ICT across the curriculum

Management Guide

Department for Education

Key Stage 3
National Strategy

ICT across the curriculum
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Key Stage 3
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Introduction

About the *ICT across the curriculum* (ICTAC) pack

The training pack for *ICT across the curriculum* (ICTAC) forms part of the Key Stage 3 National Strategy's support for whole-school improvement. It should be used flexibly to suit local circumstances and, if you have chosen ICT across the curriculum as your whole-school priority, will be supported by your local Key Stage 3 lead consultant for ICTAC.

The *ICT across the curriculum* (ICTAC) pack is a set of materials designed to promote the use of ICT across all subjects in schools. It builds on the work of the Key Stage 3 National Strategy ICT strand and the ICT capability that pupils are bringing to their subject lessons from their ICT lessons. It also considers the value that ICT can add to teaching and learning in subjects and the need for a whole-school approach to develop coherent and effective practice across the currculum.

The training pack comprises:

- a management guide;
- a series of *ICT in ...* printed guides (one per subject);
- exemplification materials on the subject-specific CD-ROMs;
- case study video on the subject-specific CD-ROMs;
- subject-specific A2 colour posters describing use of ICT capability (two per subject).

About this guide

This guide is intended for senior leadership teams and other staff with responsibility for leading and managing ICT across the curriculum.

The main objectives of this publication are to:

- consider the relationship between the teaching of National Curriculum ICT as a subject and the use of ICT in other subjects, and how these two components can be mutually supportive in contributing to the raising of standards;
- raise whole-school awareness of ICT capability, as set out in the National Curriculum for ICT and taught in ICT lessons, and how it may be applied and developed in and across the curriculum;
- analyse the opportunities that exist in the curriculum for developing and applying pupils' ICT capability, encouraging creativity and exploration, and adding value to teaching and learning;
- consider the implications for senior leadership teams when they are developing coherent whole-school approaches to ICT across the curriculum.

The executive summary that follows highlights the key points raised in this guide.

Executive summary

> The past five years have seen a slow but steady improvement in pupils' achievements in ICT capability, the quality of teaching, and the leadership and management of ICT ... The complementary use of ICT across subjects, however, has been slow to develop and is uneven across schools and subjects ...
>
> The effective balance between the teaching of ICT skills, knowledge and understanding on the one hand and the application of these as part of learning across subjects on the other hand remains a difficult and elusive goal for the majority of schools.
>
> *(Information and communication technology in secondary schools: Ofsted subject reports 2002/03)*

The key messages of this guide include these points.

1 Schools have two responsibilities for ICT in the National Curriculum:

    a to teach the National Curriculum programme of study for ICT;

    b to give pupils opportunities to apply and develop ICT capability across the curriculum (all subjects).

Making coherent links between these two components presents a significant challenge for senior leadership teams to raise standards and make the most effective use of available resources.

2 The rationale for giving pupils opportunities to apply and develop ICT capability must be firmly rooted in moving learning in the subject (science, art, music, ...) forward. Use of ICT needs to be purposeful and add real value to the subject.

3 Pupils' ICT capability can only be applied and developed in subjects if it has been taught effectively in the first place. The National Curriculum for ICT sets out the ICT capability that needs to be taught. The Key Stage 3 National Strategy gives detailed guidance, through the publication, the *Framework for teaching ICT capability: Years 7, 8 and 9* (DfES 0321/2002), and sample teaching units, on how this may be achieved. It recommends that ICT be taught as a discrete subject so that the subsequent ICT capability can be applied and developed effectively in all subjects.

4 If the ICT strand of the Key Stage 3 National Strategy has been implemented successfully then pupils will bring a sound level of ICT capability to other subject lessons. Pupils will not need to be taught the ICT but will be able to 'apply and develop' ICT to move learning in the other subjects forward. This will provide subject teachers with additional expectations and opportunities for teaching and learning in their subject.

5 It is important to make the distinction between pupils' and teachers' use of ICT in lessons. The main focus of this guide and the other materials in the ICTAC pack will be on pupils' use of ICT, but they also take account of teachers using ICT, for example, when working on a whiteboard for demonstration. This may take subject learning forward (which, of course, is crucial) but it is important to recognise that, in this lesson, pupils are not applying and developing ICT capability.

