her own ICT capability? ▪ What types of CPD/ supports in ICT would the teacher like/ require?	Workshop 1 ▪ Discussion *School visit* ▪ Teacher interview ▪ Teacher Questionnaire 4b

Table A4a. School Infrastructure Questionnaire

1. School Name:			
2. School Size			
Number of Students		Number of Teachers	
3. Is there an ICT coordinator in the school?			
Yes		No	
4. If yes, does the ICT Co-ordinator hold a post of responsibility for the position?			
Yes		No	
5. Does the school have an ICT plan?			
Yes		No	
6. If yes, who was involved in its development? Select all that apply.			
Principal		ICT Co-ordinator	
Group of Teachers		Whole Staff	
BOM		Parents	
Students		Other	
7. How often is the ICT Plan updated?			
Yearly		Never	
Every few years		n/a	
8. Does ICT appear as an item on the school budget?			
Yes		No	
9. Does the school have an AUP (Acceptable Use Policy) for ICT use?			
Yes		No	
10. Does the school have a broadband connection?			
Yes		No	
11. If yes, how would you rate the speed, reliability and usefulness of the Internet connection?			
	Speed	Reliability	Usefulness
Excellent			
Very Good			
Good			
Fair			
Poor			
12. How many working computers are in the school?			
13. Approximately, how many of these computers are			
Less than one year old			
Between 1 and 3 years old			

Between 3 and 5 years old	
Over 5 years old	
14. Approximately, how many of these computers are located in	
ICT Lab	Classrooms
Specialist Rooms	Learning Support/Resource Rooms
Staff Room	Administration
Allocated to specific teachers	
15. Does the school have a computer network?	
Yes	No
16. If yes, approximately how many of the total number of computers are networked?	
17. If there is an ICT Lab available, which classes have timetabled access to the room? Select all that apply.	
Junior Infants	Senior Infants
First Class	Second Class
Third Class	Fourth Class
Fifth Class	Sixth Class
Learning support	Resource
Other	
18. Taking account of the timetabled classes, how available is the ICT lab to bring unscheduled classes to the room?	
No availability	
Limited availability	
Good availability	
19. What types of software are available in the school? Select all that apply.	
Word processing	Presentation (Powerpoint)
Reference	Learning support
Paint and draw	Image editing
Video editing	Subject specific
Administrative	Other
20. Please indicate the types and numbers of hardware available in your school? Select all that apply.	
Printers	Laptops
Scanners	Digital stills camera
Digital video camera	CD burners
DVD burners	Interactive whiteboard
Datalogging equipment	Control technologies
Microphones	Headsets
Web cameras	Video conferencing
Mobile classrooms	Other
21. Please add any other comments on your school infrastructure below	

Table A4b. Teacher Access to ICT resources

1. School Name		
2. School Type	Primary	Post-primary
3. Teacher Name		

4. Class (primary) Please tick all that apply			
Junior Infants	Senior Infants	First	Second
Third	Fourth	Fifth	Sixth
Resource/ Special Needs	Learning Support		

5. Please enter the subjects that you teach at junior cycle level?

6. What senior cycle (including transition year) subjects/modules do you teach?	
Subject/Module	

7. Please describe the ICT resources you have access to and the location of these. Check both columns if available in both.	Classroom	Resource Room
Broadband connection		
Computer (desk top)		
Data projector		
Datalogging sensor		
Datalogger		
Digital stills camera		
Digital video camera		
DVD player/writer		
Digital microscope		
Inkjet Printer		
Interactive whiteboard		
Laptop (s)		
Laptop (Mobile cart)		
Laser printer		
MP3 player or mini disc recorder		
Personal Digital Assistant (PDA)		
Scanner		
TV and video		
Web cam		

8. How many computers or laptops do you have access to for your class?

9. Does your class have timetabled access to a computer room?	
Yes, one period a week (45 mins)	
Yes, two periods a week	
Yes, more than two periods a week	
No	
Other (please specify)	

