

5-14 5-14 National Guidelines

Information and Communications Technology

Guide for Teachers and Managers



SCOTTISH EXECUTIVE



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The examples of practice contained in this guide are drawn from three main sources:

- from schools directly, through a series of visits (Report of school visit)
- by evidence and advice from local authorities (Local authority example)
- through materials supplied by New Opportunity Fund (NOF) training providers (Background from NOF training provider).

Particular thanks also to the Qualifications, Curriculum and Assessment Authority for Wales (ACCAC) for permission to reproduce extracts from *Whole School Approaches to Developing IT Capability* (ACCAC, 1999).

A number of examples referred to in the text are, for reasons of space, not extensively developed. Access to fuller versions of these documents would be of great value. Therefore it is proposed to issue these online. Other items including the workshop materials and overhead masters referred to in this guide will be included on the Learning and Teaching Scotland 5–14 website under development.



Introduction

This *Guide for Teachers and Managers* provides managers and teachers in schools with advice on the implementation of *Information and Communications Technology: 5–14 National Guidelines* (Learning and Teaching Scotland, 2000). An important feature of implementation is the development of a management strategy to establish the necessary context of ICT capability on the part of schools. Schools and local authorities are building on their own planned approaches and policies for ICT development and implementation, including the vital area of staff development. This guide is an aid in taking these issues forward and provides assistance in a different degree to a range of audiences, at whatever point has been reached in ICT implementation within the emerging national framework.

Information and Communications Technology: 5–14 National Guidelines should be taken into account alongside this guide and along with existing local authority or school policies in ICT and other national documents, particularly *The Use of ICT in Learning and Teaching* (a report by HM Inspectors of Schools: Scottish Executive Education Department, 2000). The HMI report states:

Optimising the impact of ICT has become one of the major challenges facing our educational system. We must harness it to promote learning and teaching and improve pupils' attainment.

The Use of ICT in Learning and Teaching (a report by HM Inspectors of Schools: Scottish Executive Education Department, 2000).

The pace of technological change is so great that the equipment and strategies for making the most of ICT for teaching, learning and managing require almost constant review. These factors increase the task of using ICT for the benefit of the education process and of introducing young people to the skills and concepts that underpin ICT as an ever more important aspect of our modern society.

National guidelines for ICT 5–14 are concerned largely with teaching and learning, and this guide considers some issues and opportunities arising for teachers at the 5–14 stages. The guide also stresses the importance of effective management in facilitating development at authority, school and classroom level. The guide offers help with roles and responsibilities within the accepted framework of the performance indicator structure contained in *How Good Is Our School? Self Evaluation Using Performance Indicators* (SOEID, 1996). The significance of effective planning cannot be overstated. The central importance of building ICT into school development planning and strategic management thinking is inescapable. While hardware and software implications and acquisitions are clearly a vital consideration in any longer-term strategy, it is more important that schools gain an early and thorough understanding of where they stand in relation to ICT and confirm where they want to go in using ICT.

The significance of effective planning cannot be overstated.

Thinking through the steps and developing an action plan that meets individual school and local authority needs will pay dividends in terms of shared working, resource-provision strategies and the growing confidence and commitment of all involved in the rapidly changing scene of ICT development.

The pace of change in ICT has an unsettling effect on some teaching staff, who are already dealing with change in many aspects of their work. However, it is important to acknowledge that ICT strategies and approaches will now always require review as new and emerging technologies – such as refined speech-recognition facilities – develop. One aspect that has emerged nationally has been the importance and benefits of shared development across authorities and between schools. Mutual support has proved most effective where collaborative working to specific learning and teaching and/or management purposes has been defined. This includes joint projects that involve more remote schools or cluster groups working to coordinate pupil experience.

The national guidelines for ICT 5–14 clearly indicate that the main approach to ICT development should lie in working towards a permeation strategy where technology is used to support all aspects of learning and teaching and educational management. The focus for schools should be geared towards the:

- use of ICT to improve pupils' knowledge, understanding and skills in a range of curriculum areas and subjects
 - learning through ICT
- development of pupils' general skills in ICT
 - learning in ICT.

These objectives will be delivered best in the context of an approach characterised by learning about ICT through the use of ICT.

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It is recognised that implementation of all aspects of the range of 5–14 national guidelines will involve phasing over a number of development planning years. Implementation of ICT also raises the consideration of time allocation within a very challenging curriculum structure for those aspects of ICT skill development that may require more discrete teaching, such as the skills of basic word-processing. There is no easy answer to this issue, particularly given the diversity of starting points for schools. The solution will vary in different schools according to priorities agreed in partnership with the local authority. However, some curriculum time will be required and it is important to plan for this. It is also vital to engage in a staff development approach that equips staff to deal competently with the hardware and confidently with the application of ICT in teaching and learning.

Information and Communications Technology 5–14: Section 1

Teaching, Learning and Assessing



Section 1

Teaching, Learning and Assessing ICT

ICT is no longer considered as incidental to the curriculum or an optional classroom activity. It has an increasingly important presence within overall learning and teaching strategies.

This section explores:

learning *through* ICT – the use of ICT to improve pupils’ knowledge, understanding and skills in a range of curriculum areas and subjects

learning *in* ICT – the development of pupils’ general skills in ICT.

Quality of the teaching process

ICT is no longer considered as incidental to the curriculum or an optional classroom activity. It has an increasingly important presence within overall learning and teaching strategies. The various revised 5–14 national guidelines all indicate the potential of ICT to develop effective learning and teaching. The national guidelines on ICT offer a clear structure for tackling ICT concepts, skills and attitudes on the part of pupils. The need for continuity and progression in learning and teaching is reinforced. Covering both the development and the exploitation of ICT to enhance learning and teaching in other curriculum areas, the national guidelines have strands and targets laid out in grid form for levels A–F. This section of the *Guide for Teachers and Managers* exemplifies elements of these strands and targets, and focuses on a few areas of importance in the learning and teaching process. This includes how ICT:

- can influence and shape the curriculum
- offers opportunities to extend or enhance the curriculum
- brings with it the potential for new approaches to teaching
- can help in the planning and structuring of tasks.

Advice is also offered on:

- assessment
- communication with parents
- safeguards.

Whether a teacher is involved in an activity that is focused on a discrete element of ICT development or is using an aspect of ICT to develop another curriculum area, the teacher will:

- be well prepared in terms of equipment to be used and confident in the use of both the equipment and the software

- have planned, structured activities in line with advice given later in this guide
- have identified clear and appropriate objectives and/or curricular aspects
- be prepared to use a range of strategies to stimulate pupils and retain their interest, such as exposition, demonstration, questioning and discussion – both individually, in groups and, where appropriate, as a class
- respond when pupils need help by discussing possibilities and helping pupils to find a solution themselves
- make correct use of relevant technical vocabulary and require high standards in pupils' written and oral contributions
- take due account of what pupils are learning at home and outwith the classroom to develop their ICT capability
- ensure equality of opportunity in access to ICT experience.

Teachers will recognise that in quality approaches to teaching in or through ICT there is little that is different from the general approach to effective teaching.

Teachers will recognise that in quality approaches to teaching in or through ICT there is little that is different from the general approach to effective teaching. Whilst some additional professional confidence in this area may still be necessary for many, the planned and regular application of ICT experience for both staff and pupils will see a growth of capability and confidence over time.

In any teaching and learning situation involving ICT, success will be obvious where pupils are:

- motivated, challenged and required to think for themselves
- encouraged to be independent and confident users of technology
- set tasks that encourage cooperation and collaboration to tackle them and to solve given problems
- more responsive in the context of support for learning activities.

For their part pupils will:

- display high levels of sustained interest when engaged in meaningful ICT-related tasks
- display increased responsibility in engaging in tasks that involve personal research and application
- work well with their peers
- bring to bear a wide range of skills and experiences including those gained through accessing technology at home.

Teachers should reflect on how and where these characteristics have been achieved by pupils in the context of the exemplification of strands tables.

Issues for implementation

Schools have the flexibility to use ICT in conventional and innovative ways to meet their aims and objectives.

In considering the advice in the national guidelines it is worth reinforcing that in all schools ICT implementation is already underway. Teachers should feel confident that, with appropriate support, those aspects of ICT new to them can be assimilated into normal teaching over a period of time. How ICT is delivered and how individual teachers use ICT depend on school circumstances in terms of readiness, resources and teachers' skills. However, it is important that the full range of individual, group and whole-class (both discursive and direct) approaches are applied to meet the range of pupil needs.

Schools have the flexibility to use ICT in conventional and innovative ways to meet their aims and objectives. It is unlikely that pupils will experience ICT or develop ICT capability strand

by strand and level by level as set out in the *National Guidelines* framework. What is important is that pupils make progress and develop an ICT capability over time at a pace that provides suitable challenge. Pupils will bring greatly varied levels of skill and prior learning to this area. Resource levels may dictate imbalances in achieving particular strands at defined stages and the resolution of this will take time, in line with other school priorities. The ICT framework and exemplification grids provide a model that teachers can use to define their expectations as part of the development planning cycle. This process will be measured in years rather than months or a single school session.

Introducing the guidelines to staff and parents

This section introduces a series of workshops designed to assist teachers and parents to begin to gain familiarity with the content of the national guidelines and to explore the impact of the guidelines on how they deal with ICT. The workshop materials supplement training provided through other sources and do not set out to tackle coverage of all the issues concerned with the development of ICT. More detailed training for teachers and librarians is provided through the NOF training programme and by training initiatives, such as the forthcoming course 'ICT Training for Primary Headteachers' (LT Scotland).

... detailed training for teachers and librarians is provided through the NOF training programme ...

The approach adopted is based on a number of approximately 40-minute workshops that might be used in school-based in-service training (INSET) sessions. They may also be used to introduce parents to the national guidelines for ICT 5–14.

The workshop materials will be available to print or download on the Learning and Teaching Scotland 5–14 website (www.LTScotland.com) from early 2001.

The workshops have been arranged in a broadly sequential order but can be altered according to the priorities of different establishments. Alternatively, a selection of the workshops, suitably customised to suit the circumstances of individual schools, might be combined to form a part- or full-day staff development programme. Further, there is the useful possibility of the resource being used to form the basis of associated school group working or specific primary–secondary liaison initiatives.

The workshop material has been given a standard format. It comprises A4 sheets and includes, for example, the task title and the suggested time allocation, purpose and audience, reference materials and equipment needed, and organisation and methodology.

The workshops cover the following topics.

- ICT and its place in the curriculum
- The guidelines – strands and attainment targets
- The guidelines – the need for planning
- ICT across the curriculum
- The role of the ICT coordinator
- Safety and legal issues
- Learning and teaching – school board/PTA
- Communication with home and parents

Action points – ideas for getting started

Many schools will be considering developing action plans to support implementation of national guidelines. The following framework offers a possible model covering the main issues. This framework is expanded in greater detail on the 5–14 website.

Implementing 5–14 ICT in school: action points – ideas for getting started

- | | | |
|---|---|--|
| 1. Find out where the school is now | ➔ | <ul style="list-style-type: none"> • What is the current provision in curriculum, resources, for training, and for other needs? |
| 2. Find out where the school needs to be | ➔ | <ul style="list-style-type: none"> • What do I know of national developments for ICT? • What do I know of my local authority's plans for ICT? • What are the implications for the school library? • Will ICT be used to enable community access and contribution? |
| 3. Decide how the school will get there | ➔ | <ul style="list-style-type: none"> • How does one involve the whole school community, and gain its commitment and support? • What are the expectations for all staff? • What are the particular expectations for promoted staff? • What are the particular expectations for classroom and department management? • How will the school introduce the guidelines to parents and communicate with parents? • What about pupils' ICT experiences outwith school? • What about pupils' stages of learning within your school but outwith 5–14? • What about liaison with associated schools? |
| 4. Create an ICT section in the school development plan | ➔ | <ul style="list-style-type: none"> • Decide how developments will be led, managed and coordinated. • Publish and share the school development plan with the school community. • Action planning |
| 5. Conduct a staff training ICT needs assessment | | |
| 6. Review the curriculum, building in ICT 5–14 national guidelines | | |
| 7. Consider approaches to teaching and the structuring of tasks | | |
| 8. Consider how ICT can have impact on a range of learning approaches | ➔ | <ul style="list-style-type: none"> • The quality of pupils' learning • Improving attainment • Meeting pupils' needs |
| 9. Consider the ICT present learning environment and what is needed to deliver the curriculum | ➔ | <ul style="list-style-type: none"> • Consider the need for resources including technical support. • Coordinate the provision of staff development and training with the available resources at the school. |
| 10. Determine how assessment, recording and reporting for ICT will be done | | |
| 11. Consider developing a policy statement for ICT across the school | ➔ | <ul style="list-style-type: none"> • Access issues • Undesirable material • Copyright • Information ethics • Acceptable use • Responsible use • Informed use |
| 12. Determine how monitoring and evaluation of ICT will be carried out | ➔ | <ul style="list-style-type: none"> • Conduct monitoring and evaluation and review progress. • As a result of the review amend ICT school development plans as appropriate. • Consider how ICT will be applied to management and administration. |

Exemplification of ICT 5–14 strands

The tables of exemplification have taken as a starting point the strands and attainment targets described in the framework and set out in *Information and Communications Technology: 5–14 National Guidelines*. It is worth reinforcing the statement contained in the national guidelines.

It is important to recognise that this framework is a way of describing the curriculum and of identifying the desired outcomes of learning in ICT; it does not prescribe a particular approach to teaching.

*Information and Communications Technology: 5–14 National Guidelines,
Learning and Teaching Scotland, 2000*

In planning for learning in ICT careful consideration should be given to the nature and content of the seven strands.

- *Using the technology*
- *Creating and presenting*
- *Collecting and analysing*
- *Searching and researching*
- *Communicating and collaborating*
- *Controlling and modelling*
- *Developing informed attitudes in relation to ICT in society*

In primary schools, the tables of exemplification will provide assistance in planning for coherence and progression through P1–P7, and in secondary schools individual departments can be invited to examine their current provision against these and to share the information with other departments. This will reveal duplication or gaps. School clusters will find the tables useful in offering a common set of examples and promoting negotiations on coverage. Some individual teachers might feel that the degree of specification in the tables is extremely challenging, while others will appreciate the support this offers.

The real translation of learning through ICT will come from the more incremental but vitally important task of examining schemes of work and programmes of study with a view to building in the ICT.

The real translation of learning through ICT will come from the more incremental but vitally important task of examining schemes of work and programmes of study with a view to building in the ICT.

The exemplification reproduced here draws on examples of current practice collected from a number of schools. However, it is unlikely that many schools are in a position to ensure immediate coverage of the strands in total and instead will use the statements in the national guidelines and these tables of exemplification initially as a reference point for development planning. In particular, the resources available in a school will determine which strands can be fully developed, or planned for. As additional resources become available, including teachers' skills, more can be progressively tackled.

Two further features of these tables should be noted. First, and importantly, the tables are *not* 'programmes of study' in ICT, rather they are guides to assist schools in planning their own provision for skills development in pupils for their ICT experience, to then apply through the curriculum. Secondly, they represent a possible analysis at this point in time and much of the detail may quickly be replaced by the facilities offered by emerging technologies, software and services.

Using the Technology

Exemplification of Strand

Main features of the strand	Level A	Level B
The computer interface	Use a mouse to point/click, and navigate through suitable applications.	Use menus and further mouse controls, e.g. double click, drag. Use suitable keyboard short cuts.
Hardware and responsible use	Start up/shut down the computer.	Insert and start up a CD-ROM. Start and close an application. Create a new document in an application.
Networks and communications		Understand that computers can be interconnected. Use a 'username' and 'password' to log on.
Computer peripherals	Use a keyboard/concept keyboard to enter familiar words and phrases (e.g. own name). Print by clicking a 'print' button.	Use a keyboard confidently, including shift, caps lock, delete and return. Print using a menu. Load printer with paper.
Storing work and file management	Save and retrieve work with support, using a named file.	Save and retrieve work independently in a named folder. Change filenames.