6 It is essential that all subject teachers understand the ICT capability that pupils will bring to their lessons and know when it will have been taught in ICT. There may be implications for raising staff awareness and providing effective training where necessary. This is usually a critical role for the ICT coordinator and/or the senior leadership team member who has responsibility for ICT.

7 School leadership is a critical component in ensuring an effective and coherent whole-school approach to ICT across the curriculum. Maximising opportunities for pupils to use ICT in a range of subjects and contexts requires careful planning and coordination. This involves consideration of infrastructure, staff training, schemes of work, resource management and deployment, monitoring of impact and entitlement and links to the school development plan.

8 Schools put considerable investment into ICT resources. However, investment in technology alone will not give pupils appropriate and significant opportunities to apply and develop ICT capability – nor automatically add value to teaching and learning. Making effective use of these resources requires strategic management and whole-school planning.

> The use of ICT is not guaranteed to enhance teaching and learning in other subjects. For example, the production of multimedia presentations may enable pupils to reapply the skills learnt in ICT lessons, but if they focus on too narrow a range of learning, this may not be a good investment of time in the context of the subject. ICT-based learning works best where it is led by the learning objectives of the subject being taught.
>
> *(Information and communication technology in secondary schools: Ofsted subject reports 2002/03)*

Introduction to ICT across the curriculum

ICT capability

What do we mean by 'ICT capability'?

ICT capability involves technical and cognitive proficiency to access, use, develop, create and communicate information appropriately, using ICT tools. Learners demonstrate this capability by applying technology purposefully to solve problems, analyse and exchange information, develop ideas, create models and control devices. They are discriminating in their use of information and ICT tools, and systematic in reviewing and evaluating the contribution that ICT can make to their work as it progresses.

ICT capability is much broader than acquiring a set of technical competencies in software applications, although clearly these are important. ICT capability involves the appropriate selection, use and evaluation of ICT. In essence, pupils need to know **what** ICT is available, **when** to use it and **why** it is appropriate for the task.

For example, when pupils are creating a presentation, they use their ICT capability to select appropriate software, consider fitness for purpose and match content and style to a given audience. It is important that lessons are not driven by software or technology but are focused on clear objectives in the subject, where ICT is used as a vehicle to support achievement of those objectives and to enhance teaching and learning in all subjects.

Requirements for ICT in the National Curriculum

There are two statutory responsibilities within the National Curriculum for teaching ICT in schools at Key Stage 3. Schools need to ensure that all pupils are:

- **taught** the programme of study, at each key stage, as set out in the *National Curriculum for Information and communication technology* – the attainment target, ICT capability, sets out the expected standard of pupils' performance required at each level;

- given opportunities to **apply and develop** their ICT capability through the use of ICT tools to support their learning in all subjects.

The first bullet point focuses upon teaching ICT as a subject whereas the second point refers to applying the subsequent ICT capability across other subjects.

ICT – the subject

In this publication, 'ICT – the subject' refers to the teaching of the National Curriculum for ICT. Advice on how ICT can be taught as a subject is detailed in the Key Stage 3 National Strategy publication, the *Framework for teaching ICT capability: Years 7, 8 and 9* (DfES 0321/2002). The Framework breaks down the Key Stage 3 ICT programme of study into yearly teaching objectives. It also recommends that schools should allocate a minimum of one hour per week for discrete ICT teaching in each year of Key Stage 3, to ensure sufficient time for the programme of study to be taught effectively.

The Strategy's guidance about how to teach ICT capability as a subject is extensive. A series of sample teaching units, developed from the QCA/DfEE publication, *A scheme of work for Key Stage 3 information and communication technology*, includes detailed lesson plans and resources showing how the ICT yearly teaching objectives can be taught in lessons. The units are intended to provide a stimulus for planning, for individual schools to adapt and integrate within their own schemes of work.

All of the materials and guidance for teaching ICT as a subject are available on the website for the Key Stage 3 National Strategy (**www.standards.dfes.gov.uk/keystage3**). Teaching ICT as a subject is therefore not the focus of this publication, but there are clearly overlaps with the use of ICT in other subjects that should be considered. Consequently, this and related publications include guidance about how pupils can be given opportunities to apply and develop their ICT capability in other subjects, and how these relate to the teaching of ICT as a subject.