10. Please describe any other ICT resources you have access to?

11. Which ICT resource(s) do you use most frequently in the classroom?

12. Please select the most appropriate term to describe your access to the following resources and supports in your school

	Not available	Minimal	Adequate	Good	Excellent
Computers and other ICT equipment where I need them					
Adequate number of computers for what I want to do					
Reliability of ICT equipment (computers, printers etc)					
Reliable broadband connection					
Software appropriate to class and subject area					
ICT for my own planning and creating lesson resources (e.g. laptop, scanner, printer)					
ICT for teaching lessons (e.g. presentations)					
Availability of technical support					

13. Please indicate your areas of greatest strength in relation to ICT use	
Preparing lesson resources	
Presentation in the class e.g. Powerpoint	
Project work	
Email	
Using the digital camera	
Using the digital video	
Using the Internet to find resources	

Using software for drill and practice	
Other (please specify)	
14. Please indicate the areas in which you need support in your use of ICT in the classroom	
Making presentations	
Using the digital camera	
Using the digital video	
Interactive whiteboard	
Using the data projector	
Email	
Using the Internet to find resources	
Creating projects with the class	
Image editing	
Other (please specify)	

Appendix 5

Table A5. Formative Evaluation

Focus of enquiry	Key Questions and or actions	Methods
Accessibility	▪ Is the language of the ICT Framework accessible? ▪ Are the layout and the structure of the ICT Framework accessible? ▪ Is the suggested presentation accessible? ▪ Does the ICT Framework adequately cover what is important in relation to ICT in curriculum?	*Workshop 2* ▪ Discussions/ questions with teachers
Usability *Teachers' approaches and methods*	▪ What was the your experience with using the ICT Framework in class(es)/ lesson(s) in terms of - pedagogical use? - presentation use? ▪ What were the positives? ▪ What were the negatives?	*School visits Dec 2006* ▪ Individual teacher meeting *Workshop 2* Discussion ▪ Lesson templates 5a. ▪ Online Questionnaire: *Usability* 5b.
Usability *Student experience*	▪ Have you used ICT to support your learning? ▪ How have you experienced ICT in the classroom?	▪ Focus groups May 2007
Feasibility *Practice*	▪ How feasible was it to use the Framework in school in terms of - school timetabling - access to ICT resources/ hardware - your ability to incorporate it into curriculum planning? ▪ What preparation did you need to make in order to undertake a lesson using ICT? ▪ What were the implications of using the ICT Framework for your classroom practice? ▪ What planning and preparation were required? ▪ What supports- people, training, resources, knowledge were necessary	*School visit 2* ▪ Teacher interview *Workshop 2* ▪ Discussion with teachers *Workshop 3* ▪ Discussion with teachers ▪ Online Questionnaire: *Feasibility* 5c

Focus of enquiry	Key Questions and or actions	Methods
	for successful use of the ICT Framework? ▪ How feasible is this preparation in comparison to preparation not involving ICT use in a lesson? ▪ How feasible was it to incorporate the ICT Framework into curriculum planning in terms of - time - resources - supports? ▪ What were the implications for planning at school level in terms of - teacher collaboration - team preparation - class/group/department preparation?	
Supports/ resources *Requirements*	▪ Where do gaps exist (support, resources, knowledge, skill) in your ability to engage with the ICT Framework? ▪ What types of supports are required - for teachers - for schools?	*School visit* ▪ Individual teacher meeting *Workshop 3 May 2007* ▪ Discussion

Table A5a. Lesson Template

Planning	
Reflect on what you want to do	
Describe the learners (learning needs, prior experience, ICT competence)	
Class	
Particular needs/focus *inclusion, cooperative work, SEN, etc.*	
Subject(s) learning outcomes (Strand, strand unit, topic)	
ICT Framework learning outcomes E.g. C1 F2 etc	