Level C	Level D	Level E	Level F
<p>Understand and use the components of a 'windows' environment, e.g. desktop, icons, menus, windows (and their elements).</p> <p>Switch between applications.</p>	<p>Find a file using, e.g., the 'find' or 'search' facility.</p> <p>Use help facilities with support.</p>	<p>Use help facilities without support.</p>	
<p>Use a computer securely and responsibly and understand the need for these measures.</p>	<p>Understand that computers can be different in type of format, e.g. portable computers, computers built into appliances.</p>	<p>Interpret simple computer specifications, such as speed and memory.</p>	<p>'Troubleshoot' using manuals and online help to resolve simple hardware and software problems.</p>
<p>Use a computer on a network.</p> <p>Understand local area networks and wide area networks, e.g. school/intranet/internet.</p>	<p>Be aware of the different ways of connecting to wide area networks and the speeds of transfer.</p>	<p>Understand the costs of accessing network services.</p> <p>Understand where and why controls and restrictions are placed on network services.</p>	
<p>Use another input device, for example scanner or digital camera, with support.</p> <p>Change page setup and other printer options.</p>	<p>Use other input devices independently, e.g. scanner or digital camera.</p>	<p>Use other peripherals as appropriate.</p>	<p>Understand in simple terms how a computer, peripherals and software work together.</p>
<p>Understand and use simple file hierarchies.</p> <p>Understand the difference between hard discs and removable discs (floppy discs).</p> <p>Use removable media (floppy discs).</p>	<p>Understand the need for backing up files, and be able to do so.</p> <p>Understand the advantage of being able to share files with others and be able to do this by one method (removable media, file transfer, file servers).</p> <p>Be aware of the capacities of different media.</p>	<p>Copy/duplicate discs.</p>	<p>Understand the general 'write once' nature of CD-ROM.</p>

Using the technology – exemplification of strand

Creating and Presenting

Exemplification of Strand

Main features of the strand	Level A	Level B
Text handling	<p>Create one or more sentences without teacher support.</p> <p>Using appropriate software, begin word-processing skills by using some text-handling features, for example:</p> <ul style="list-style-type: none"> • enter text through keyboard using, e.g.: <ul style="list-style-type: none"> – spacebar – shift – enter – delete keys • amend text by deleting. <p>Where appropriate children may:</p> <ul style="list-style-type: none"> • enter text through concept keyboard overlays • enter text through speech-recognition package. 	<p>Create a piece of text, e.g. a menu, invitation or story.</p> <p>Using appropriate software, extend word-processing skills by using additional text-handling features, e.g.:</p> <ul style="list-style-type: none"> • insert/delete text using: <ul style="list-style-type: none"> – mouse to position cursor – arrow keys to position cursor • insert/delete text from menu using copy, cut and paste • edit text using font, style, size and colour • print-out work. <p>Where appropriate, children may enter/edit text through a speech-recognition package.</p>
Graphic manipulation	<p>Create a picture.</p> <p>Using appropriate simple art/drawing/graphic software, begin graphics manipulation skills by using some basic features, e.g.:</p> <ul style="list-style-type: none"> • pencil (line tool) • fill • stamps/templates • delete • paintbrush. 	<p>Create a picture/document.</p> <p>Using appropriate simple art/drawing/graphic software, continue graphics manipulation skills by confidently using features and showing ability to change attributes, e.g.:</p> <ul style="list-style-type: none"> • alter line width • fill shapes using colour and patterns • reposition graphics.
Multimedia manipulation	<p>Add text to a picture.</p>	<p>Create a multimedia page using appropriate software incorporating, e.g.:</p> <ul style="list-style-type: none"> • text • graphics • sound • animation • video.

Level C	Level D	Level E	Level F
<p>Create and edit a document, e.g. a report, newspaper article or letter.</p> <p>Using appropriate software, extend word-processing skills by using more text-handling features, e.g.:</p> <ul style="list-style-type: none"> justify centre page break undo. <p>Where appropriate, children may enter/edit text through a speech-recognition package.</p>	<p>Create and edit a document, e.g. card, calendar, school newspaper.</p> <p>Using appropriate software, extend word-processing skills by using a range of advanced text-handling features, e.g.:</p> <ul style="list-style-type: none"> position graphics and text wrap tabs margins line spacing spell check thesaurus print preview columns search and replace. <p>Where appropriate, pupils may continue to use a speech-recognition package.</p>	<p>Create a document incorporating textual, graphical and statistical information.</p> <p>Using appropriate software, extend word-processing skills by using more sophisticated text-handling features, e.g.:</p> <ul style="list-style-type: none"> insert date, time, page, etc. bullet points numbering header/footer tables page set up borders. 	<p>Create a document using a desktop publishing software package.</p> <p>Using appropriate software, extend word-processing skills by using a large range of text-handling features, e.g.:</p> <ul style="list-style-type: none"> caption footnote index cross reference. <p>Explore various desktop publishing software packages.</p>
<p>Create a document, e.g. a class newspaper or poster.</p> <p>Using appropriate powerful art/drawing/graphic software, continue graphics manipulation skills, e.g.:</p> <ul style="list-style-type: none"> copy and paste graphic/digital image into a word-processing/drawing/painting program change size of graphic by clicking and dragging. <p>Add text into a drawing/painting/art program.</p> <p>Add graphics to a word-processing program.</p>	<p>Create a document, e.g. a magazine or advertisement.</p> <p>Using a range of drawing/painting facilities, extend graphics manipulation skills, e.g.:</p> <ul style="list-style-type: none"> align scale by per cent move to front/back patterns/gradient rotate text wrap copy and paste graphics/text/sound from the internet. 	<p>Create a document using a wide range of graphical material, e.g.:</p> <ul style="list-style-type: none"> scanned images digital photographs clipart. <p>Manipulate images/graphics using graphic programs and/or appropriate software.</p>	<p>Create a document.</p> <p>Using more sophisticated features of drawing/painting/art software produce a well-presented document incorporating a high level of graphics manipulation.</p>
<p>Create a simple presentation/slide show/web pages using appropriate software. Incorporate, e.g.:</p> <ul style="list-style-type: none"> graphics text background colour/patterns <p>from limited sources, e.g.:</p> <ul style="list-style-type: none"> clip-art packages CD-ROM. 	<p>Create a slide show/presentation or web pages using more sophisticated software and with teacher support. Incorporate, e.g.:</p> <ul style="list-style-type: none"> text graphics sound <p>from various sources, e.g.:</p> <ul style="list-style-type: none"> clip-art packages CD-ROMs the internet digital/scanned images. 	<p>Create a presentation or web pages using appropriate software. Working independently, incorporate, e.g.:</p> <ul style="list-style-type: none"> text graphics sound video <p>from various sources, e.g.:</p> <ul style="list-style-type: none"> clip-art packages CD-ROMs the internet digital/scanned images. 	<p>Create a presentation and/or web pages using appropriate software with confidence. Incorporate, e.g.:</p> <ul style="list-style-type: none"> text graphics sound video animation <p>from various sources, e.g.:</p> <ul style="list-style-type: none"> clip-art packages CD-ROMs the internet digital/scanned images.

Collecting and Analysing

Exemplification of Strand

Main features of the strand	Level A	Level B
Concepts	Understand that information in a database has a consistent format.	Demonstrate understanding of the need for accuracy in data entry.
Database skills	Use simple pre-defined databases, e.g. look up information about animals using a simple index.	Enter data into a pre-defined database using, e.g., the keyboard, pick lists. Browse records. Produce a simple report (with support) and interpret the output.
Spreadsheet skills		Use simple spreadsheets and show an understanding of the information displayed.
Problem solving	Demonstrate an understanding that computers can be used in problem solving.	Tackle simple problem-solving activities using suitable software.

Level C	Level D	Level E	Level F
<p>Use the basic structure of a database, different field types (text, numeric, picture). Understand the need to interpret a request for information in order to interrogate a database. Understand the basic structure of a spreadsheet (row, column).</p>	<p>Be able to use the structure of a spreadsheet (rows, columns, labels, formulae).</p> <p>Explain the basic differences between a spreadsheet and a database.</p> <p>Choose type of chart to best display the data.</p>	<p>Show understanding of the need to analyse problems, plan and implement solutions and evaluate their effectiveness.</p>	<p>Use a range of field types including, e.g., date, calculation, and make use of their advantages in searching and sorting databases.</p> <p>Identify similarities and differences in databases and spreadsheets.</p>
<p>Define fields and simple report formats.</p> <p>Search databases.</p> <p>Produce simple reports and interpret the output.</p>	<p>Define fields and report formats. Search and sort databases.</p> <p>Produce reports by selecting fields.</p> <p>Interpret the output.</p>		
<p>Enter data into a simple spreadsheet.</p>	<p>Set up a simple spreadsheet (labels, data, formulae).</p> <p>Create suitable charts from the spreadsheet data.</p>		<p>Use more advanced spreadsheet functions, e.g. replication, formulae.</p>
	<p>Interpret the charts.</p> <p>Solve straightforward problems by creating databases, using them appropriately and evaluating the solutions.</p>	<p>Solve more complex problems by creating databases, using them appropriately and evaluating the solutions.</p> <p>Model straightforward scenarios using spreadsheets, represent the data graphically, carry out 'what ifs' and evaluate the models.</p>	<p>Solve complex problems that involve a choice of spreadsheet or database or both.</p>

Collecting and analysing – exemplification of strand

Searching and Researching

Exemplification of Strand

Main features of the strand	Level A	Level B
<p>Where to search</p>	<p>In class and elsewhere within the school.</p> <p>In magazines, newspapers, comics, photo albums and electronic sources.</p>	<p>Understand that many paper-based sources are now available electronically.</p> <p>Recognise particular CD-ROMs or software packages as resources for acquiring information.</p>
<p>How to search</p>	<p>Ask prepared questions.</p> <p>Play guessing games.</p> <p>Look at websites with teacher help.</p>	<p>Access information on a specific CD-ROM with support.</p> <p>Use in-built website e-mail to make contact and ask for information.</p> <p>Use bookmarks set by the teacher to access websites and use simple keyword searches in these.</p>
<p>How to extract the information</p>	<p>Talk about important features of what has been found out.</p>	<p>Discuss in more detail how relevant information is extracted.</p>
<p>How to evaluate the results</p>	<p>Be encouraged to ask questions, such as 'Is this what we wanted to find out?'</p>	<p>Check information from one source to another, e.g. reference book and CD-ROM.</p>

Level C	Level D	Level E	Level F
<p>Make use of teletext facilities for a specific task, e.g. find the local weather forecast.</p> <p>Carry out an interview and collate and publish the information gained.</p>	<p>Search across a range of media (e.g. internet, e-mail, TV, radio, published materials, etc.) with a view to presenting the findings in a multimedia format.</p>	<p>Use timetables on the internet – rail, bus, air travel.</p>	<p>Make use of specialist search engines, e.g. in different subject areas.</p> <p>Use online language translators.</p>
<p>Access information from a CD-ROM encyclopaedia independently.</p> <p>Use links supplied within a website to search for information in related sites.</p> <p>Enter a specific URL to access a particular website.</p> <p>Use the toolbar or menu to navigate within a website.</p>	<p>Understand and be able to use synonyms.</p> <p>Understand the use of keywords to locate specific information.</p> <p>Use a search engine to identify websites containing specific information.</p> <p>Use bookmarks (favourites) to store addresses of useful sites.</p>	<p>Refine searches by adding additional search strings and by using logical operators.</p>	
<p>Print information found.</p>	<p>Save text and graphics captured from web pages and assemble these into simple word-processed documents.</p>	<p>Online exercises, e.g. held on intranet, to gather information and produce reports, e.g. work on volcanoes in science.</p> <p>Downloading files; understanding of file types and sizes.</p>	<p>File transfer.</p> <p>File compression.</p>
<p>Compare information found on a website with the task set.</p>	<p>Compare two websites of similar content (e.g. daily newspapers) for usefulness and ease of use.</p>	<p>Make critical evaluation of information obtained.</p>	<p>Compare a range of search engines.</p> <p>Examine the sources of websites, e.g. national organisations, e-commerce, 'fun', and compare style, purpose, etc.</p>

Searching and researching – exemplification of strand

Communicating and Collaborating

Exemplification of Strand

Main features of the strand	Level A	Level B
Phone	<p>In role play use mock equipment. Talk to others in, e.g., a play corner about:</p> <ul style="list-style-type: none"> • friends • shopping lists • complaints • enquiries. <p>Pass on simple information such as:</p> <ul style="list-style-type: none"> • information required to complete a task • directions to reach a location • list of items for collection as part of an arranged call. 	<p>Answer the telephone, identifying the location, as part of a shared series of activities, such as a project on the emergency services.</p> <p>End a telephone call using accepted protocols.</p> <p>Dial a number taken from a phone list or directory to:</p> <ul style="list-style-type: none"> • provide information • acquire information. <p>Redial a number.</p>
Fax		<p>Carry out procedures to receive a fax (single and multiple pages).</p> <p>Receive drawings, diagrams and written information as part of a series of shared activities.</p>
E-mail	<p>Open a simple message from a mail box.</p> <p>Read a simple message.</p> <p>Type a simple message in the e-mail message window.</p> <p>Click on the appropriate button/command to send a completed message.</p> <p>Print a message to keep a record or to provide information to others.</p>	<p>Type an appropriate response as a reply to a received message.</p> <p>Create and address a message, using an address book. Insert a message title and include information on the new message.</p>
Videoconference	<p>Speak to someone at distance. Be given the opportunity to observe a videoconference call and say hello to the people at the other site.</p> <p>Participate in a short conversation with someone as part of an organised series of activities:</p> <ul style="list-style-type: none"> • asking a set of prepared questions • answering a set of prepared questions. 	<p>Under supervision, operate videoconferencing equipment in order to call another site under supervision.</p> <p>Close a videoconferencing call, adhering to established protocols.</p> <p>Participate in a conversation with someone, or as part of a group using the hands-free facility, to:</p> <ul style="list-style-type: none"> • ask questions • provide answers • participate in a short quiz.

Level C	Level D	Level E	Level F
Deal with a wrong number connection. Use accepted procedures where a wrong number connection is made.	Use the hands-free phone facility, if available, as part of a group discussion. Leave a message with the distant party, including your location, contact number and availability. On receiving a call for someone who is unavailable, take simple but accurate notes on the reasons for the call and find out the caller's: <ul style="list-style-type: none"> • future availability • full telephone number • other contact details. 	On encountering an answering device leave simple but accurate information on: <ul style="list-style-type: none"> • your name and telephone number • reasons for your call • your future availability. 	
Dial and send a fax (single page). Send a drawing, diagram or written information as part of a series of shared activities.	Dial and send a fax (multiple pages). Send drawings, diagrams and written information as a personal or shared activity.	Create a fax cover sheet with appropriate information.	Keep written or printed records (catalogue) of sent/received faxes.
Carry out the correct login procedures to connect to an e-mail server. Carry out the correct logoff procedures to connect to an e-mail server. Know how to disconnect and reconnect to the e-mail server, in order to work offline.	Send a copy of a message (c.c. a prepared message to someone). Save previously sent messages. Delete old messages where appropriate.	Attach a previously prepared file to an e-mail message. Download a previously prepared file sent as part of an e-mail message. Follow the procedures for setting up a shared, on-screen activity. Follow the procedures for closing a shared, on-screen activity.	Compress a file using the appropriate software, with the intention of attaching to an e-mail message. Decompress a file that has been attached to a received e-mail message. Send a message to multiple addresses. Add addresses to a contact list. Add new addresses to a prepared e-mail address book.
Switch on videoconferencing equipment following all safety regulations set by the school. Open the appropriate program for videoconferencing to launch the appropriate videoconferencing software. Prior to a call, open and use the 'self-view' facility within the program to check and reposition the on-camera position. Close on completion.	Participate in an on-screen, shared activity. Share a piece of on-screen work with another at distance to: <ul style="list-style-type: none"> • prepare a shared survey • design a card, logo/letterhead or magazine graphic • compile a simple database • create a short story or poem • complete an interactive worksheet on a specific curricular area. 	Follow the procedures for saving the results of a shared, on-screen activity, offline, to disc. Send and receive a file during a videoconferencing call.	Locate and share a file during a shared activity. Be able to locate/open/print a received file from a distant partner. Create a new file during a shared activity. Be able to create a new file as part of an on-screen, shared activity.

Communicating and collaborating – exemplification of strand

Controlling and Modelling

Exemplification of Strand

Main features of the strand	Level A	Level B
Position, movement and direction	<p>Understand the following words related to movement/ direction:</p> <ul style="list-style-type: none"> • up, down • left, right • forwards, backwards. 	<p>Move their body from a standing position in different directions, e.g. 'forward two paces', 'turn to the left', 'lift up object', etc.</p>
Control/simulation software and operations	<p>Slide the pointer forwards, backwards, left and right on the screen using a mouse.</p> <p>Use the mouse button and pointer to reposition (drag) a graphic to any new position on screen.</p>	<p>Use the mouse button and pointer to reposition (drag and drop) graphics to specific locations on screen.</p> <p>With assistance, use suitable application software (e.g. LOGO) to control the movement of a real or virtual object (e.g. a turtle) at a basic level.</p>
Control hardware	<p>Explore the use and operation of simple devices.</p>	<p>Use with assistance, e.g. a static (fixed base) robot arm, controlling it using immediate single-step instructions.</p>
Knowledge of terms and uses	<p>Use appropriate vocabulary e.g. 'mouse', 'pointer', 'left', 'right'.</p>	<p>Name main parts of devices used, and describe what the devices can do and simulate.</p>
Control and design processes		
Input and output sensor/ devices		

Level C	Level D	Level E	Level F
<p>Understand and use:</p> <ul style="list-style-type: none"> right 90, left 90 clockwise/ anticlockwise to turn a 'human robot' (friend), also to use (open, close, grip) their hand to hold and lift an object. 	<p>Understand:</p> <ul style="list-style-type: none"> stop, start or go with reference to sequence of traffic lights. 	<p>Understand and use examples in different contexts, e.g. mathematics, science, technology.</p>	
<p>Use the mouse and arrow keys (if applicable) to select basic options in a simple simulation software application/game.</p> <p>Draw any basic design (square, rectangle, etc.), on screen using a control software application (e.g. LOGO).</p>	<p>Use the keyboard and mouse to operate fully a simulation/ adventure software application/ game.</p> <p>Use the control software application with repeat/loop command(s) to make a basic pattern on screen and print the results.</p>	<p>Know and understand the term 'simulation'.</p> <p>Have an appreciation of the positive value that simulation software brings to people in terms of safety, cost, training, etc.</p>	<p>Load and run simulation software, and using basic instructions program the required task.</p> <p>Use design software to create a small graphic logo/motif. Save, print and transfer using a device, e.g. to fabric.</p>
<p>Use a mobile robot and control it to follow a precise path on the floor (e.g. maze).</p>		<p>Investigate and report on specialist control devices, e.g. hardware that assists a person with a disability.</p>	
<p>Know and be able to label the main parts of a robot arm, e.g.:</p> <ul style="list-style-type: none"> forearm wrist gripper. 	<p>Know what CNC/CAM (Computer Numerical Control/ Computer Aided Manufacture) stands for.</p>	<p>Have appreciation of the positive value that control devices bring to people/society, e.g. those that:</p> <ul style="list-style-type: none"> lift heavy objects have the ability to work remotely in hazardous environments are re-programmable operate with great accuracy. 	<p>Name and understand the uses of the robot arm tools such as:</p> <ul style="list-style-type: none"> gripper suction cup ladle electromagnet welder.
<p>Witness (using video) and know what CAD (Computer Aided Design) stands for.</p>	<p>Witness (using video or alternative) the CNC/CAM process.</p>	<p>Witness (e.g. using video) robots in action in the production of a manufactured product.</p>	<p>Know and understand open- and closed-loop control.</p>
<p>Know and understand the terms 'input device' and 'sensor'.</p>	<p>Give examples of where input sensors may be used for:</p> <ul style="list-style-type: none"> temperature moisture light sound. 	<p>Know and understand the term 'output device'.</p> <p>Give examples of output devices in use, e.g. motor, buzzer, flashing light bulb.</p>	<p>Know and understand the terms 'input' (feedback from sensors) 'decision' (made by computer) and 'action' (output as a result of the decision).</p>