ICT – in subjects

Successful implementation of the ICT strand of the Key Stage 3 National Strategy will give pupils a sound level of ICT capability and the transferable skills to build upon in their learning of other subjects. This has implications for teachers across all subjects in the curriculum.

Pupils will come to subject lessons with expectations about how they might apply ICT to move their own learning forward. Subject teachers will not need to teach ICT capability but can exploit new opportunities for pupils to apply and develop the capability that they already have, to enhance their learning in subjects. Consequently, the focus of the lesson remains firmly rooted in the subject and teachers are not burdened with the need to teach ICT.

There are implications for subject teachers, in that they will need a good understanding of the breadth of ICT capability that pupils have been taught and will be bringing to their lesson. This is explored later in this section. Teachers will also need to know which parts of ICT capability offer significant opportunities for teaching and learning in their own subject and how they can be incorporated into existing schemes of work. This is explored in detail in sections 2 and 3 in each of the *ICT in* ... series guides that accompany this ICTAC pack. The use of ICT needs to be purposeful and to add value to the teaching and learning of the subject and should not be seen simply as a bolt-on. It needs to be carefully integrated into the subject lessons, with a clear rationale for its use. Some examples of lessons are outlined in section 4 of the *ICT in* ... series guides and the lessons on which they are based are included, in full, on the accompanying subject-specific CD-ROMs.

The relationship between 'ICT – the subject' and 'ICT – in subjects'

Pupils' ability to apply their ICT capability across the curriculum is largely dependent on the effective teaching and learning of ICT in the first place. Pupils' use of ICT in other subjects may be ineffective if they do not already have an appropriate level and understanding of ICT capability. This may result in a lack of progress in both ICT and the subject area. For example, asking pupils to produce a presentation in a given subject will be unproductive if they have little experience of using the software or understanding of how to create meaning and impact for a given audience. Pupils who try to learn new areas of ICT at the same time as new subject content will often fail in both endeavours.

It is crucial that pupils are taught the appropriate ICT capability before applying it in other subjects. The relationship between 'ICT – the subject' and 'ICT – in subjects' can therefore be viewed as interactive and mutually supportive as shown in the diagram on the next page.

Purposeful and appropriate application of ICT in subjects offers pupils opportunities to:

- use their ICT capability to assist and progress their learning in subjects;
- engage in higher-order thinking skills, for example, by using ICT to undertake detailed analysis when modelling data;
- demonstrate, apply and reinforce their understanding of ICT capability within a range of subject contexts. The transferability of ICT capability is an important aspect of progression in pupils' knowledge, skills and understanding.

| ICT capability | Apply and develop ICT capability |

ICT – the subject
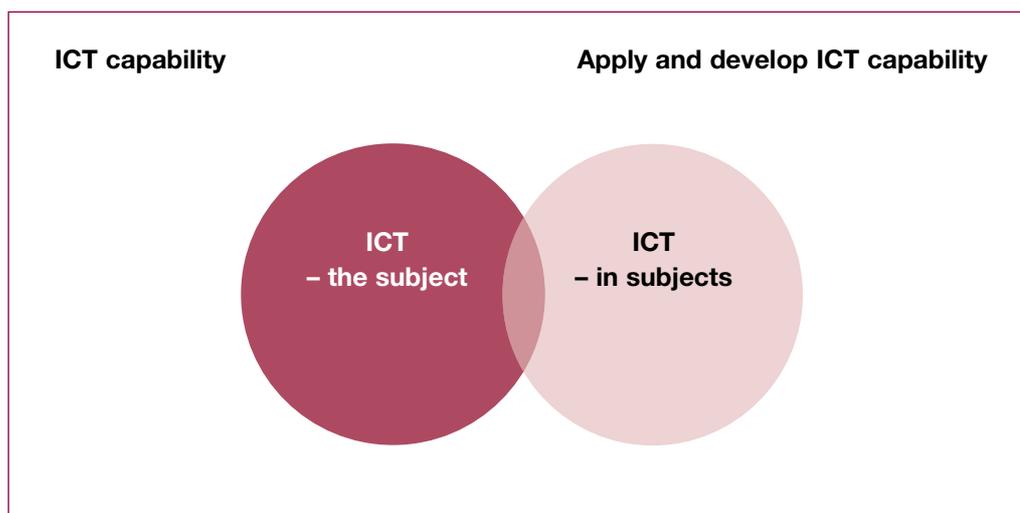
ICT – in subjects

It is important to recognise that pupils using ICT effectively in subjects may not always be applying high levels of ICT capability. For example, using a wordprocessor to draft and redraft text is a valid and powerful activity in a range of subjects; using software to support learning in MFL or using a learning support program in mathematics or a bespoke program designed to aid learning in science can be significant in helping pupils to make progress. In all such cases, ICT fulfils a legitimate function if using it moves learning in the subject forward, but it may make little contribution to developing the ICT capability taught in ICT lessons.