Process			
Describe the learning environment (resources, facilities, tools, etc			
Where will the lesson(s) take place (√)?			
Classroom	❑	Computer room	❑
Specialist Room _____	❑	Other _____	❑
What ICT resources will you use (√)?			
Computer (s) Digital camera Data projector Internet Connection Software_____	❑ ❑ ❑ ❑ ❑	Video camera Printer Scanner _____ _____	❑ ❑ ❑ ❑ ❑
What other resources will you use (√) ?*List main ones*			
Books Art materials	❑ ❑	_____ _____	❑ ❑
What teaching approach will you use (√)?			
Whole class Group work	❑ ❑	Pair work Individual work	❑ ❑
Describe the learning activity, including how ICT will be used to support learning			

What does the teacher do?	What do the students do?

Review	
Reflect on the approach taken (taking into account all of the above)	
Highs	
Lows	
What would you do differently?	
School	
Teacher	
Date	

Table A5b. Usability Questionnaire

1. Teacher name and school				
2. Which level and areas of the ICT Framework did you use? Please select all that apply.				
	Foundational knowledge skills and concepts	Creating communicating and collaborating	Thinking critically and creatively	Social and personal impact of ICT
Level 1				
Level 2				
Level 3				
3. Did you find the layout and structure of the ICT Framework accessible and easy to use? Please comment.				
4. Was the language of the ICT Framework accessible? What recommendations if any, would you make to improve the language and accessibility for teachers?				
5. What was most useful in supporting your use of the ICT Framework in the classroom?				
6. Were there any constraints or barriers to your use of the ICT Framework in the classroom?				
7. Based on your use, what recommendations if any would you make to improve the overall usability of the ICT Framework for teachers?				

Table A5c. Feasibility Questionnaire

1. Teacher name and school

2. Which level and areas of the ICT Framework did you use? Please select all that apply.

	Foundational knowledge skills and concepts	Creating communicating and collaborating	Thinking critically and creatively	Social and personal impact of ICT
Level 1				
Level 2				
Level 3				

3. Please rate the usefulness of the ICT Framework

	Not useful	Somewhat useful	Useful	Very useful	N/A
Aid to planning					
Layout/ structure					
Comprehensive					
Guide to ICT content					
Ease of use					

4. What I found most useful about the ICT Framework was

5. The greatest challenge in using the ICT Framework in planning lessons was

6. An improvement I would make to the ICT Framework is

7. What other supports would you have liked to aid your use of the ICT Framework in subjects?

Appendix 6

Table A6. Outcome Evaluation

Focus of enquiry	Key Questions and or actions	Methods
Impacts Outcomes and outputs - Teacher	▪ What were the impacts of the ICT FRAMEWORK initiative - on the teachers involved - on other teachers - on the school? ▪ What were the benefits of participation - for the teacher - for the school? ▪ Were there any unexpected outcomes? ▪ What challenges were involved? ▪ What recommendations would you make in order to successfully bring the ICT FRAMEWORK to other schools?	*Workshop 3* ▪ Teacher Focus group interviews ▪ Group discussion
Impacts Outcomes and outputs - student	▪ What were the impacts of the ICT FRAMEWORK initiative on the students? ▪ What were the benefits of participation for the students' - learning - motivation - behaviour - ICT skills, knowledge - other?	*Workshop 3* ▪ Group discussions ▪ Demonstration of lesson samples
Supports Resources	▪ What training/supports were provided? (NCCA liaison with NCTE /ICT Advisors in relation to local training needs) ▪ What was the impact of the supports provided on your use of the ICT Framework? ▪ What types of supports were most effective in your use of the ICT Framework? (people, training, resources, other?) ▪ What supports are needed to facilitate your use of the ICT Framework - at school level - in planning classes - in the classroom?	*Workshop 3* ▪ Group discussions

Appendix 7

Table A7. Digital Award Schools who developed Sample Activities for the ICT Framework supported by NCTE