Controlling and modelling – exemplification of strand

Developing Informed Attitudes

Exemplification of Strand

Main features of the strand	Level A	Level B
<p>Know where and how ICT is used</p>	<p>Know and give some basic examples of places where computers/ICT are used in society, e.g.:</p> <ul style="list-style-type: none"> • homes • schools • banks • shops • library. 	<p>Know and give some examples of how/in what ways computers/ICT are used in:</p> <ul style="list-style-type: none"> • games • typing • counting money • adding up bills • recording information on books.
<p>Know why ICT is used</p>	<p>Know and give some examples of why computers/ ICT are used:</p> <ul style="list-style-type: none"> • in leisure/relaxation • in quality letters/documents • for accuracy • for speed • to make information easy to find. 	
<p>Implications of ICT</p>		<p>Progressively show when and where it is not appropriate to use ICT for a task.</p>

Level C	Level D	Level E	Level F
<p>Know and give some examples of places where these positive values (below) can be seen and how they bring positive values.</p> <ul style="list-style-type: none"> • Emergency services – speed • Transport – punctuality • Factories – quality control • Banks – accuracy • Supermarkets – speed of service • Advice/helplines • Fast information and support 	<p>Have appreciation of and discuss how computers/ICT change or affect a specific area of their choice, such as in:</p> <ul style="list-style-type: none"> • a newspaper • sport • education • industry • space/underwater exploration. 		
<p>Have appreciation of the positive value computers/ICT bring to people/society in terms of:</p> <ul style="list-style-type: none"> • communication • speed • accuracy • safety • quantity/quality. 	<p>Have appreciation of why computers/ICT require varying levels of security, with respect to:</p> <ul style="list-style-type: none"> • unauthorised access to private information • invasion of privacy • nuclear arms • viruses/bugs. <p>Investigate/explore one of the above areas and write up a paragraph/brief report on the area.</p>	<p>Have appreciation of why the following legislation has been introduced as a result of increased use of computers/ICT.</p> <ul style="list-style-type: none"> • Computer Misuse Act • Data Protection Act. 	
<p>Consider the implications in the use of computers/ICT focusing on:</p> <ul style="list-style-type: none"> • the user/worker • the customer/client • the business/organisation. 	<p>Have appreciation of the less desirable value(s) that computers/ICT might bring to people/society, e.g.:</p> <ul style="list-style-type: none"> • in employment • health concerns • social impact. 	<p>Have appreciation of the responsibilities that society has in using computers/ICT/ internet, focusing on issues such as:</p> <ul style="list-style-type: none"> • racism • terrorism • threats to young people. 	<p>Know and understand the positive and negative benefits of universal access to knowledge and the accelerated interchange of ideas and information.</p>

Developing informed attitudes – exemplification of strand

How ICT influences, shapes, extends or enhances the 5–14 curriculum

ICT can be applied across the 5–14 curriculum and in a wide variety of ways.

ICT can be applied across the 5–14 curriculum and in a wide variety of ways. Drill and practice, such as simple addition in mathematics, spelling reinforcement in language or recognition of musical notes on a staff, was the sort of use that very much characterised the early use of computers in schools. These applications are most effective in helping pupils with a specific difficulty and require careful matching of individual pupils to particular pieces of software or the use of special equipment such as a concept keyboard.

There remains a place for such uses of ICT but it is important to think of broader learning goals and particularly of where ICT can be deployed flexibly and used productively with many pupils and in a variety of circumstances.

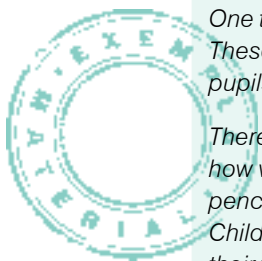
Language development

One of the most impressive features of ICT use is the amount of pupils' talk generated. A group of pupils working with ICT gives a natural focus for talk and all its features of participation, listening and reflection. The range of activity possible is significant and could include:

- using software designed specifically to promote reading with early stages
- work involving a word-processor and the dialogues necessary to correct and improve text
- using a database to collect, analyse and discuss information in science or social subjects
- discussion involving the use of a digital camera to illustrate a project or assignment
- a collaborative investigation of an internet website or remote database in order to obtain information for a study.

One of the most impressive features of ICT use is the amount of pupils' talk generated.

The important ICT skill of word-processing offers significant opportunity for shared writing tasks, amending drafts and justifying the reasons for change. In addition it brings the development of presentational skills and also the important reward of a well-finished document. The facility to illustrate documents with text and sound simply add to the creative potential of language and ICT working together. This is a creativity that can be employed from the earliest stages, with pupils enjoying reading their own stories, to the sophisticated personal research multimedia presentations that pupils at even a relatively young age can now achieve.



One teacher used small, hand-held, dedicated word-processors with her infant class. These were used as preparation and practice to use later on the class PC system. The pupils worked in pairs.

There was more value in this activity than I had first anticipated. I just hadn't appreciated how well the pupils worked together and shared out the work. When they use paper and pencil and work in pairs one usually does all the work while the second looks bored. Children discuss their work far more than when writing it by hand. Pupils have more pride in their work once it is printed off because it is neater and will show no rubbings out or crossings out. Pupils felt it was all right to make mistakes because no one would know what they had done once the final version was printed. It was also interesting how much more writing was produced, especially from less-able pupils.

Background from NOF training provider

Word-processing can also act as a useful tool in the development of reading skills, and indeed the flow across language skills is facilitated by the use of ICT including computers, faxes, cameras, recorders and, of course, the telephone.

Over time, by matching ICT and programmes of study in English language, it will become clear that each can support the other. For example, writing at Level D can incorporate most Level D ICT strands including:

- *creating and presenting*
- *searching and researching*
- *using technology*
- *communicating and collaborating*
- *collecting and analysing.*

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Other aspects of language work are also covered. For example:

One secondary English department set up a lesson sequence as part of a drama unit focusing on bullying. The work sought to develop work in drama activities, speaking and listening. The intention was also to support the school's personal and social development and health education programmes. The staff sought to explore the features and effects of bullying and how it could be stopped by way of:

- rational debate (rights, causes and solutions)
- affective experience (empathy, role play and poetry)
- representation (conveying ideas through verbal and visual images, through the conventions of drama, poetry and media).

In the ensuing work pupils engaged in all the areas of activity outlined above, including the use of computers for text generation and digital cameras for presentation. The technical and ICT aspects explored were:

- drama – still images, roleplay, improvisation and freeze frame
- media – point of view, camera angle, representation
- ICT – exploring digital technology, zoom, framing, composition, image, word-processing, desktop publishing, importing images, cut-and-paste and fonts.

Background from NOF training provider

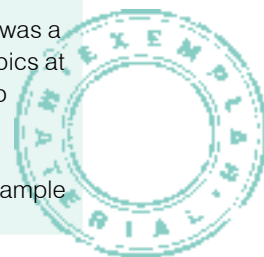


Mathematics

In mathematics the range of support from ICT and opportunities to develop ICT skills and concepts have developed steadily over the past few years.

One local authority set up a working party to examine where ICT could be used to support a nationally used mathematics scheme. The result of the work of the group was a CD-ROM package with supporting worksheets covering a range of mathematics topics at levels A–E. The package not only matches to the published scheme of work but also matches ICT and mathematics 5–14 outcomes.

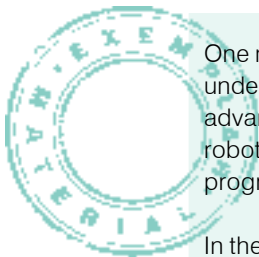
Local authority example



There remains scope for using ICT in the reinforcement of number bonds and basic numeracy that have become a familiar teaching tool in many classrooms. Where ICT can be applied to problem-solving tasks, real opportunities exist to exploit the potential of both the technology and the pupils. LOGO programming can be used to drive floor or screen turtles, to explore the thinking skills involved in programming sequences of actions and in tackling problems in shape, position and movement. These can be contextualised in an adventure-type setting, such as an escape from pirates or a journey through a set of mountain gorges. In this type of context, once again opportunities are provided to work across the curriculum and develop language and technology skills as well as mathematics. In such work it is important to not only solve pre-set problems but also to encourage pupils to ask questions such as:

- 'Can we make a pattern with right-angled triangles and squares?'
- 'What sort of patterns can we make using six right-angled triangles?'
- 'How many patterns can we make using ten octagons?'
- 'What sort of pattern might appear if we change the number of "repeat statements" in our procedure?'

An important element of this sort of work is encouraging pupils to hypothesise before actually carrying out action on the screen or floor. Confidence in this sort of manipulation both on and off screen will certainly stimulate pupils towards the use of more readily available computer design programs for everything from garden design to plans for model machines and buildings.



One middle stages primary teacher used a small Lego kit robot to reinforce pupils' understanding of time and distance. In this case the teacher constructed the robot in advance to keep the focus of the work on mathematics. Pupils could have constructed robots as part of a related task or use could have been made of commercial programmable floor robots.

In the work undertaken by the pupils, the robot was programmed to run a number of journeys of the same straight course but with each journey set to a different time limit. In this way the pupils began to see patterns and relationships in time and distance and went on to record these findings in a series of bar charts. In her work the teacher covered mathematical skills and concepts such as measure, accuracy, bar graphs, pattern, sequence, time, distance, fraction and multiples. She also covered ICT elements in communicating, collaborating, controlling and modelling.

Background from NOF training provider

Alongside these ICT teaching tools sit the database and spreadsheet programs that allow the collection and analysis of information and allow the exploration of costing and other calculation exercises that are valuable in mathematics and other studies in science, technology and social subjects.



Fife Council education department has developed a suite of ICT support materials made available to all schools, which includes Units of Practice/lesson plans for possible classroom implementation. In the material on spreadsheets, exemplars are given of spreadsheet contexts such as a survey of homes by type, or personal fitness datasheets to include information on age, height, weight and performance in various fitness tasks. A further example embraces a survey of crisp preferences and includes the capacity to generate graphs from collected spreadsheet information. Teachers valued the exemplars given and the help it provided in structured planning and organisation.

Background from NOF training provider

Environmental studies, health and religious education

First-hand enquiry characterises science and technology work in 5–14 and care should be taken to avoid using simulations on computer or video when real experience offers learning gains and a firmer ground on which pupils may base their observations and predictions. However, the use of databases to record results, and to produce and present information in an effective way should be encouraged. Once again, the range of ICT applications is legion, including everything from recording visits to a playground bird table to analysing school classroom temperatures with a view to suggesting practical ways to achieve economies. Similarly, using the power of a computer to calculate or to monitor temperatures and – in conjunction with a camera or sensors – movement may open other avenues for supporting curricular work whilst developing ICT skills and competence.

... using the power of a computer to calculate or to monitor temperatures and – in conjunction with a camera or sensors – movement may open other avenues for supporting curricular work whilst developing ICT skills and competence.

Environmental studies, health and religious education may be contexts for a broad range of topics and activities, especially in the primary school. ICT can facilitate skill development in:

- observation
- collecting, organising, recording and retrieving information
- using a range of sources of information
- communicating findings, ideas and predictions in writing, pictures, models, diagrams, video and sound presentations.

Many teachers will be familiar with the early work done in these areas by software packages such as *The Desperate Journey*, where pupils were encouraged to empathise with the subjects of study, sometimes with the use of simulations in different contexts. Today improvements in graphics, sound and more powerful computers mean that pupils can use not only computer-generated simulations but can also draw on information through CD-ROMs containing multimedia data on real situations and places. In this way pupils are encouraged to seek and challenge the evidence and to develop their own hypotheses as well as assimilate accepted interpretations.



One primary school uses ICT to support work in environmental studies. A P7 study *Doon the Watter* is concerned with life on the Clyde at the turn of the nineteenth century including the then very fashionable Clyde holiday resorts. The teacher aimed to help pupils to:

- adopt methods of historical enquiry and to develop research skills across the curriculum
- use a variety of sources of evidence
- develop knowledge of how local people lived
- interpret, identify with and respond to situations and events in a variety of ways.

The focus of the study is on 'People in the past' and 'Using information technology'. The study makes use of a commercially available CD-ROM and takes place as part of the work over one term.

Planned tasks covered were:

- devising, carrying out and reporting on a questionnaire into current holiday destinations
- planning and costing a holiday 'doon the watter'
- creating a wall frieze of an esplanade
- designing and making a 3-D model of the Clyde and its environs
- compiling a holiday scrapbook
- investigating the impact of the holiday trade on the local area.

The ICT objectives set for pupils included:

- searching census databases and extracting information from given searches, and from self-devised searches
- extracting information from a range of sources within a CD-ROM, including oral accounts, pictures, film and photographs
- printing out relevant information (pupils' written work), for example a scrapbook of a holiday
- typing answers to questions on the CD-ROM.

Background from NOF training provider



In Argyll and Bute a pilot project involved a number of small remote primary schools and the National Museums of Scotland in Edinburgh. The project centred on developing video links between the schools and the museum so that pupils could access artefacts and information. This initiative not only gave schools 'virtual' contact with significant collections of material, it also facilitated schools and museum staff working together to support individual and inter-school projects. The sharing of skills in using the video technology and the rich dialogue between them are important features of the initiative.

Local authority example

In religious education, one secondary school teacher used ICT to encourage pupils to retell stories and use visual images to illustrate their own understanding and interpretations.

All RE teachers use the processes and techniques of text manipulation – organising, structuring, classifying, drafting, editing, amending, extending and correcting – to develop pupils' learning. Whilst these ideas are not new, the facilities provided by ICT can greatly improve the quality of pupils' tasks in the classroom. The capacity to employ charts, tables and graphs and particularly to call up visual images enables pupils to communicate effectively with one another and with a wider audience. RE teachers are very aware of the power of pictures in helping to explore religious events, symbolism or theological concepts. Using pictures available through the internet or from CD-ROMs can be especially effective across a variety of RE topics.

Background from NOF training provider



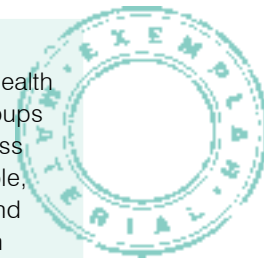
In health education the P7 pupils of another primary school made use of the World Wide Web.

A Fife Council NOF trainer worked alongside the classroom teacher to demonstrate internet teaching in context. The P7 class was researching its health topic using the Health Education Board for Scotland (HEBS) website. The pupils were working in small groups to gather information, then working as a whole class to collate their findings. The class worked on ICT tasks both at the computer and away from the computer. For example, pupils printed out selective pages from the site and then made posters by cutting and pasting the facts together creatively and illustrating the posters further with their own drawings and commentaries. They also played the health quiz on the website and e-mailed HEBS to offer congratulations on the quality and usefulness of its site.

The new ICT strands covered in this work were:

- *searching and researching*
 - Level C – use a web browser independently; print selectively
 - Level D – use a search engine; create bookmarks
- *communicating and collaborating*
 - Level D – carry out a simple shared activity, for example, group communication/ collaboration through e-mail.

Background from NOF training provider



The capacity of ICT to increase the range of information sources and generate a wider audience should be borne in mind. The internet can be used to provide information sources for data on, for example, local and global weather, news, significant specialised information through libraries and museums, music and contact with other web users. Contact with other schools through appropriate websites or e-mail raises the possibility of shared data collection in, for example, local area studies and provides a wider readership for the findings.

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The Science Online Support Network (SOLSN) is a pilot study managed by the Scottish Schools Equipment Research Centre (SSERC) to support teachers in primary schools in teaching science. The venture has involved the Scottish Executive Education Department (SEED) and three local authorities. The development has involved the creation of a CD-ROM (initially only for the pilot schools) that provides help and advice to primary teachers. The objectives of the SOLSN project are to:

- support Scottish primary teachers to improve their own understanding of science, assisting them in their own professional development
- seek to improve standards in the learning and teaching of science at the 5–14 level
- improve liaison and continuity of experiences of pupils across the primary and early secondary stages.

The support offered includes lesson plans, resource and equipment advice, teacher's notes, tips and worksheets. For more information, see the published report *Using ICT to Support Teachers in Primary Schools* (SCRE Research Report, SCRE, 2000).