School Name	School Address 1	School Address 2	Principal First Name	Principal Surname	Phone	Email
Sacred Heart NS	Church Avenue	Portlaoise, Co Laois	Maura	Conroy	057 86 21904	preshart.ias@eircom.net
Stokane N.S	Enniscrone	Co. Sligo	Michell	Bonner	096 36673	snstuacan@eircom.net
St. Eithne's GNS	Edenmore	Dublin 5	Aileen	Corboy	01 8480630	steithnes@eircom.net
St John's JNS	Rathmullen	Drogheda, Co. Louth	Dympna	Mac Kenna	041 9831488	stjohnscomputerroom3@eircom.net
Mid West School for Hearing Impaired	Rosbrien Rd	Limerick	Ted	O Mahony	061 227722	mwshic@eircom.net
Gaelscoil Ó Doghair	Newcastle West	Co. Limerick	Daithi	Ó Murchú	069 61087	gscoil.ias@eircom.net
Our Lady of Consolation NS	Collins Avenue East	Donnycarney, Dublin 5	Gerry	Cogan	01 8310721	oloc@eircom.net
St. Itas & St. Josephs NS	Balloonagh	Tralee, Co Kerry	Tomas	de Barra	066 712537	stita@eircom.net
Scoil na mBuachailli	Clonakilty	Co Cork	Barth	Harrington	023 34487	snbclonakilty.ias@eircom.net
Scoil Nicoláis	Frankfield	Cork	Micháel	Ó'Cohláin	021 4899567	dabos@eircom.net
St Joseph's BNS	Terenure Rd East	Dublin 6	Matt	Hume	01 4906905	info@stjosephsterenure.ie
St Leonard's NS	Ballycullane	New Ross, Co Wexford	Martin	Kennedy	051 562570	saintleonardsns@eircom.net
St Brigids BNS,	Mart Lane	Foxrock, Dublin 18	Pat	O'Connell	01 2893199	reville.matt@gmail.com
Scoil Naomh Fiachra,	Clontubrid	Co Kilkenny	Tommy	Maher	056 8832417.	snfiachra@eircom.net
Whitechurch N.S.	Cappagh	Co. Waterford	Michael	Colloo	058-68282	info@whitechurch.org
St. Oliver Plunkett NS	Blackcastle	Navan, Co. Meath	John	Hand	046 9023347	stop@stop.ie
San Carlo	Leixlip	Co Kildare	Paddy	Keegan	01 6245002	sancarlo@iol.ie
Carnaun N.S.	Carnaun	Athenry, Co. Galway	Mark	Hannon	091 844668	carnaun.ias@eircom.net

Appendix 8

Scenario 1: Curaclam na Gaeilge and the ICT Framework

Mr. O' Shea is working with his second class to develop of a series of pod casts which tell a story the class will develop over four weeks. This project addresses each of the four strands of Curaclam na Gaeilge, *Éisteacht, Labhairt, Léitheoireacht and Scríbhneoireacht* as well as two objectives in the ICT Framework, *Objective C: Creating, communicating and collaborating with ICT* and *Objective S: Social and personal impact of ICT*.

Mr. O' Shea is hoping that this project will encourage the more reluctant pupils in the class to become actively involved with the four strands of *Curaclam na Gaeilge* and help to develop children's confidence in using Gaeilge as a living language. For this project, the class will use all of their ICT classroom resources—five broadband networked PCs, an interactive whiteboard, two school digital cameras, the school video recorder and Mr. O' Shea's laptop.

The class is organised in four mixed ability groups. The first task for each group is to think of a theme for their class story. Following a class vote on group entries, the winning theme is Oíche Shamhna/ *Halloween* which corresponds with the theme of ócáidí speisialta / *special occasions* within the curriculum. As a class the children discuss possible titles, characters and settings for their class story. Once these have been decided upon they develop a timeline for the story. The timeline for week one looks like this:

Dé Luain / *Monday:* Identify three characteristics of your character, within groups. Develop four descriptive sentences for your character.

Dé Máirt / *Tuesday:* Discuss chapter one and agree three developments in this chapter, as a class. Present chapter one on the interactive whiteboard for the class at the end of the lesson.

Dé Céadaoin / *Wednesday:* Practice reading chapter one. Work in groups to act chapter one (using appropriate intonation, facial expressions and gestures). Choose the group to be filmed.

Déardaoin / *Thursday:* Bring in appropriate costumes and props. Act out chapter one, video tape it, photograph characters, and write descriptions for the main characters (all group tasks).

Dé hAoine / *Friday:* Identify the steps involved in uploading material to the school moodle, as Gaeilge. Upload the recordings, photos and descriptions to the moodle site.

The development of the story continues over a number of weeks in this manner, with groups rotating their tasks, while Mr. O' Shea focuses on developing aspects of children's language awareness, form and function in this context.

Although the school-based moodle site is password protected, parents have access to this website and can view the work the children are doing as Gaeilge at home in order to further support their children's learning of Gaeilge in school.

Scenario 2: The Primary School Curriculum and the ICT Framework

This week, children in Ms. Bryan's fourth class are learning about another European country. She is teaching the Geography strands *human environments, environmental awareness and care* and the strand units *People and other lands - an environment in another European country and caring for the environment*. She is also integrating the *environmental awareness and care* strand of the Science Curriculum and the strand *myself and the wider world* from the SPHE Curriculum. In her planning, Ms. Bryan notes that through this project, students will have opportunities to demonstrate objectives in the Science Curriculum and the SPHE Curriculum as well as embedding outcomes from the ICT Framework. Using the ICT Framework online, she identifies four outcomes which children will demonstrate learning in. One is from objective C (use ICT to create, communicate and collaborate) and three are from objective T (use ICT to think critically and creatively).

There are ten PCs with broadband connection, speakers and headsets in Ms. Bryan's classroom and she recently attended in-service on using the new interactive whiteboard in her classroom to support the Primary School Curriculum (1999). For this project, the class has also signed out two of the school's digital cameras for the week.

Ms. Bryan has organised her class in six mixed-ability groups. Each group has a task to complete which will contribute to an overall class project on Germany. The data gathered and compiled by each group will be presented in a PowerPoint presentation on the interactive whiteboard. The children are very excited about the project which they planned with Ms. Bryan during the previous week.

Groups one and two are investigating Germany's physical landscape using Google Earth online. They are also investigating homes and other buildings there. In their presentation to the class, they plan to give a virtual sightseeing tour of Germany. Their presentation to their class will point out places and features of interest in Germany including famous landmarks and typical homes in Germany. The teacher has provided the group with a list of landmarks and a few physical features of note, to get them started.

Groups three and four have elected to find out about German foods and the language of Germany. They have been following a webquest set by their teacher to find out how to say and write certain words and phrases in German. They have also sourced information on traditional German food online. They have been gathering food wrappers from their own environment and examining the ingredients for German language. Two children from this group have photographed German food items in Aldi and Lidl while shopping there with their parents. They are also including some photographs their teacher took while on holiday in Germany.

Groups five and six are finding out about recycling in Germany and comparing it to the Irish recycling system. Germany has a comprehensive recycling programme where all waste is deposited in appropriate bins, returned to shops or composted. This group will present their findings on the interactive whiteboard and develop an interactive game where classmates can virtually drag rubbish items into their appropriate bins (green, grey, brown, yellow).

Scenario 3: Junior Cycle Science and the ICT Framework

During the next two weeks, Ms. Cole and Mr. Smith are teaching their junior science class about current electricity; a topic where misconceptions are plentiful, not just amongst students, but also amongst the general public. When students start secondary school, they generally have only partial understanding of electricity, and often have incorrect ideas about how electrical appliances work. Students will know from experience that electrical and electronic gadgets must be switched on, can work from batteries or from being plugged in. Through their experiences, and also from work at primary school, students will have developed some foundational ideas about electricity. Some of these ideas may be on the right lines but some will also be on the wrong track.