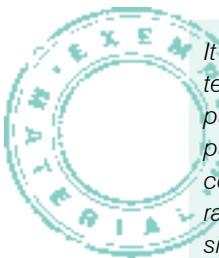
In the area of Scottish historical resources, the Scottish Cultural Access Network (SCRAN) website provides an invaluable searchable resource (www.scran.ac.uk). The resource contains over 300,000 records and is aiming to provide one million in 2001. SCRAN is a charitable organisation and has the backing of major cultural and media interests. It provides resource packs, classified by topic or curriculum stage, CD-ROMs and online access to a host of audio, visual and text-based resources.

Expressive arts

In expressive arts and physical education, ICT has a role to play ...

In expressive arts and physical education, ICT has a role to play as well as being a further context in which to develop ICT skills and concepts. In music, the use of midisynthesisers and keyboards allows for the development of music skills and the scope for composition and analysis of music on a note-by-note basis. The best music software allows pupils to create, edit, manipulate and mix sounds – to hear individual notes and phrases, or to play whole compositions.

ICT is a complement to existing music-making techniques and does not replace them. One music teacher in a secondary school commented:



It is my belief that pupils should engage with technology at the earliest opportunity so that technology skills and music learning move forward together, each feeding off the other. If pupils are not allowed to work with music technology until they are 13 or 14, the teaching of pure technology skills will need to be concentrated in time and abstracted from musical contexts. Valuable teaching time is then spent showing pupils how to use the technology, rather than music learning. It results, for example, in sequencing software being used simply as a means of producing neat printed-out copies of compositions rather than mediating with the compositional process.

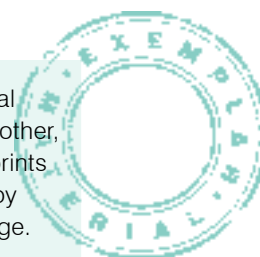
Background from NOF training provider

In art and design a range of software exists to give pupils opportunities to create, manipulate and modify designs, pictures and patterns. The facility to scan photographs or include digitised pictures and the availability of colour printers has meant that many more possibilities can be achieved in this curricular area. The medium also allows for the creation of animated films, and developments in software will soon make the inclusion of moving images a standard feature of presentation work.

A Fife primary school class teacher created a unit of artwork around the use of digital photographic images. The pupils used the digital camera to take portraits of one another, developed pencil drawings from the black-and-white pencil images, cut the colour prints in half and created some half-printed/half-drawn pictures. They also made posters by manipulating their images and adding text effects within a desktop publishing package. This activity matched to ICT guidelines in:

- *using the technology*
 - Level C – use another input device
- *creating and presenting*
 - Level C – create a document with text and graphics using more sophisticated software.

Local authority example



In physical education the above facilities are also useful in respect of information gathering and analysis. The importance of digital still and video cameras in helping improve performance has become obvious, not only in sports but also in other skills, such as in dance.

One teacher used digital video to record pupils' performance in games (volleyball) and then used the results to analyse individual and group performance to determine strategies for remedying problems and initiating development. It was particularly helpful in the case of one class group with two pupils with pronounced special educational needs, who were supported by a teaching assistant, and six other pupils with various less severe special needs. This supplied quality feedback to both teacher and assistant, helped to plan next steps and provided the pupils with the encouragement to play well and a reference point for discussion, and reinforced and reaffirmed the game rules and principles.

Background from NOF training provider



ICT has great potential to enrich and extend topics and studies of a cross-curricular nature, such as those designed to promote citizenship, sustainable development and the international dimension. In particular, as more schools benefit from increased ICT facilities, the strand 'Communicating and collaborating' can be developed in motivating and realistic settings.

From the commentary and examples in this section it is plain that within subject areas and particularly in cross-curricular studies, ICT has much to offer, while subject and cross-curricular working provides meaningful contexts for ICT development.

... within subject areas and particularly in cross-curricular studies, ICT has much to offer, while subject and cross-curricular working provides meaningful contexts for ICT development.

Approaches to teaching and the planning and structuring of tasks

Although ICT influences what we teach, it has the potential to shape how we teach. The emergence of the personal computer as an essential tool for the workplace is as true for teaching as for virtually every other professional walk of life. Computer technology allows teachers to consider a wider range of strategies and approaches across the curriculum and in their own personal planning and management. The availability of hardware and software is, of course, vital to the development of ICT and its application to the wider curriculum. However, teachers' attitudes to its use also have a bearing on future developments. Already there is significantly more collaborative planning and teaching in both primary and secondary schools and between the sectors. The development of ICT through a cross-curricular focus and within individual subjects means that there is much to be gained by sharing and understanding teaching objectives and approaches.

... ICT influences what we teach, it has the potential to shape how we teach.

Teachers are beginning to explore the use of tools, such as the interactive blackboard, whilst the wider availability of school networks and intranets has meant access to a greater range of software and tools for planning and recording progress. The development of communications through the internet and through local area networks, and the access to teaching and learning resources that this has opened up, imply that teachers and schools

Computer technology allows teachers to consider a wider range of strategies and approaches ...

should consider their role in respect of developments and how ICT will have impact on every level. Teachers should consider what benefits can be gained to support both themselves and their pupils by employing ICT, and the selection of any particular strategy will take account of a

range of options including those offered by ICT. This self-evaluation approach allows schools and teachers to define their current position as a basis for development. Self-evaluation and planning aspects are developed later in this guide.

Teachers' increased confidence in using ICT will benefit their teaching by helping them to:

- explain, demonstrate or consider areas of study more effectively than with other methods or teaching tools
- exploit the capacity of ICT to allow pupils to do tasks that otherwise might have been impossible – such as presentation of digitised photographic images
- exploit the capacity of ICT to permit easy changes to on-screen work and presentations
- provide almost immediate access to a vast array of information sources – World Wide Web, databases such as those run by national museums, CD-ROM-based information, as well as traditional sources such as tapes and videos.

Teaching approaches vary to meet the circumstances of individuals and classes. However, it is important to bear a few strategies in mind regarding ICT use.

- Holding a whole class or group discussion before engaging on a task helps to focus it.
- Encouraging pupils to discuss whether or not there is a need for discussion and planning before engaging on the task helps to foster higher-order skills in communication.
- A balance of tasks should involve simply using ICT as the most appropriate tool, for example word-processing to write a book review.
- Integrating ICT-related issues into discussions largely focused on another curriculum area will help young people to appreciate the usefulness of appropriate ICT use.

- Review of a task in process or at the end of a task is important in providing feedback to pupils on how they have performed. This will help to build pupils' confidences and will also inform assessment and review strategies.
- Technology sometimes fails to work and the well-prepared teacher will be able to deal with basic problems or, alternatively, have other activities available should failure occur.

How ICT can have an impact on a range of learning approaches

Just as teachers will see the impact of ICT on their teaching methods, learners will also be influenced by their use of it. ICT can be used to support current approaches to learning including individual and collaborative learning. The range of available hardware gives a variety of options for teachers to exploit, from specialised tools such as a screen-mounted camera or a touch screen, to individual computer notebooks and rooms or areas customised for ICT development work. This can involve the use of programs that diagnose, support and monitor individual pupil programmes of study and collaborative tasks such as shared problem solving.

Just as teachers will see the impact of ICT on their teaching methods, learners will also be influenced by their use of it.

Pupils in primary schools often use computers in pairs or small groups. This may be determined more by hardware availability than by a teaching purpose. However, research is beginning to indicate that teachers might consider relating types of tasks and organisation to different kinds of groupings. Some examples are as follows.

- Problem solving should use the collaborative nature of ICT work and be carried out in pairs or very small groups. Discussion of progress towards solutions and the shared assessment of outcomes and presentation on screen all work together for a positive learning experience.
- Opportunities should be available for individual computer use, particularly in developing specific ICT skills and also where it is important that pupils produce their own work.
- When working in mixed-ability pairs, care needs to be taken to ensure that both pupils contribute purposefully by a careful division of tasks.
- Teachers should observe closely in situations where pairs of pupils are engaged in a task to ensure that the dominant personality does not unduly influence the direction of a task outcome.
- Where larger groups are involved it is important that, either by specification or by prior agreement, all the pupils are clear about their roles so that no one is left out.

In secondary schools there may be more facilities for pupils to have greater opportunity for individual working. Here the teacher should be clear when group work is preferable to individual assignments, in order to ensure the benefits of collaboration and communication that working with ICT can bring.

Quality of pupils' learning

Pupils will readily respond where they can see the relevance of the tasks and studies to their lives and to the society of which they are a part.

It is central to effective teaching and learning to recognise the importance of motivation as a factor underpinning a pupil's participation in a learning task. The motivation provided by using ICT tools and equipment has been extensively researched. Both boys and girls are making increasing use of ICT tools in their everyday lives in everything from mobile telephones, interactive television, video and audio technology, to the internet. Pupils will readily respond where they can see the relevance of the tasks and studies to their lives and to the society of which they are a part. Teachers should try to ensure that pupil involvement in ICT focuses on activity rather than passive observation and that as far as possible pupils are given a high degree of responsibility for developing their own learning. The *communication* part of

ICT encourages interaction and collaborative working and teachers should capitalise on the opportunities that these features give them.

The *communication* part of ICT encourages interaction and collaborative working and teachers should capitalise on the opportunities that these features give them.



In Argyll and Bute a group of primary schools developed a joint project called 'Planet X'. This interactive project involved a range of media but was principally based on computers linked by e-mail, with other links such as fax and telephone forming important communications avenues. The project focused on fictional groups of space travellers who had landed in a range of locations on a hostile planet. Each group (an individual school) was allocated a different area of the planet with very different characteristics of hostility, such as a poisoned atmosphere, hostile creatures, freezing temperatures, etc. It was the job of the groups to communicate with each other and devise plans to overcome their individual and collective difficulties so that the group as a whole could survive. Each group possessed some specialist survival equipment although this was usually of use, not to them, but to another group on the planet. The whole project was geared to promote the use of ICT to facilitate communication, and resulted in positive collaboration and the deployment of a range of other skills across the 5–14 curriculum. The obvious enthusiasm and application of the pupils and their teachers was a marked feature of this initiative.

Report of school visit

ICT can improve pupil attainment

The development of pupils' attainment in ICT skills and concepts will be seen over time as pupils begin to work through programmes of study in different curriculum areas and sequences of skill- and concept-building outlined in national guidelines and this guide. It is important that schools not only plan and implement these programmes but also that they establish systems to record and monitor progress. This is developed further in the assessment section of this guide.

... development of pupils' attainment in ICT skills and concepts will be seen over time ...

The evidence is beginning to appear with regard to improving pupils' general attainment or attainment in particular subjects. The recently published HMI report, *The Use of ICT in Learning and Teaching* (Scottish Executive Education Department, 2000), indicates that while it is not always easy to quantify the extent to which pupils' attainment results solely from the effective use of ICT, it is making a key contribution. It is plain from both the HMI and teaching staff viewpoints in a number of cases that the role and contribution of ICT has been of paramount importance in the increased effectiveness of both teaching and learning.

In English language, from the early stages to S2, there are a number of examples of pupils making good use of computer skills to improve literacy. The use of the concept keyboard to develop reading and writing skills has had a positive impact with many younger pupils, who have improved their understanding of not only text decoding in reading but also text construction in writing.

It is plain from both the HMI and teaching staff viewpoints in a number of cases, that the role and contribution of ICT has been of paramount importance in the increased effectiveness of both teaching and learning.

In one primary school, pupils made extensive use of a commercial program that generated text, graphics and sound effects for pupils to produce individual storybooks to a high level of presentation standards. The pupils took great delight and pride in reading their stories to each other and to visitors. The school library also displayed a magnificent collection of these small books, which were read avidly by appreciative, and at times constructively critical, young readers who voiced not only language observations but also commented on how they would have used the technology differently to present the story.



Report of school visit

The HMI report describes how, in other schools, capitalising on the audience for class and school newspapers has also resulted in pupils becoming absorbed in a real task that has encouraged their development with regard to a range of important skills in organisation and communication, as well as language and ICT capability.

In mathematics, teachers have reported pupils gaining a greater general understanding of the aspects of shape, position and movement through the use of floor and screen turtles. Others report the database and spreadsheet capabilities of computers as having a significant effect on pupils' understanding of data collection and organisation as well as the presentational elements, such as a variety of graph types. Where such work is based on local and first-hand data, pupils have seen the application of their work in the context of local topics and issues, often with immediate spin-off in the areas of citizenship and community perspectives.

In environmental studies, many pupils' research skills, breadth of knowledge and understanding of different topics were improved through competent use of a range of ICT resources, including carefully controlled access to the internet. Pupils were confident in using internet search engines to find the required information. They could download images and text that broadened and consolidated their knowledge and understanding of important concepts in topics studied. They were able to select and use appropriate materials to enhance the content and presentation of their projects. Many pupils made effective use of a range of CD-ROMs to research information for personal projects. Pupils in one P7 had created their own CD-ROM.

The Use of ICT in Learning and Teaching
(a report by HM Inspectors of Schools:
Scottish Executive Education Department, 2000).

The HMI report supports the growing evidence that using ICT to develop the wider curriculum, and as an area of study in its own right, is beginning to show attainment gains on the part of pupils. This is signified by the examples of improved attainment cited in this

... using ICT to develop the wider curriculum, and as an area of study in its own right, is beginning to show attainment gains on the part of pupils.

section. This means that in considering their plans for the curriculum, teachers and management should now include ICT as a matter of course. (This theme is developed later in the planning section of this guide.) Further, in analysing pupils' attainment, schools should not merely note improvements or weaknesses but should use the data as part of a considered strategy that will:

- have a bearing on the degree to which ICT figures in the planned curriculum
- influence expectations of achievement by pupils within the targets set for pupils
- shape the access opportunities pupils have to ICT, taking account of their personal access outwith the classroom
- shape the level of resource provision and the distribution and scheduling of ICT equipment.

Meeting pupils' needs

Differentiation is a feature of all well-planned work at the 5–14 stages. In using ICT to develop any curriculum area the same principle applies and teachers will consider not only differentiating the curriculum-specific task but also any ICT work involved in developing it. The development of specific ICT skills and knowledge involves setting tasks that are varied and matched to ICT capability and take account of prior learning. In planning, teachers should ensure that tasks are accessible to all pupils, including those who are more capable with ICT and who require more challenging tasks to extend them. A differentiated approach ensures pupil involvement in some of the higher-order skills such as work planning, forming and testing ideas and self-evaluation of the completed tasks.



In one primary school, pupils investigated a new part of their local area each year as part of a rolling programme of mapping and studying the environment of the school and local community. The pupils and their teachers planned the areas of investigation and different groups undertook survey work that involved the pupils in recording and presenting their material. Extensive use was made of ICT, including recording interviews, using digital cameras and organising and presenting text. These pupils were at the final stages of their primary education and had been part of a strong school tradition of exploiting ICT to the maximum. The individual and group contributions by pupils were of a significant quality and there was clear evidence that pupils had consolidated and extended their learning. Of particular note was their demonstration of a number of skills in communication and organisation that had been built up over time. The work was also characterised by the way in which expectations of pupils in tasks and assignments were matched to capabilities of individual pupils.

Report of school visit

Collecting and sharing information

An important task for schools and teachers is to take account of the prior learning that pupils bring to the area of ICT. For schools with pupils for a settled period of time and where good home-school links are already established this task is made easier than in schools that have a high pupil turnover and where parents are less frequently involved in curricular discussions. For primary schools, information on pupils' exposure to ICT from associated pre-school providers would be helpful. Similar strategies for linking primary and associated secondary schools should be considered along with shared understandings between primary schools in an associated school group. The importance of noting and acting on prior learning and experience lies in developing continuity and progression and setting appropriate ICT next steps for pupils. These next steps will have due regard for the advice in national guidelines but will also be based on a review of available resources and the levels of confidence and expertise of staff. An important aspect of information collection is finding out which pupils have access to computers at home. Research is beginning to show that pupils who have computers at home make more use of computers at school than those who do not.

An important task for schools is ...
to take account of the prior
learning that pupils bring to the
area of ICT.

Information on pupils' home access might lead schools to consider:

- opportunities for pupils without home access to have supervised use of computers at lunch breaks and after school to develop coursework, complete homework or explore available ICT resources
- discussions with parents to encourage the use of home computers for school-related tasks
- strategies to encourage equal gender access to the technology.

The importance of noting and acting on
prior learning and experience lies in
developing continuity and progression
and setting of appropriate ICT next steps
for pupils.

Regular use of ICT is important to build both skills and confidence on the part of pupils.

Regular use of ICT is important to build both skills and confidence on the part of pupils. Schools should ensure that they have considered, and are working to, agreed principles of access for all pupils. The issue of the widening gap between those pupils with home and leisure access to ICT and those who have only limited contact is an area of concern that should be a central feature of planning at every level.



A group of four Glasgow primary schools, including Richmond Park, which caters for a range of special needs, engaged in the 'Chrysalis Project' to enable pupils to:

- be confident, motivated and well-rounded
- be literate to a level at or above that of their peers elsewhere
- understand fully and be able to play their parts as citizens of a democratic society
- seize opportunities open to them regardless of their background, culture or race.

This was a 'transformation' project, the main aim of which was to help children emerge as better readers through an innovative collaborative project between schools, teachers, pupils and parents. In the context of the Early Intervention programme and aiming to raise attainment in literacy using ICT, the project drew on both central and local government funding. Two key workers from Richmond Park worked collaboratively and inclusively with partner schools who shared a determination to use ICT to help meet learners' needs. SEN and mainstream staff worked together, sharing self-evaluation of teaching strategies and the impact of approaches and methodology on the quality of learning and teaching.

The project used a few commercial story-making programs and ICT tools, such as 'concept' as well as 'qwerty' keyboards. Central to teaching was tuition and practice in word segmentation by syllable and the principle of 'writing to read'. A meaningful context for *The Magic Garden* was created in all four schools. The schools shared magic garden parties and swapped 'story starters' for others to develop. One P1 class dramatised their story and performed for a partner school. Writing was meaningful and improvements in attainment were noted. The project worked well because:

- there were shared visions and understandings, including among parents, through workshops
- individualised staff development was provided on the packages and strategies used
- time was allocated for collective planning, monitoring, review and evaluation
- early identification of children 'at risk' led to fewer failures
- help was provided early and was effective
- ICT provision covered all areas of the children's learning and teaching
- teachers, children and parents viewed all learners as children with particular needs and appreciated the need to work collectively
- children and parents were valued
- conscious attempts were made to be equitable.

Report of school visit

Many young people have a range of very particular learning needs, and the use of ICT to support these pupils can bring significant benefits for both pupils and teaching staff. A range of approaches can be applied, often with the assistance of a nursery nurse or classroom assistant:

- using ICT for demonstration of a particular skill or concept
- giving step-by-step instruction where the teacher checks that pupils are following the necessary steps
- making discovery approaches, with the teacher prompting pupils towards workable solutions
- using ICT to perform a task – redrafting a pupil's written work to focus a learner's attention on issues other than ICT-related matters.

Many young people have a range of very particular learning needs, and the use of ICT to support these pupils can bring significant benefits for both pupils and teaching staff.

The increased level of inclusion of pupils with special educational needs in mainstream schools poses particular challenges. A guidance note to staff in a school concerned with meeting special needs helps mainstream schools to focus on this question.

The school operates to the principle that accessing ICT and the curriculum is dependent on open attitudes and inclusive approaches that foster an ethos of achievement for all. They identify a number of factors that any school should take account of in meeting particular needs.

- Identify the barriers to learning.
- Assess and plan for progression.
- Provide a support infrastructure.
- Identify staff training requirements.
- Monitor and evaluate.
- Develop new strategies.

The school has noted that there are many different ways of offering alternative access and adaptations to computers in order to meet pupils' specific needs. Whilst recognising that the success of ICT as a teaching tool will depend on how well it is integrated into the curriculum, it is important to look at broad bands of learners and the types of learning support available to them.

Physical impairment

Normal computer input devices can be adapted or extended to include:

- expanded or mini-keyboards
- concept keyboards or Intellikeys – where pressing an overlay can cause the computer to react
- switches with scanning options, allowing a pupil to select the required place when the indicator passes over it. Switches can be of different designs to allow the use of that part of the body over which the user has most control
- touch screens that allow the user to interact with the monitor
- setting the 'control' functions of the computer to tailor them more for the user, for example slowing down the mouse
- software that allows pupils to write to their ability level whilst cutting down on physical effort.



Sensory impairment

Visual impairment

- screen magnification software or enlarged cursor
- changing the computer settings to enhance monitor displays – large fonts, folders, etc.
- screen-reader software or basic text-to-speech facilities
- CCTV, braille keyboards
- keyboard stickers or a 'bigkeys' keyboard
- dedicated OCR–speech systems that scan a page and convert it to suitably enhanced text; multimedia and CD-ROMs with built-in scanning option.

Hearing impairment

- The visual impact of multimedia and CD-ROMs can make language more meaningful for pupils with hearing impairment and so contribute to a multisensory approach to learning.
- Software that uses language in a context and with animation, such as 'Living Books', can provide reinforcement and be highly motivating for a pupil.
- Concept keyboards, Clicker and Intellikeys can be integrated in imaginative ways to support the curriculum by presenting language in more concrete and interesting ways.

Specific learning difficulties

- Content-free software is a powerful resource allowing the teacher to decide on content and match it to the needs of all pupils.
- Word-predictor software frees pupils from difficulties associated with remembering the spelling of words whilst engaged in imaginative or functional writing.
- Access word processors allow pupils to concentrate on the written task rather than the mechanical writing process.
- Voice recognition software that converts speech to text can make some writing work easier, although issues of background noise interference can be problematic in a normal class setting.

Report of school visit

Assessment

With the introduction of the ICT national guidelines, along with significant local and national ICT staff training programmes, it is important to consider approaches to the assessment of pupil attainment in ICT. This will be a new area for many teachers, but whilst offering them

some challenge, teachers should bear in mind that the same principles apply to ICT as in other 5–14 contexts. Schools will have an agreed policy for assessment, approaches and procedures already in place.

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The national guidelines on assessment 5–14 set out how assessment should be developed as an integral part of classroom learning and teaching.

In this context the teacher has a central role in planning, teaching, recording, reporting and evaluating. In ICT it is particularly important that pupils are able to demonstrate progress in certain discrete aspects. These are:

- development of confident use of ICT equipment and applications
- development of the capacity to decide when it is best to use ICT as opposed to other media
- development of the capacity to be creative in the use of ICT
- demonstration that the use of new ICT skills and concepts are complementing other skills such as making judgements, drawing connections to experiences and applying new understandings in thoughtful and meaningful ways
- demonstration of developing positive attitudes towards the use of ICT.

The recent Welsh study, *Whole School Approaches to Developing IT Capability* (ACCAC, 1999), very usefully analysed what it describes as IT capability, and the skills in particular techniques required, to gain successful working in ICT. The study recognises that techniques do not have to be fully learned before they can be applied, since the software to drive most ICT equipment provides on-screen prompts on how best to proceed. As most teachers will recognise this, pupils may work out for themselves what to do as they proceed. Many young people are already particularly adept in this way of working. Eventually, techniques require little thought to carry out, allowing the user to focus on the task rather than monitoring the progress of the technique. For teachers, while it is important to teach techniques and monitor progress of their mastery, the greater challenge is to monitor the development of higher-order skills, which show that pupils can:

... while it is important to teach techniques and monitor progress of their mastery ...

- plan how or whether ICT should be used for a task
- decide which ICT resources and techniques are appropriate to a task
- consider the data and strategies that might be used
- evaluate the outcomes of using ICT
- explain and justify the use of ICT in devising solutions
- learn new techniques through exploration of on-screen prompts.

In providing an interactive medium supportive of learners, these skills are just as relevant to the Scottish guidelines on ICT as they are to the national curriculum framework in Wales.

The study goes on to give a useful set of definitions that are helpful in structuring a learning and assessment policy.

Techniques, such as copying an element of a graphic design to make a regular pattern, are easier to use in practice than to describe how to do. The learning of techniques is supported by the understanding of concepts and principles that enable IT capable learners to explore confidently beyond familiar procedures when solving problems. Techniques are primarily learned through help from a teacher or friends.

Routines, such as mouse operations and techniques such as copy/paste may become routines as a result of practice (mental automation) or of developments in hardware/software (technical automation).

The **key concepts** that underpin knowledge of techniques are relatively few, and successful schools give careful attention to these, in whatever situation they are developed and applied, until they are well integrated into pupils' knowledge. The key concepts include:

- a file as a unit of data that can be saved, loaded and printed
- a window as an area of the screen that can display a file or part of a file
- a menu as a displayed list of options that can be selected
- text as a continuous string of characters, including formatting codes
- an object that can be selected, formatted, moved, resized, copied, deleted and transferred to other locations

- a database structure that can be searched and can display selected information
- a model that represents relationships among variables
- a spreadsheet grid, each cell of which can contain a value or a formula
- a link in a hypertext structure (such as a World Wide Web site or a CD-ROM database) that allows quick access to chosen options
- a sequence of instructions that achieves a specified result
- a monitoring process that records data from sensors.

Concepts and higher-order skills are primarily learned through direct teacher instruction and through help from the teacher during tasks.

The most successful schools are clear about the nature of progression in IT capability. Rather than teaching more and more techniques for their own sake, or requiring pupils to use more complex software, they provide tasks that increasingly require sensitivity to information requirements, sophisticated decision-making, knowledge of available tools, and accuracy in evaluation. Techniques are then taught at the stage where the task provides a suitable context. Extra practice in routines is provided if necessary to supplement the work in context.

Whole School Approaches to IT Capability, ACCAC, 1999.

The Welsh framework matches well with that developed in the national guidelines for ICT 5–14 and it is recommended that the components outlined might be considered by schools and authorities in designing the assessment framework for their own situations.

For many schools the focus in 5–14 so far has been on recording pupils' experience of ICT at class level. This has largely taken the form of checklists of activity and represents a measured way of starting the assessment process. Teachers will take time to assimilate the ICT skills and concepts outlined in the national guidelines before more comprehensive assessment/recording systems are developed.

Some schools have experimented with highly detailed individual checklists that set targets, define teaching strategies and resources, indicate success criteria and embrace review and evaluation statements. Care should be taken that such approaches remain useful tools and do not become overburdensome.

In approaching assessment strategies a useful *aide memoire* was developed by the Welsh researchers.

Different assessment methods assess different aspects of IT capability, and a combined approach is needed to provide a full picture.

- *Tests best assess factual and conceptual knowledge.*
- *Observation best assesses techniques and routines.*
- *Sets of work showing development from draft to final version best assess higher order skills.*
- *Oral questioning best assesses concepts and higher-order skills.*

Whole School Approaches to Developing IT Capability, ACCAC, 1999.

It is important to remember that the assessment process goes beyond simply recording the progress made by pupils. It also includes evidence:

- to help evaluate and modify the quality of teaching
- to contribute to more effective planning at class and school levels
- of individual pupil attainment and the basis for tailoring individual programmes where appropriate, and of realistic target-setting
- of indications regarding better deployment of available hardware and resources.

It is important to remember that the assessment process goes beyond simply recording the progress made by pupils.

The assessment and monitoring of pupils' progress with regard to learning *in* ICT, as opposed to learning *through* ICT, is a relatively new area for non-ICT specialists. Most teachers will approach this task through observation and professional comment. In setting ICT targets for pupils, care has to be taken that teachers are fully aware of the attainment levels that are being sought. The assembling of pupils' work portfolios and observations by teachers will provide an initial basis for the discussion of the various issues involved and the sharing of approaches to the assessment process.

In setting ICT targets for pupils, care has to be taken that teachers are fully aware of the attainment levels that are being sought.

In reviewing the present arrangements for assessment 5–14 to embrace the gradual implementation of the national guidelines on ICT 5–14 it is important that agreements are reached as to what should be assessed, when and how. The solutions will be different for each school but an agreed strategy must be put in place at school and department level.

Collaboration between associated schools is also a high priority for development. In one authority, a short-life working group was set up involving a secondary school and its associated primaries.

The work of the group covered ICT planning recommendations and assessment approaches, including agreement on ICT technique strands and purpose strands. The assessment model was agreed and the instruments and procedures for assessment outlined. Following this discussion a range of other recommendations was agreed on, including:

- sharing of planning and resources
- matching of ICT resources to topics
- staff training needs
- good practice agreements.

Local authority example



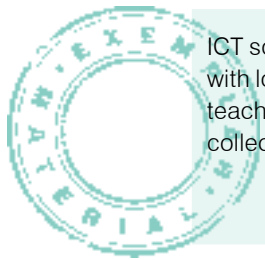
Using ICT for assessment

In assembling the evidence from both formal and informal assessment procedures, schools have begun to consider the benefits of ICT itself; with regard to using ICT for more general assessment purposes, schools are already familiar with the collection and analysis of national test and other data and the use of ICT to process and present such information for planning and administrative purposes. Increasing use is being made of management information systems and new facilities are constantly being developed. Some of these will support schools to take things a step further to record and to undertake more sophisticated analysis of assessment data.



Kilmartin PS, a rural school in Argyll, developed a technique to analyse the assessments of pupils' writing tasks at the middle stages to evaluate the relative value added by the school. Whilst the approach has validity only within the school itself, it is a very useful way of obtaining pointers to effective teaching and also in highlighting areas of priority for work with both classes and individuals. The use of ICT to help with the analysis and presentation of results is significant.

Report of school visit



ICT software is used by one special school in drawing up individual learning programmes with long- and short-term targets, individual success criteria and a note of the best teaching approaches for each pupil. ICT is then used to record progress and analyse the collected data that can, in turn, be employed for reporting and planning purposes.

Report of school visit

Communication with home and parents

Parents and carers in general have a growing awareness of the importance of ICT in learning and an expectation that their children will achieve high levels of expertise and knowledge. For many adults there is already a gap in knowledge and expertise between them and some of

... it is important that agreements are reached as to what should be assessed, when and how.

even the youngest school-age pupils, thanks to ICT exposure at school and, for example, the electronic games culture. Adults acknowledge that today's children seem extremely adept at picking up new techniques and routines associated with ICT. Increasingly adults are appreciating that rather than be intimidated by ICT it is better simply to

learn alongside children. This puts the home experience in a central position of learning support in ICT. There are significant opportunities for parents and teachers to work together, introducing and consolidating learning about ICT and using it to support work in different curricular areas. Where the home has a computer and other ICT equipment such as a digital video or still camera, children quickly learn how to use them and apply them to their lives. It is in the home where they will often find application and support for skills learned in school, not least in passing on skills and information to other family members.

... today's children seem extremely adept at picking up new techniques and routines associated with ICT.

Many children use home computers for games, but increasing numbers are also using facilities such as word-processing and the internet. Often the learning is by example and

demonstration. In the home many children very quickly adopt the collaborative mode of working, and a significant amount of learning is undertaken through peer exchanges. The use of peer support is something that teachers can build on. Much can be gained by collaborative working and, in one school visited, 'expert' primary pupils assisted at staff INSET – taking learning together to new levels.

Home computers are an important resource for schools to exploit in helping pupils to develop their ICT capability and a number of schools have used this in interesting ways including:

- setting assignments that can involve family support in investigations at home
- setting assignments that involve the preparatory work for ICT-related studies such as planning and research
- sending examples of pupils' work home in electronic format
- encouraging parental contact by electronic as well as standard written and oral communication
- using parental expertise in developing lunchtime and after-school activities where children who do not have home access can use school hardware and software to develop their learning and experience.

Schools should share with parents their strategy with regard to the development of ICT. Parents need to be assured of a balanced school approach that uses ICT to support the curriculum as well as the strategies to develop the necessary ICT skills and concepts.

Parents should be engaged as partners in the development of ICT...

Parents should be engaged as partners in the development of ICT and there is scope for this partnership not only in the development of learning and teaching but also in safeguards in using aspects of ICT such as the internet.

At a time when many schools are seeking ways in which to involve the wider parent body in the work of the school there are opportunities to reach out to parents and to engage in genuine shared development in a way previously not available.

One Scottish council has developed a leaflet for parents outlining aspects of safe child usage of the internet including:

- an explanation of what the internet is
- tips for promoting safe internet use, siting of children's computers, working with children to get the best from the internet and use of filtered internet access to avoid children accessing inappropriate material
- using e-mail
- frequently asked questions such as 'What is internet chat?' and 'What is a search engine?'
- useful information including websites for parents and a guide to some useful publications.



Local authority example

ICT offers the potential to improve school ethos, as well as links with the parent body, with the wider community and world beyond. Schools have made good use of desktop publishing to improve print communication such as newsletters, enhanced reporting procedures and presentation of pupils' work. In others enterprising work has been

... there are opportunities to reach out to parents and to engage in genuine shared development in a way previously not available.

undertaken in the production of audiotapes and CD-ROMs to carry performances and school achievements to a wider community. Digital cameras have been used in support of local investigations and with ICT-based publication and presentation, either on the internet or live to audiences at school events. Some schools now have electronic display screens in public access areas to welcome visitors and to convey information to staff and pupils.

Safeguards

Well-reported instances of abuse of media such as the internet, telephone, video and photography in terms of paedophilia, pornography and sales exploitation raise serious questions of personal safety on the part of children and schools in the use and development of ICT. This has, quite properly, become an aspect of major public concern. It would be easy for schools to react simply by prohibiting access by young people to the internet and other

... protective systems including the filtering of internet access, have evolved to prevent young people from accessing inappropriate material.

ICT tools, but the natural curiosity of young people to explore is a feature of life. Young people will try to find ways of beating any system put in place that attempts to give them a degree of protection. The positive benefits of ICT are plain, and protective systems including the filtering of internet access have evolved to prevent young people from accessing inappropriate material. These systems

are becoming more sophisticated and robust and it is incumbent upon schools and education authorities to put suitable screening procedures in place.

The Scottish Executive 1999 publication *Click Thinking* (www.scotland.gov.uk/clickthinking/) explores the issue of safe internet access in depth including topics such as:

- risk assessment
- the context of the internet
- publishing on the internet
- e-mail and newsgroups
- chatrooms.

Click Thinking gives references to a range of other publications and websites that will be of interest to teachers and parents. Advice on general strategy is also offered and schools should consult that source in developing ICT policy and to ensure that personal safety programmes for pupils covers this important area.

Pupils' safety is paramount but it is also important for staff to feel similarly protected and supported. Aberdeen City Council has produced a booklet for heads of establishments entitled *ICT and the Law*. This booklet can be accessed online at www.aberdeen-education.org.uk/ict/ICTinAberdeen/SchoolResources/ICTlaw.htm and is recommended to schools nationally. The booklet is intended for general guidance only and is not a comprehensive statement of the law on these matters. However, very useful advice is given on important areas, such as:

- copyright protection – software licences and plagiarism
- child protection – supervision, internet, parents and health & safety
- protecting confidentiality – secure practices, networks and stand-alone computers and viruses
- acceptable use policies for senior and junior schools and further information.