To identify the students' misconceptions and to ensure that all students achieve the Junior Certificate learning outcomes to the best of their individual abilities, Ms Cole wants to teach electricity in ways which are motivational and interesting to students.

To get started Ms. Cole and her colleague, Mr. Smith, use their planning time to develop a bank of interactive electronic diagnostic assessment tools, using freely available authoring software. Both teachers will use these tools to gather a clear picture of their students' prior knowledge and the extent of their misconceptions.

Using a web-based tool for problem-based-learning in electricity, Ms. Cole is able to direct the students to those areas in which they needed most help. The students are asked to predict, observe and explain (for example when a bulb would light). The software gives each student constructive feedback. Following this exercise, further diagnostic tests are carried out and the students and their teachers can monitor the progress of learning.

Following this initial exercise, Ms. Cole and Mr. Smith plan learning activities which build on students' ideas about electricity from everyday life and from primary science. The students use kits to build electrical circuits and to test their understanding of how circuits work. As well as having the 'real life' circuit kit, each pair of students has an electronics kit in their computer. Students can build virtual circuits with resistors, light bulbs, batteries, and switches and take measurements with the realistic ammeter and voltmeter. This allows the students to develop hypotheses and test them without having the added levels of difficulty of physical construction obscuring the 'big picture' of what was happening at an electronic level. Once they are happy with the circuitry, they are able to build circuits for real with a good degree of confidence.

During this first week of activities, students have had opportunities to demonstrate learning in two objectives in the ICT Framework: Objective F (use ICT to develop foundational knowledge, skills and concepts) and Objective T (use ICT to think critically and creatively). Ms. Cole and Mr. Smith note that students' presentations towards the end of the following week will also target Objective C (use ICT to create, communicate and collaborate).

Scenario 4. Junior Certificate Mathematics and the ICT Framework

Ms. Ryan's first year mathematics class is working on data and statistics in the revised syllabus. The class is participating in the international *Census in Schools* project and this week they are concentrating on student pastimes.

Using classroom laptops and a spreadsheet programme, the class has collected and analysed a range of data to identify the 'top ten' pastimes, based on the popularity of the pastimes and the average time spent on each across class members. Small groups of students are preparing summaries and a short presentation on two of the 'top ten' pastimes from the class. They use ICT to generate tables and charts and to prepare an electronic portfolio (or slide presentation) that includes photos and video clips of the students in action. Ms. Ryan will use the portfolios to assess students' understanding of data and statistics and their proficiency using ICT in innovative and creative ways to enhance their own learning. Students' portfolios will also be assessed as part of their mathematics examination in the Junior Certificate.

Tomorrow, students will register the 'top ten' pastimes from the class online with the census project so that students in other schools in Ireland and abroad can compare preferences. Ms. Ryan's class will be able to communicate with other schools and classes to see what students of similar age in different countries are interested in and the amount of time they spend on their pastimes. It will be interesting to see what students from other parts of the world have picked as their 'top ten.'

Ms. Ryan no longer needs to visit the ICT Framework to know that through this project her students are developing skills relevant to two outcomes in the ICT Framework for Level 3:

- Objective C3: gather, organise, manipulate and analyse data using ICT
- Objective T4: explore and develop problem-solving strategies using ICT

At a glance, Ms. Ryan can see from the ICT Framework chart in her classroom, that through this project students are showing evidence of six demonstrations of learning. At her next team meeting, she'll collaborate with her colleagues to plan further opportunities for students to use and extend these skills in Geography and SPHE. At this meeting, the school ICT Coordinator plans to showcase some sample activities (including video and photographic resources) which focus on embedding ICT in teaching and learning Geography and SPHE with first year students.