Schools will be aware that the legal position changes and local authorities will keep them informed of any legal steps that they require of staff in schools. Managers for their part need to demonstrate that they have exercised 'all due diligence' to prevent any offence being committed – information sources such as those described help in the exercise of this duty.

Information and Communications Technology 5–14: Section 2

Planning & Implications for Managers



Section 2

Planning and Implications for Managers

An important feature of the implementation of ICT is the development of a management strategy to establish and maintain the necessary ICT capability on the part of staff and pupils.

Introduction

In the past few years, the experiences of schools in using ICT as part of their everyday practice have gradually been disseminated. These findings, contained in a number of publications and online, have begun to give pointers to the aspects of initiatives that work and that carry positive outcomes. In all of these outcomes the importance of planning emerges as a key to successful development. The Scottish Office key publication, *Using the Superhighways – ICT and Development Planning* (SOEID, 1998), provides a very useful starting point for managers at every level.

While there is no single way to establish an ICT learning environment it is vital that authorities and schools consolidate their planning towards this objective.

While there is no single way to establish an ICT learning environment it is vital that authorities and schools consolidate their planning towards this objective. Some authorities have taken very substantial steps to equalise the provision across their area, such as establishing ICT hardware, software and training programmes either through their own services or by entering into a partnership with an outside provider to manage services on their behalf. In other areas and schools the process has been much more gradual. Whatever the pace at which schools have moved thus far, the pace of technological change continues to accelerate, and in all establishments the move towards an ICT learning environment is likely to be through incremental steps rather than through any overnight transformation. The *Education Departments' Superhighways Initiative* (EDSI) report (HMSO, 1997), carried out at the early stages of development of the National Grid for Learning (NGfL), indicated that simply purchasing hardware and establishing technical infrastructures will not guarantee success. The most successful developments occur where:

... the move towards an ICT learning environment is likely to be through incremental steps ...

- management is proactive in managing change, has a clear vision of what ICT can achieve, and is fully committed to ICT development and initiatives
- ICT is viewed as a school-wide, whole-curriculum commitment, with adequate funding to obtain the resources necessary to meet agreed targets

- the need for on-going staff development is recognised and time and resources for this are provided
- ICT is perceived as an effective means of peer development for staff and pupils
- existing social groupings see ICT as a means of consolidating the group or helping to achieve its goals
- new approaches and resources for learning are continually being sought, not only within education but also from industry and commerce
- links with parents and the wider community are seen as integral to the life of the school.

Central to the planning process is a rigorous approach to effective self-evaluation ...

Self-evaluation

Central to the planning process is a rigorous approach to effective self-evaluation – complemented by input from external evaluations where these are available. *How Good Is Our School?* outlines an evaluation process familiar to schools. *Using the Superhighways – ICT and Development Planning* developed this model in the context of ICT.

Step 1: How are we doing?

- Identifying ICT expectations within the school vision aims
- Defining key areas for evaluating ICT activity. The evaluation might be broad-based, take a curricular focus, look at teaching approaches or cover a group of key areas

Step 2: How do we know?

- Selecting appropriate ICT performance indicators (PIs)
- Identifying appropriate indicators of good quality, referring to national and local advice and developments in ICT
- Finding out if these are effective or present in the key areas selected for evaluation

Step 3: What are we going to do now?

- Reporting on the standard and quality of what has been observed
- Setting achievable targets to meet ICT implementation and appropriate staff development needs

Within this framework there are clear requirements for effective ICT development planning at three main levels:

- **local authority – strategic plan**
- **school – school development plan**
- **class/department plans.**

This means that there are a number of audiences in this section. Readers may wish first to go directly to the advice relating to their own area of responsibility.

Each of these levels of planning has particular characteristics but all share some common features. Each level of planning is explored further through examples in this section. These examples should not be taken as the definitive way to plan for ICT implementation in 5–14 but should be seen as helpful prompts and sources of ideas based on existing good practice.

Local authorities

Local authorities have the task of establishing procedures for creating and reviewing strategic plans for the education service and for the development of effective ICT as integral to the work of schools. The recent HMI publication, *Closing The Circle – Raising Standards*, (SOEID, 1999) indicates that the most effective authority strategic plans:

- were explicit and contained clear statements of the authority's overall or specific aims, vision, values and priorities
- related to the wider plans for the council as a whole
- incorporated all the authority's major developments in the area, including response to national initiatives and issues of concern as well as those arising from the authority's own audit of provision and key aims
- were clearly and precisely presented and included details of objectives, the personnel responsible, the resources required and the criteria against which success would be judged.

Within this broad context, there are a number of specific considerations for authority managers if the creation of an ICT learning environment is to be achieved.

- **An agreed authority policy/statement of position with regard to ICT and its place in authority priorities and within the provision offered by schools**

This statement should embrace the authority's position with regard to national advice, be based on an authority-wide self-evaluation exercise and have a clear vision statement of the direction in which the authority and its schools should be heading.

- **A clear definition of the position and importance of ICT within the curriculum and how this is weighted among the many objectives set for schools**

This statement should also embrace how the authority will support or encourage movement towards a permeative approach to ICT development as outlined in the national guidelines. In particular it should consider the position of discrete ICT teaching within S1 and S2 courses. The issues of recognition of pupils' primary school experience and the 'fit' with courses and provision beyond S2 should also be explored.

- **An indication of the expectations of the authority in terms of pupil attainment with regard to the strands and targets identified by the 5–14 guidelines**

Consideration should be given to the extent of agreed phasing of ICT priorities in terms of prioritising strands, particularly where more specialist hardware or software provision is required.

- **An explicit outline of the quality of learning and teaching in ICT to which the authority aspires**

This should include guidance on the issue of time for teaching discrete aspects of ICT skills, the level of staff expertise and guidance on the general entitlement of pupils with regard to access to teaching and learning opportunities, hardware and other learning resources. Other key matters will include monitoring, assessment and recording expectations with regard to ICT, and maintaining essential records that minimise administration on the part of schools. This could include advice on the use of ICT as part of an authority-wide approach to management information collection and analysis.

- **An indication of the authority policy on meeting the needs of pupils**
In terms of both meeting special educational needs (including in mainstream schools) and of an inclusive approach aimed at diminishing disadvantage for pupils currently without ICT access at home. This latter point could usefully embrace advice to schools on ways of ascertaining pupils' prior experience of ICT and current levels of skill.
- **A statement of the authority's position with regard to the involvement of parents, carers and the wider community, including business, in developing and supporting ICT in schools**
- **A strategic overview of resources, including hardware, software, accommodation, specialist staff and infrastructure needs**
An important element of this will be a clear indication of the solution chosen by the authority for the management of ICT development, for example, an 'in-house' approach, a managed service in partnership with another provider, such as an IT company, or a combination of partners. Whatever decision is taken on how best to develop the ICT infrastructure, the explicit description of relationships and responsibilities of all those involved is crucial to implementation.
- **Indications of the availability of support staff, to what degree they carry specialist knowledge and their position in relation to schools with regard to setting targets and defining priorities or approaches**
- **An acceptance of responsibility to facilitate effective staff development support structures that draw on the evidence gathered from consistent school self-evaluations of need**
This will include the overarching authority strategy and how the authority is engaging in the NOF training programme, including provision for librarians. It will also indicate other training and development initiatives planned by the authority itself. As hardware and ICT approaches expand, a particular requirement will be the needs of classroom assistants, auxiliaries and other support staff who work alongside teachers.
- **The inclusion of school management and leadership issues including responsibility for monitoring the implementation of the strategic approach, the importance of collaborative approaches across levels in the education service and the coordination of development, particularly across and between schools**
This is important not only between local authority managers and headteachers but also in clusters of schools, particularly between secondary schools and their associated primaries – but including primary–primary links within an associated school group.

School management

The development planning approach is now well established in schools and there are agreed approaches to the process. In many schools there is a standard procedure for arriving at the final plan with the local authority. At school level the basis of ICT development will draw on the policy and planning context set by the local authority and will be fostered through the development planning process. To implement the advice given in the national guidelines for ICT 5–14 a number of important factors should be considered in any school where the change process has been recognised and is effectively managed. In particular, planning responsibilities should be acknowledged.

At school level the basis of ICT development will draw on the policy and planning context ...

A number of the bulleted lists that follow are reproduced as OHT masters on the 5–14 website for staff development and in-service purposes.

All staff, including the class teacher, subject specialist or visiting specialists and those in promoted posts, have a responsibility to:

- become familiar with, and take account of, the national guidelines for ICT 5–14
- participate in the planning and development processes as individuals and as part of wider school teams
- along with colleagues, plan the nature, balance and content of pupils' learning experiences in ICT and how it will be assessed and reported on
- be aware of the range of learning and teaching opportunities for ICT including the resources, accommodation and support within the school and to agreed levels from outwith the school
- use their personal planning to implement the policy and long-term plans of the school
- contribute to the monitoring and evaluation of the implementation of ICT in the work of the school.

OHT master

Promoted staff have particular responsibility for:

- providing the lead for establishing a strategic approach to ICT
- ensuring that current and appropriate information on ICT 5–14 is readily available to staff as part of the approach to dealing with priorities within the school development plan
- supporting staff as they implement the school policy and their own plans
- consulting with staff for monitoring and evaluation purposes
- being responsive to circumstances that may change the pace of implementation, such as a change of staff personnel or the emergence of new technology.

In all of this, some key characteristics for effective ICT development are clear.

- Quality time should be allocated for planning at every level.
- The planning process should be collaborative at school, subject department and class levels to make it effective in terms of:
 - teacher's time
 - avoiding duplication of effort
 - sharing understanding of the significance of ICT development, its place in the curriculum and the wider life of the school.
- Agreeing how implementation of ICT 5–14 will best be achieved through the established planning procedures for the wider 5–14 programme.

OHT master

A clear sense of vision and purpose for ICT in the school is critical. A successful way to achieve this begins with a whole-school evaluation of where it is in relation to ICT understanding, provision and policy for development.

A clear sense of vision and purpose for ICT in the school is critical.

What are the sorts of questions that need to be asked in a school to achieve the capability of an ICT-rich learning environment?

The guidance in *Using the Superhighways – ICT and Development Planning* (pp. 19–23) identifies a number of *key areas*.

- **Curriculum**

The use of ICT in enhancing and promoting existing successful curricular practice.

- **Attainment**

The use of ICT to support pupils' progress and attainment including the recording of achievements and the analysis of their performance.

- **Learning and teaching**

The use of ICT to enhance learning through focusing on such skills as:

- independent study
- information handling
- keyword searching
- evaluating retrieved information
- problem solving

in addition to the exploration of applications within curricular areas.

- **Support for pupils**

In terms of guidance in its broadest sense relating to welfare and self-esteem as well as the specific forms of support for individuals.

- **School ethos**

The employment of ICT to develop aspects of ethos such as:

- better parental involvement and contact
- links with the wider community both locally and globally through, for example, the internet.

- **Accommodation**

What is the appropriateness of existing facilities for housing the necessary hardware and ICT infrastructures?

- **Existing and future provision**

Providing:

- local authority and national aims for ICT
- arrangements for accessing information and knowledge on developments and current ICT provision within the school, including the deployment of ICT coordinators within the school management arrangements
- arrangements for obtaining hardware and software and the security of these both in the physical sense and in terms of possible abuse or corruption through electronic interference either by way of the internet or virus contamination.

- **Online provision**

What are the technology options and how is provision to be supported and developed?

- **Staff**

Ascertaining:

- levels of expertise and staff development priorities
- availability of providers
- deployment of any available specialist staff and those with a support/responsibility role.

- **Funding**

Exploration of:

- levels and types of funding available
- savings to be achieved by efficiencies ultimately to be gained through the use of ICT including the possibilities of shared costs with other schools and partners.

- **Management, leadership and quality assurance**

To go beyond learning about ICT to applying ICT to the learning and teaching process managers need to:

- discuss their own levels of knowledge and expertise
- agree the priority of ICT development and the impact of any prioritisation of development in a curriculum area or on hardware and software acquisition
- assess how school priorities relate to local and national aspirations and initiatives, including the priority of ICT in relation to other priorities and development plan targets.

... wide-ranging discussion around the key areas is vital to the audit process in development planning and also to securing a school-based vision and set of policy priorities.

This wide-ranging discussion around the key areas is vital to the audit process in development planning and also to securing a school-based vision and set of policy priorities.

One school set up a task force with a project schedule to tackle ICT elements as part of the school development plan. The school insisted that all objectives were SMART – *Specific, Measurable, Achievable, Relevant and Timed*. The schedule used the following headings.

- Project title
- SMART targets
- Success criteria
- Resources
- Staff development
- Timescale
- Personnel responsible

In another case a local education authority drew up an outline action plan for a school to tackle ICT implementation. This was a generally applicable plan and was called *Anywhere School*. The structure and approach has been well received by schools.

Local authority example



School policy

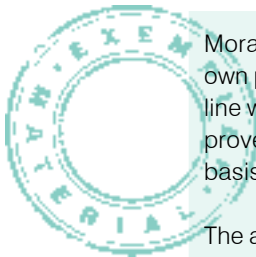
Policy statements should be brief but comprehensive ...

Policy statements should be brief but comprehensive, leaving staff, pupils and parents in no doubt about the school's intentions and the means by which it proposes to achieve its ICT goals.

The main features of the school ICT policy statement should include:

- a definition of ICT and its relevance to the education process
- a statement of aims – the vision, including a plain statement on the place of ICT in the curriculum and including the importance of planning
- the importance of pupil and staff experiences of ICT and a statement on equalities of opportunity
- links between ICT and schemes of work and programmes of study, and the school development plan
- assessment, recording and reporting priorities and approaches
- roles and responsibilities of managers, specialist staff and other partners
- the impact of ICT on teaching approaches; the importance of teaching methodology in, and the organisation of, ICT development
- hardware and software issues and strategies
- staff development issues/priorities and strategy
- procedures for monitoring and evaluating the policy implementation
- funding and acquisition strategies.

OHT master



Moray Council offers a policy template to all its schools to be customised to suit their own particular situation. This not only helps give some consistency across the authority in line with its chosen route of a public–private partnership to develop ICT but has also proved very popular with schools in identifying the main policy features and in providing a basis for individual and associated cluster-group development.

The aim is defined simply as:

We will develop ICT capability within the school.

This aim applies to everyone within the school and, by striving towards it, we will also:

- enhance access to information
- enhance opportunities to communicate
- develop competencies in the management of information
- develop competencies in communication
- take advantage of opportunities to enrich the curriculum
- take advantage of the opportunities to raise standards and attainment in all areas of the curriculum
- take advantage of the opportunities to motivate and enthuse students and staff
- ensure equality of opportunity for all.

Local authority example

Curriculum management

A significant factor in implementing ICT 5–14 is consideration of strands and suggested outcomes. In order to develop a successful permeation strategy it will be necessary to match these to current schemes of work and programmes of study. In this way the school's ICT policy developed and understood by staff becomes translated into action in the daily class or subject teaching. Matching the details of ICT 5–14 to current practice is a significant task that needs to be done carefully as part of an incremental process which recognises the demands on staff. One approach might be to assign some of the task to a working party. The working party might then be directed towards a gradual ICT implementation in selected curriculum areas as they are reviewed as part of the development or departmental plan audit. Alternatively, the working party might focus on several curricular areas at different stages, for example across the curriculum at P5, P6 and P7, or on an inter-school approach focused on P6–S2.

... policy developed and understood by staff becomes translated into action in the daily class or subject teaching.

Some schools and local authorities have already begun this process of matching ICT 5–14 to existing schemes of work. For example in one primary school an early attempt has been made to look at language guidelines together with the new ICT national guidelines.

5–14	STRAND	LEVEL	TARGET
Writing	W1 Functional writing	A	Write briefly for simple practical purposes
Activities Writing of this kind may arise from activities such as: <ul style="list-style-type: none"> planting seeds giving directions exploring technology baking, etc. Pupils will discuss before, during and after activity. They will report orally to teachers or others. Sequence can be explored through drawing perhaps linked by arrows to form a flow chart. The teacher will help pupils to: <ul style="list-style-type: none"> observe select important features order their writing act as a scribe. 			Cross-reference to: ICT – Level A <ul style="list-style-type: none"> Searching and researching Control and modelling Using the technology
Writing	W2 Personal writing	A	Write briefly about a personal experience
Activities From the first the teacher will establish trust, helping pupils speak confidently about themselves. They will express ideas perhaps through drawings, which after discussion will be elaborated to provide detail and form the basis of a story. The teacher will: <ul style="list-style-type: none"> discuss decide with pupils the main points act as a scribe. When pupils first compose, their own stories may consist of a single sentence. This can be aided by the provision of printed words and phrases for story making. With more experience pupils will be able to compose several sentences.			Cross-reference to: ICT – Level A <ul style="list-style-type: none"> Creating and presenting Using the technology

Report of school visit

The target of ICT capability on the part of a school is best promoted when schemes of work in subjects and curriculum areas set out clearly the ICT knowledge and skills to be developed, alongside the knowledge and skills within the subject.

Progression on the part of pupils will be achieved over time where schemes:

- set out the ICT skills and concepts that are expected to be developed within each scheme of work or programme of study
- identify any specific ICT skill teaching that pupils require and the methodology to be adopted, such as group or individual tuition, self study or taught material, etc.
- specify any particular resources or activities
- indicate how attainment can be assessed.

... schemes of work in subjects and curriculum areas set out clearly the ICT knowledge and skills ...

Midlothian Council has set out to assist its schools in this process by matching the locally set elements of its mathematics and environmental studies programmes to ICT 5–14 guidelines (see p. 66).

In primary schools much of current practice is based on topic-based work across subjects, particularly at the early and middle stages. In upper primary and S1 and S2 in secondary schools there is a greater subject-specific focus. In both these circumstances it would be profitable for working groups that are common in many authorities to give time to exploring the ICT implications of, and to share, their findings both locally and nationally.

Recent advice on the structure and balance of the secondary curriculum has indicated the need for particular consideration to be given to the S1 and S2 years. As a consequence, secondary schools have been looking at different ways of organising the curriculum including use of once-discrete subjects in new groupings and the reduction in the time spent

on certain areas. The solutions are different for different establishments, and within these rearrangements differing models of ICT curriculum delivery have emerged, several of which involve degrees of discrete ICT and cross-curricular approaches. ICT national guidelines are clear in that the permeative approach is the preferred route for development, but that it is appropriate to take account now of a number of important considerations. The guidelines recognise that:

... national guidelines are clear in that the permeative approach is the preferred route for development ...

- time will have to be set aside to ensure that some discrete skills teaching is undertaken
- in S1, secondary schools might consider what steps to take to ensure that the levels of all pupils' ICT experience and expertise are equalised as far as possible. (Current variation should, however, greatly diminish with implementation of ICT 5–14)
- pupils benefit from the input of specialist staff within carefully balanced curriculum provision.

A number of secondary schools are beginning to take a 'whole-school' approach to ICT and have chosen to deploy specialist staff to support other staff and subjects.

The cross-curricular approach requires effective management with high levels of communication between staff and departments. While some secondary schools might find the logistics of this easier on the grounds of size, many schools have overcome communication difficulties through managed solutions, including the designation of staff as ICT link persons or the deployment of ICT coordinators. Some secondary schools have

found placing ICT within the core skills approach to be the way forward in matching their particular circumstances. The most appropriate curriculum model will vary but it will certainly involve the application of ICT to all curriculum areas to consolidate the development of skills and will be likely to include some discrete teaching involvement on the part of specialists.

The cross-curricular approach requires effective management with high levels of communication between staff and departments.

The ICT coordinator

It is becoming more common practice in primary and secondary schools to designate the role of ICT coordinator to a member of staff. In some cases the coordinator is a voluntary or negotiated activity, but the value of this role is being increasingly recognised by a number of local authorities and they are creating posts with this responsibility. Where the role is part of a current promoted post remit, the postholder is in a position to provide input to management, departments and class teachers and so exercise an important influence in sustaining continuity and progression for pupils across the school.

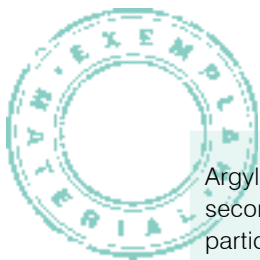
The ICT coordinator should be given opportunities to keep his/her knowledge and skills updated in a fast-changing environment and systems should be in place for coordinators to share their knowledge and expertise with management. The situation in a school can change when a member of staff moves on, and steps should be taken to ensure that the school does not suffer from a knowledge gap should the coordinator change. This problem may be thought particularly severe in primary schools, but it can also occur in secondary schools where staff may have come to depend heavily on the advice offered by the coordinator.

ICT coordinators should be concerned with learning and teaching, and while they may develop some troubleshooting technical skills, managers should delegate these responsibilities to appropriate technical support services.

The role of an ICT 5–14 coordinator can be summarised as:

- keeping up to date with ICT developments in learning and teaching in 5–14
- providing an example of effective classroom practice in using ICT for learning and teaching
- coordinating the teaching and assessment of discrete ICT elements across the school
- assisting colleagues with the ICT applications that support their learning and teaching across the curriculum
- supporting staff to achieve the school and the authority's ICT guidelines and policies
- advising on staff development needs and organising an in-service programme in partnership with the appropriate promoted staff
- coordinating ICT resource allocation
- ensuring systems maintenance to a level agreed with the appropriate technician services
- working within agreed primary–secondary liaison procedures to ensure that ICT continuity and progression are maintained across sectors. At primary level this will also include links with nursery provision outwith the school
- working within agreed primary–secondary liaison procedures to ensure that ICT continuity and progression are maintained across sectors. At primary level this will also include links with nursery provision outwith the school
- networking with colleagues with similar responsibilities to share developments.

OHT master



Argyll and Bute, where there is a significant number of scattered rural primary and secondary schools, has developed distant specialist teaching through ICT and, in particular, by videoconferencing. Specialist teachers work with a number of schools using video links and e-mail to provide regular support and advice to staff and pupils. The authority has made significant investment to ensure that both primary and secondary schools are linked and have the appropriate level of technology.

Each specialist teaching 'studio' comprises audio–video link hardware and software with auxiliary cameras and monitors, permitting the specialist to provide practical teaching demonstrations, provide assessment and evaluation feedback and to hold extended dialogue with those linked to the studio. Videoconferencing sessions are timetabled and provide support to pupils:

- with specific needs to allow individual tuition
- in groups with group tutorials
- by providing demonstration lessons with feedback to assist non-specialist class teachers, particularly in primary schools.

Local authority example

Hardware and technical support

This guide does not explore particular types of hardware or software. Decisions with regard to the phasing of hardware and the necessary building work to accommodate ICT infrastructures are a matter for local decisions. Government has made specific funding available to help local authorities and schools develop ICT capabilities. At local level, schools and authorities negotiate budgetary allocations and priorities. How the infrastructure is managed and put in place is another key decision to be taken at local level and due account will have to be taken of the experience of those who have tried different approaches, including:

- leasing equipment and maintenance support
- provision through the authority's own service to schools
- provision of some or all of the required infrastructure through a private–public partnership (PPP) arrangement with external providers.

Whatever the arrangement, it is clear that the pace of technological change is such that today's solution is not likely to be sustained in a few years time. Arrangements have to take account of the need to refresh systems and approaches probably within a five-year cycle and so the review of ICT and the infrastructures that support it should figure annually within the development planning procedures.

Decisions as to how hardware will be deployed are very important since these impact on the design of new schools or classroom upgrades for both class bases and specialist-subject classrooms. The options for hardware configurations are discussed in the HMI publication, *ICT and Development Planning* (SOEID, 1998), pp. 44–54. Thought will be given to the merits of:

- linked or networked machines giving connection to different parts of the school
- a system not only facilitating more effective learning and teaching but also supporting the school's management and administration
- an infrastructure that facilitates links to the outside world and exploits the resources of e-mail, searchable internet facilities and other technologies such as videoconferencing
- a system that is well supported in terms of staff training needs and available resources such as CD-ROMs.

Hardware facilities must be reliable if teachers are to have confidence in implementing their use in learning and teaching. Technician support solutions vary, but should include consideration of a number of options. These include:

- commissioned technical support from an outside provider
- maintenance agreements as part of PPP arrangements with agreed contractual requirements on uplift, repair and return of equipment
- offline or remote help service from a helpdesk for both hardware and software problems. (This is now becoming very sophisticated with the helpdesk able to upload solutions to schools through telephone lines.)

The importance of an adequate technical back-up must be stressed strongly if ICT users – both staff and pupils – are to proceed confidently.

Further advice on technical specifications and guidance can be found in parts 5 and 6 of *Using the Superhighways – ICT and Development Planning* (SOEID, 1998) and local information will be readily available from the local authority.

Applying ICT to management

Over time, ICT will have an increasing impact on all aspects of the professional life of teaching staff. The confidence of staff and their understanding of ICT increases as it is used as part of the everyday business of school management and operation. For example, in a number of schools the development of devolved financial management responsibilities has led to the use of financial management programmes to administer the school's budget allocation.

Applying ICT to management includes:

- use of ICT by management and staff of a commercial software package for recording absence, pupil records and financial management, report generation, file storage and other administrative tasks
- using ICT to manage and track pupils' progress and attainment and possibly suggest courses of teaching action to tackle problems
- using the school network or intranet to post messages, establish bulletin boards and generally improve communication between staff and pupils, and for management purposes
- using a local area network or the internet to share ideas and to communicate between schools, particularly in the transfer of files that might include teaching material, assessment strategies and other professional areas of concern
- accessing the internet for resources to enhance teaching and for pupils and staff to engage in research including the Scottish Virtual Teachers' Centre (SVTC) and links to training providers at both local and national levels
- exploring ways in which ICT might improve links and communication with parents and with local business and community organisations.

OHT master

The following extract introducing the national MIS project report indicates the potential of this area of work now and in the future.

The National Management Information Systems (NMIS) project worked collaboratively with representatives of staff in schools and education authorities to promote and support electronic data exchanges. The project team saw some good uses of management information and became aware of many of the strategic and operational difficulties schools face in using their computer systems to the best effect. This report offers a vision for the future of MIS in schools, the benefits for users of MIS and the issues to be addressed in moving forward. Potential benefits include making more use of the information schools hold or can hold to:

- *monitor pupils' progress*
- *evaluate curricular provision*
- *manage the use of resources*
- *perform day-to-day administration more efficiently.*

The benefits are not just in improved administrative services. Analyses of the data can give teachers, administrators and managers a more informed overview of current practices in a school to help them plan and improve the quality of provision and raise pupils' attainments. SEED is committed to providing benchmark data electronically to schools for use in their analyses.

Managing with Information – Making More Effective use of ICT in Management and Administration, LT Scotland, 2000

Staff development

ICT has emerged as both a significant teaching and learning resource and as an area in which people generally need to develop their own competence and confidence. In this, teachers are no different from society as a whole, but it is acknowledged that teachers need support to develop the necessary knowledge and skills, given their role in the preparation of young people for the future. Teachers recognise the importance of ICT and the potential it has for enhancing teaching and learning and they are properly concerned to identify issues that will impede development, such as:

- provision of hardware and online access
- time available to review new software packages to support curricular areas
- time to develop personal skills in ICT
- planning time to take account of ICT developments
- appropriate training opportunities.

While having mainly positive views about ICT generally, most staff are currently likely to have confidence with certain applications only – such as word-processing – where the links to current curricular work are clear, rather than in some other applications such as multimedia packages or advanced electronic communication. There is uncertainty amongst some secondary specialist staff about teaching ICT within their subject and amongst primary staff that a raft of new knowledge and expertise is yet another requirement for the generalist practitioner.

The Welsh study referred to earlier, *Asking Questions/Getting Answers*, identifies ICT-competent teachers as displaying the following characteristics.

- Positive attitudes to ICT
- Understanding of the educational potential of ICT
- Ability to make effective use of ICT in the curriculum
- Ability to manage ICT in the classroom effectively
- Ability to evaluate ICT use as one teaching and learning tool as compared with others
- Ability to ensure purpose and differentiation
- Technical ability

OHT master

The report goes on to say:

For most teachers who are using IT successfully in teaching, their decision to develop pupils' IT capability is a natural response to learners' needs. Subsequent reflection on these experiences leads to planning future teaching to address these needs specifically. The most successful schools disseminate this classroom experience and plan for all pupils to gain similar opportunities for IT learning.

The challenge facing schools is how best to develop ICT-competent teachers and the ethos that leads staff naturally to build ICT into day-to-day professional practice.

At national level the New Opportunities Fund training scheme offers schools and authorities a means of accessing appropriate training based on the work in schools. Several examples in this guide are drawn from materials developed by NOF training providers.

For many schools there is also the opportunity to benefit from locally provided INSET from the local authority and the possibility of input from specialist authority support staff or providers contracted to it. A coordinated approach to training is required to meet the strategic needs of the school and individual teachers.



Argyll and Bute Council has developed a set of basic ICT skills support cards for teachers. The cards are divided into four levels according to the teacher's own self-assessed level of capability. Teachers can then customise their own support pack from the set of master cards. This allows for a highly personalised professional support and teachers can move gradually through increasingly more complex ICT skills. In addition it is possible for the teacher who is more skilled in word-processing to have a support pack that extends learning in that area but also begins the same teacher at a lower level in, say, graphics work.

The same authority has also created a team of locally based part-time support staff from area groups of schools. These support staff have confidence in the use of ICT and are themselves teachers with skills in supporting classroom work with the technology. Schools contribute an element of funding from their devolved budgets to provide funds for the support teachers to be covered in their own schools. This gives the commissioning schools input of expertise and support whilst minimising the disruption to the class of the supporting teacher. The local nature of the arrangement also cuts down on travel costs and promotes shared understanding in associated school groupings.

Local authority example

Staff development needs require to be considered against the long-term aims for the school but should be focused on a number of short-term priorities to gain staff confidence in the use and importance of ICT.

Early attention should be paid to developing the ability of staff to integrate ICT into their teaching and to understand the contents of the national guidelines.

- The staff development programme requires to be sustained with real opportunity for staff to practice what they have learned subsequent to any training activity.
- There should be an early focus in the training programme on developing the personal ability of staff to use generic software, such as databases and word-processing packages, and software related to current curricular work or subject specialisms.
- Early attention should be paid to developing the ability of staff to integrate ICT into their teaching and to understand the contents of the national guidelines.

In addition to these considerations, training should make reference to:

- evaluation strategies for effective ICT use
- classroom organisation and management, including siting and access to hardware, time on task, teaching strategies and the balance of direct teaching with independent learning
- whole-school matters, such as the impact of ICT on the role and teaching style of the teacher; scope for learning outwith the classroom and in partnership with parents; scope for differentiating learning within subjects and also in the teaching of ICT skills and concepts; planning and resource implications
- strategies for monitoring, assessing and analysing the development of pupils' skills, knowledge and attitudes over time to ensure not only progression and continuity but also a realistic level of challenge for each pupil.

In *primary schools* particular emphasis should be given to training that:

- supports current development plan priorities and phasing
- recognises the very varied ICT experience and knowledge base of staff
- acknowledges the sometimes extensive knowledge and expertise of pupils and gives teachers strategies for handling this
- recognises the role of an ICT coordinator in providing a model of implementation, particularly where schools have developed a consistency of teaching style and approach to pupils.

In *secondary schools* the same factors outlined above for primary schools apply and in addition it would be helpful to give priority to considering:

- coordination of a targeted programme of content suitable for individual departments
- identifying who within departments might be an effective disseminator of both good practice and any training offered on a cascade model to other department members.

In all establishments, the process of evaluating the individual staff development needs of teachers should give attention to ICT as part of the staff development and review process. The Scottish Office research report, *Interchange 58 – Teachers' ICT Skills and Knowledge Needs*, gives perspectives on the more detailed breakdown of perceived training needs at a national level. Amongst its recommendations it includes:

- the encouragement of teachers to reflect on, and make decisions about, their own ICT needs on an on-going basis, to ensure more involvement and ownership and a greater integration of ICT within the learning and teaching process
- the provision of choice and guidance, where appropriate, in flexible training opportunities for teachers who are at different stages of ICT literacy, who teach different levels and curricula, and who are at different stages in their own career development
- the need for opportunities for continuing professional development (CPD) to be available on an on-going basis, that is not only through one-off events but also through opportunities for teachers to continue to develop at a pace that suits their local circumstances and resources
- the encouragement of teachers to integrate self-development of ICT skills and knowledge in their normal development planning.

In all establishments the process of evaluating the individual staff development needs of teachers should give attention to ICT as part of the staff development and review process.

The overall development of an ICT learning and teaching environment will be best served by a coordinated staff development programme with targets for individual members of staff as well as departmental targets that are firmly fixed in development planning priorities. Schools should find the Teacher Training Agency CD-ROMs, *ICT – Identification of your Training Needs* (containing a separate disc for primary and three discs for secondary), a useful starter for beginning their analysis of staff development needs.



Midlothian Council has adopted one approach to identifying staff development needs. Based on feedback from schools through school planning reports and advisory staff advice, areas of the ICT national guidelines have been analysed using a colour-coding system to identify opportunities for using ICT within the existing curriculum and to highlight staff competence across the authority. In this way they have identified the main areas for central support and have useful information regarding how to prioritise the phasing in of national guidelines advice.

Local authority example

Indicators of success in obtaining ICT capability

The school management implications, including effective strategic planning, are significant but, over time, not insurmountable. The document, *Using the Superhighways – ICT and Development Planning* (pp. 29–38), outlines the performance indicators relevant to the development of ICT capability and the learning environment. Clearly the achievement of success will come as elements of the performance indicator requirements are dealt with through the development planning process with the appropriate balance of school, local and national priorities. A further grid of indicators of success more related to the points made in this guide is developed in the Welsh document, *Asking Questions Getting Answers – A Whole School Approach to Developing IT Capability*. Schools should find this a useful reference in gaining ICT capability.

Success indicators for IT capability development

These indicators may be used by schools for planning, target setting and monitoring progress towards targets.

Source: This table is reproduced from the report, *Whole School Approaches to Developing IT Capability: Executive Summary* (Qualifications, Curriculum and Assessment Authority for Wales, 1999).

<p>Policy and schemes of work</p> <ul style="list-style-type: none"> • There is a written policy for IT that includes, amongst other matters, the school's aims and values in respect of IT in the curriculum. • All staff know and support the principles embodied in the policy. • The headteacher, senior management and governing body are explicit in their support for the policy. • Schemes of work, for IT as a subject and in other subjects, set out teaching and learning activities that provide for progression in IT skill development and continuity of IT skill application. 	<p>Planning, monitoring and review</p> <ul style="list-style-type: none"> • There is a development plan for IT that includes targets for developing pupils' IT capability, together with a commitment to the resources and staff development required. • Funding is allocated to implement the plan. • Systems are in place for monitoring the implementation of the plan, for evaluating its effectiveness, and for reviewing the policy, schemes of work and the development plan accordingly.
<p>Role of IT coordinator</p> <ul style="list-style-type: none"> • A realistic set of tasks is specified for the role of IT coordinator. • The IT coordinator provides an effective model of teaching IT. • The IT coordinator has the explicit support of the headteacher and other senior managers. • An adequate amount of time is available to the IT coordinator. In secondary schools, adequate staff (including technical support) are appointed. 	<p>Staff skills in IT and in developing IT capability</p> <ul style="list-style-type: none"> • All teachers have an agreed base level of personal IT capability and confidence in helping pupils use their IT capability for at least one activity in their teaching. • Support in the classroom is available for staff who are building their knowledge and confidence. • Agreed targets are set for staff reaching higher levels of personal capability and using a wider range of IT activities effectively in their teaching. • All teachers believe that they should help develop pupils' IT capability as one of the key skills and incorporate recommended approaches into their teaching.
<p>Coherence of the curriculum</p> <ul style="list-style-type: none"> • Schemes of work, for IT and for other subjects, show planned progression in new skills and continuity in opportunities to apply these skills in the curriculum. • Liaison activities between primary and secondary schools are designed to promote continuity of learning across phase transition. 	<p>Expectations, opportunities and access for pupils</p> <ul style="list-style-type: none"> • All pupils have planned opportunities to develop and apply their IT capability. • Pupils are expected to employ higher-order skills as well as IT techniques in pursuing worthwhile tasks in the curriculum. • Pupils are given opportunities to develop and consolidate their IT capability in school at times outside their normal lessons.
<p>Pupils' approach to learning IT</p> <ul style="list-style-type: none"> • Pupils are keen to develop their capability and value the teaching they receive. • Pupils are prepared to take the initiative in applying IT to relevant tasks. • Pupils are motivated to persevere with challenging tasks. 	<p>Assessment and feedback</p> <ul style="list-style-type: none"> • Procedures are in place for staff involved in developing pupils' IT capability to assess pupils' progress against statutory levels or expectations for their age. • Teachers use their knowledge of national expectations in feeding back regularly to pupils on their progress and in setting expectations of improvement in their work.
<p>Pupils' IT attainment</p> <ul style="list-style-type: none"> • A rising percentage of pupils are attaining a level of IT capability expected for their age. • A rising percentage of pupils are attaining a level of IT capability above that expected for their age. • In secondary schools, a rising percentage of pupils are gaining a recognised qualification in IT. 	

Monitoring and evaluating

Where the commitment to using ICT and developing ICT capability is strong, a school will put agreed monitoring and evaluation procedures in place to check on the quality of learning and teaching and to ensure continuous improvement. In most schools these procedures already exist for most aspects of the curriculum, and management and the incorporation of ICT-specific elements should be straightforward. However, several aspects require particular focus.

- Cross-curricular approaches in secondary schools and the use of ICT in subject areas to develop ICT-specific skills require careful consideration and shared understanding between staff. Monitoring and evaluation procedures require thoughtful structuring within an ICT development plan.
- The audit process described earlier in this guide requires thorough application.
- At school, department and class level, consideration should at least be given to:
 - pupil attainment
 - coverage of the strands outlined in the national guidelines
 - assimilation of ICT into the elements of the wider 5–14 programme
 - standards and quality of learning and teaching
 - hardware and software review
 - staff development requirements.
- There should be regular updates of policy in the light of review and technological development.
- Consideration should be given to reporting development progress and standards, for example by means of obtained a slot in the school standards and quality report.

OHT master

Classroom and department management

This guide highlights strategic and long-term planning implications for implementation of the national guidelines on ICT 5–14 and the creation of an ICT learning and teaching environment.

... it is in the classroom that the strategy has to be put into effect and it is in the complex interactions of teachers and pupils that national, local and school plans will succeed or fail.

However, it is in the classroom that the strategy has to be put into effect and it is in the complex interactions of teachers and pupils that national, local and school plans will succeed or fail.

While most staff see the importance and usefulness of ICT as part of learning and teaching and in preparing young people for life, many are still concerned about their own personal competence in ICT to deliver the necessary teaching and learning environment. We are still in the early stages of change with regard to the very fast moving world of information and communications technology.

The class teacher will depend on management to ensure that the necessary hardware, support, training and infrastructure requirements are put in place. However, the class teacher has specific responsibilities within the planning process fundamental to the success of any school initiative. The importance of the teacher's input to the formation and implementation of the school development plan is vital to its success.

Role of the class teacher

Become familiar with the terminology and content of national guidelines in the context of support from management within a planned development programme

The thrust of the ICT national guidelines is directed at two fundamental areas:

- learning *through* ICT
- learning *in* ICT.

The guidelines state that ICT should not be developed in isolation from other aspects of pupils' learning but is developed most effectively, and in a purposeful and relevant way, when it is embedded in activities integral to work on various subjects and topics. An objective is certainly to assist pupils to a point where they can decide whether or not the use of ICT is helpful to their task in hand.

Examine current schemes of work and programmes of study to see where they can be modified to input elements of the national ICT guidelines to achieve:

- coverage of content
- opportunities for consolidating continuity and progression across year groups and between the primary and secondary sectors
- opportunities to apply ICT to teaching to achieve greater teaching effectiveness and support for the particular subject or topic
- opportunities to help to build positive pupil attitudes and evaluation capacity in respect of ICT use.

In one primary school a topic on World War II was developed. As well as fulfilling the class's aims for its environmental studies programme, the aim was also set to use the context for facilitating cross-curricular use of computers. Use was made of a multimedia software package to allow pupils to make their project reports on interactive cards developed in a sequence or stack. These stacks allow the reader to click on-screen buttons to reveal text, sound and pictures that pupils have entered into the presentation from their own research. The planning was comprehensive and included assessment and evaluation criteria. A matching of language, ICT and environmental studies targets was also built in. This approach, which was an enhancement of the already established programme of work for the school, demonstrated a useful way forward in working both *in* and *through* ICT.

Report of school visit



Participate in the planning and development processes as individuals and as part of wider school teams

The role of ICT coordinator has been discussed. It should be reinforced that class teachers should have a source of advice and help on hand within the school and that a skilled member of staff's help in coordinating ICT developments is vital. In small primary schools this may be as part of a collaborative group rather than through a named individual, whereas in larger primary schools and in secondary schools individual staff members, with appropriate time at their disposal, will be a more effective solution.

Plan in conjunction with colleagues the nature, balance and content of pupils' learning experiences in ICT and how they will be assessed and reported upon in the course of the school year

... in learning about ICT, pupils will move naturally around targets or levels within a strand ...

National guidelines make it clear that in learning about ICT, pupils will move naturally around targets or levels within a strand or several different strands within the overall framework. The framework should be seen as providing a number of markers or milestones of achievement rather

than a prescriptive programme of study or a strictly linear sequence of activities or lessons. What is sought is coverage over time and it recognised that the starting points for schools and members of staff will vary. The perspectives of teachers and their awareness of each

... class teachers should have a source of advice and help on hand within the school and ... a skilled member of staff's help in coordinating ICT developments is vital.

pupil's experience of ICT will be vital in shaping the content of schemes of work or programmes of study. The reality of a more comprehensive coverage of ICT skills and concepts building from the early stages in primary schools should be given careful consideration. In secondary schools the experiences of associated primary schools and the quality of pupil experiences related to planned secondary work should be given attention. The range of experience and skill levels of primary pupils should not be underestimated or devalued by S1 teaching that fails fully to take account of prior ICT learning.

One secondary school English department had a clearly structured policy for the development and use of ICT in English 5–14 and beyond. This concise statement is set within the wider context of a whole school approach to ICT. The departmental statement comprised:

- a rationale statement
- overview of current provision in S1 and S2 including use of laptop computers, file transfers to desktop computers, keyboard and word-processing skills
- research and information skill development using ICT including skimming, scanning and the use of graphics for guiding pupils in such work; collation diagrams for organisation and presentational skills and book reviews
- links to the curriculum beyond S2
- use of CD-ROM, internet and intranet
- links and support for teaching staff
- development intentions and plans.



The statement concludes:

The possibilities are endless with regards to how ICT can enrich the learning process within the subject area of English and indeed all subjects.

Competence in the use of ICT skills, processes and concepts are skills for life. They afford pupils the opportunity to find out how to learn, and learn how to find out. Pupils can take control of their own learning, assisted by ICT.

Report of school visit

Assessment of ICT skills, concepts and attitudes has been considered earlier in this guide where the importance of giving early consideration to the means of assessing and recording pupils' progress has been discussed. National guidelines make no specific recommendations in this regard but do relate assessment to the existing national advice on this topic. It is suggested that assessment tasks and recording procedures will need to be designed as part of learning and teaching. Assessment of ICT competency is an area where national development work is required to bring forward more detailed support in the future.

Have awareness of the range of learning and teaching opportunities for ICT including the resources, accommodation and support within the school and to agreed levels from outwith the school

Teachers should feel confident to ask questions of promoted staff ...

A class teacher requires to be kept informed of other developments that will impact on the delivery of the curriculum through established and evolving teaching practices. Teachers should feel confident to ask questions of promoted staff regarding the availability of resources and support and should clearly take account of these in class planning.

Primary schools

Amongst the practical considerations that should be addressed are:

- clear information on available software and hardware, embracing both stand-alone systems and systems that are networked through a school or local area server
- advice on the location of hardware and working areas in respect of matters such as siting computers, available working surfaces and electrical safety
- advice regarding child safety in the use of communications resources such as the internet – including screened access for pupils
- timetabled arrangements for access to any centralised or shared hardware provision and agreements on aspects that might require discrete teaching
- awareness of training needs and opportunities for staff development together with the availability of support staff both school-based and centrally.

Secondary schools

All of the above points apply, and in addition:

- firm agreements within departments regarding the levels and content of ICT teaching should be undertaken within schemes of work
- clear understandings should be established with regard to the balance of discrete teaching from specialist ICT staff and that to be undertaken within other subjects.

A key issue for ICT in all schools is where they might consider discrete teaching sessions for mastery of a skill or concept, or piece of software, or where there are facilities and available specialist staff to permit such work. The latter is likely to be the case in secondary schools, and decisions have to be taken regarding the balance of discrete and permeative teaching approaches. The circumstances between schools will vary and the requirements within subjects will also differ but the agreements reached are vital for the balance of the curriculum and continuity and progression of learning about ICT in the S1 and S2 stages. In primary schools this also has a major impact on how hardware is deployed amongst classes and whether or not machines are spread around the school or focused in a teaching area with networked or stand-alone systems available in classes. Participation in this key decision-making area by class teachers is desirable as they will have to work with the resulting facilities.

Use their personal planning to implement the policy and long-term plans of the school

The national guidelines do not envisage the requirements for ICT to have significant impact on schools' existing planning approaches. There are no specific recommendations for how the personal planning of teachers and departments should relate to the wider school development plan. Indeed, schools have spent significant time already in working out realistic and practical formats. The approach envisaged is that teachers' personal planning should make reference to agreed schemes of work that have already been modified to take account of ICT as part of the overall planning strategy of the school. Where schools adopt specific teaching packages to undertake discrete areas of ICT skill development it would be important for planning to record the aspects to be covered.

Although the personal planning structures followed by teachers is not expected to be changed it would be important for teachers' plans to demonstrate growing ICT references over time.

Contribute to the monitoring and evaluation of the implementation of ICT in the work of the school

With the increase in new and more sophisticated hardware and software for teaching and administrative purposes, teachers have more opportunity to apply ICT to various aspects of their work. However, it is important that before embarking on new developments, there is a mechanism for consultation between teachers at a stage or within a department. Among the questions that should be posed are the following.

- Will the proposed course of action enhance the quality of the teaching and learning process?
- Will the proposed approach distort the balance of curriculum time and focus, to the detriment of staff and pupils with regard to syllabus coverage?
- Do the necessary hardware and software support the proposed approach appropriately?
- Have arrangements been made for relevant staff training?
- Has consideration been given to:
 - safety and access issues, such as electrical safety
 - personal welfare factors, such as inappropriate internet access
 - reasonable equality of opportunity of access on the part of pupils?

Will the proposed course of action enhance the quality of the teaching and learning process?

Evaluation of ICT experiences in shared feedback at focused staff meetings together with a more systematic gathering of staff views, using, for example, questionnaires and other data-gathering strategies, is important and depends for its success on staff

participation and cooperation. Nowhere will this collaboration be more vital than in the development planning cycle of auditing needs, evaluating personal and shared teaching strategies and evaluation of potential new hardware and software developments.

A number of other factors should be borne in mind at department and classroom level including:

- ensuring that best use is made of resources through effective timetabling of shared general resources such as hardware, specialised items such as digital cameras and the use of any dedicated ICT facilities such as a computer suite in a primary school
- exploration of where support staff, such as classroom assistants, auxiliaries and librarians can best support pupils
- consideration of how parents and carers and home-computer use can support work in school. Consideration will be also be given to how the school can cater for equality of access to compensate those pupils for whom home computer use is not an option.

Information and Communications Technology 5–14: Section 3

Resources



Section 3

Resources

In ICT there is an increasing range of potential resources available to schools. In particular the number of websites that support education is growing rapidly. Both the scale and variable quality of these present challenges to schools in monitoring the support offered. This is one issue that has been taken up nationally in the National Grid for Learning in Scotland (www.ngflscotland.gov.uk), which is committed to helping direct schools to useful online curricular and staff development resources. The National Grid for Learning website is increasingly the first reference point for Scottish schools.

Educational publishers, computer service providers, educational broadcasters and other resource providers, such as environmental organisations, are all increasingly offering updated and new resources online. Local authority and other intranets are developing, and schools are being offered a range of specialist commercial and public services such as free or subscription online learning environments.

Publications

The publications below were used in writing this guide, and many of these are already in schools. They should be referred to for in-depth advice on specific ICT issues.

- *Asking Questions – Getting Answers: Whole School Approaches to Developing ICT Capability*, Qualifications, Curriculum and Assessment Authority for Wales, 1999
- *Click Thinking: Personal Safety on the Internet*, SEED, 1999
- *Connecting Schools, Networking People 2000*, British Educational Communications and Technology Agency (BECTA), 1999
- *The Use of ICT in Learning and Teaching*, SEED, 2000
- *Managing with Information – Making more effective use of ICT in Management and Administration*, Learning and Teaching Scotland, 2000
- *Interchange 58 – Teachers' ICT Skills and Knowledge Needs*, SOEID, 1998
- *Interchange 63 – The Impact of Information and Communications Technology Initiatives*, SEED, 2000
- *Preparing for the Information Age*, synoptic report of the Education Departments' Superhighways Initiative, HMSO, 1997
- *Practical Guide to Videoconferencing*, SEED/SCET, 1999
- *Using the Superhighways – ICT and Development Planning*, SOEID, 1998

Some selected websites

- www.ngflscotland.gov.uk
The web service of the National Grid for Learning Scotland will extend the content of the Scottish Virtual Teachers' Centre to cover other groups, including pupils, parents, communities and learning managers.
- www.svtc.org.uk
The Scottish Virtual Teachers' Centre is part of the implementation of the National Grid for Learning targeted at practitioners, teachers, librarians and lecturers who work in the Scottish early years, school and college sectors.

- www.LTScotland.com
Learning and Teaching Scotland will provide an increasing range of online information and services to education in Scotland.
- www.scran.ac.uk
SCRAN's mission is to create a fully searchable resource base of Scottish material, culture and human history. SCRAN works with project partners such as museums, galleries, archives and universities to digitise selected parts of their collections. There are over 200 projects underway and material is being added to the resource base daily.
- www.scotland.gov.uk
The main site of the Scottish Executive – who they are, what they do, publications and latest news.
- sitc.mhie.ac.uk
The Scottish Interactive Technology Centre (SITC) offers access to a wide range of educational projects including ICT case studies.

Learning and Teaching Scotland 5–14 website

In the course of preparing this guide a number of very useful documents and exemplars of practice were used as reference. In addition, the publication process did not allow for some of the quoted exemplars to be included in as full a form as desired. Furthermore, in the period following drafting other useful materials have appeared. In order to capitalise on these resources, a 5–14 website is under development. Online support is likely to be developed increasingly by Learning and Teaching Scotland in the future.

The 5-14 website will contain resources such as:

- checklists for monitoring progress – sample
- local authority ICT policies – examples
- school ICT policies – primary and secondary
- class plan (primary) extracts
- departmental planning examples (secondary)
- ICT and mathematics – one authority response to developing ICT aspects
- using spreadsheets – NOF trainer example
- the Chrysalis Project – report of a school project
- ICT and SEN
- assessment process – analysis of children's writing
- cluster group working – one group's report
- parents' leaflet on ICT
- school ICT task force – project schedule
- matching 5–14 guidelines to ICT guidelines
- Argyll and Bute *ICT Skills Pack* – reference source only
- the MacNet Support Team – report
- *Providing Specialist Support at a Distance* – report
- 'Anywhere School' – action plan outline
- Introducing ICT 5–14 – workshop materials and OHT masters
- *Library Support for ICT in the Curriculum* – a discussion document
- glossary of ICT terms
- ICT action points – expanded
- implementing ICT 5–14 – a resources checklist
- ICT 5–14 implementation in the classroom.

Some of the sources are working documents, and some precede the new national guidelines. The authors are willing to share them in the spirit of collegiate working.



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