As pupils become more confident and proficient in using ICT there will be opportunities to apply and develop higher levels of ICT capability in subjects, for example, producing web pages for a given purpose and audience, manipulating data to test a hypothesis, or incorporating sound and video into a presentation to add meaning and impact. It is important to reiterate that, whatever the level of ICT capability applied, it must add value to teaching and learning in the subject.

Although the *Framework for teaching ICT capability: Years 7, 8 and 9* (DfES 0321/2002) recommends that schools allocate discrete ICT teaching time in all years at Key Stage 3, it will be for schools to decide which is the most effective model. There may be some opportunities for aspects of ICT capability to be taught in a different subject area and then also applied in an appropriate context. For example, the control elements of the National Curriculum for ICT could be taught within design and technology. However, teaching subject objectives and ICT objectives at the same time can be problematic and teachers should be aware of the potential for the lesson to lose sight of the ICT objectives. Progress in the teaching and learning of a particular subject can also be disrupted by the time taken to teach the required ICT component from scratch.

> Many schools continue to cling to a belief that cross-curricular provision can deliver good progression in ICT capability, in spite of inspection evidence to the contrary over recent years. The weight of evidence suggests that what works best is a balance between discrete provision and the application of ICT capability across other subjects. However, many schools continue to struggle to achieve this.
>
> *(Information and communication technology in secondary schools: Ofsted subject reports 2001/02)*

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A whole-school policy for ICT across the curriculum

Schools put considerable investment into ICT resources. However, this investment alone will not necessarily give pupils appropriate opportunities to apply and develop ICT capability – nor automatically add value to teaching and learning. Effective implementation of ICT across the curriculum is much more complex and involves strategic management and coordination within whole-school policies. An effective model of applying and developing ICT across the curriculum depends on a number of factors, including:

- effective teaching of the National Curriculum programme of study for ICT (the subject);
- appropriate opportunities for pupils to apply and develop ICT capability in a range of subjects and contexts (transferable knowledge, skills and understanding);
- deployment of resources so that subject areas can access ICT when it is needed, including provision of ICT within subject classrooms or areas;
- a policy for purchasing of resources that maximises their use and allows for flexibility of use, for example, whole-class teaching, small-group work, individual teacher use – this could include consideration of whole-school networking provision, laptops and wireless networking capability;
- appropriate subject-specific resources in all departments, that are selected on the basis of fulfilling subject learning objectives;
- planned use of ICT in schemes of work for all subjects, so that resources can be appropriately deployed and organised;
- whole-school policies which clearly map and sequence opportunities for application and development of ICT, so that pupils bring the appropriate ICT capability to subject lessons;
- whole-staff awareness of ICT capability and what can reasonably be expected of pupils in each year.

Key concepts in the *Framework for teaching ICT capability: Years 7, 8 and 9*

The National Curriculum programme of study for ICT groups the knowledge, skills and understanding that pupils need to acquire into four themes:

- finding things out;
- developing ideas and making things happen;
- exchanging and sharing information;
- reviewing, modifying and evaluating work as it progresses.

The *Framework for teaching ICT capability: Years 7,8 and 9* (DfES 0321/2002) subdivides each of the first three themes into three key concepts. The resulting nine key concepts describe the breadth of ICT capability and progression in learning through Key Stage 3. This provides a useful vehicle when discussing how ICT can most enhance teaching and learning in subjects. The fourth theme (reviewing, modifying and evaluating work as it progresses) is a critical feature of ICT capability, which needs to be integrated throughout all areas.

ICT capability Key Stage 3 Key concepts

Key to ICT National Curriculum themes:

- Finding things out
- Developing ideas and making things happen
- Exchanging and sharing information
- Reviewing, modifying and evaluating work as it progresses
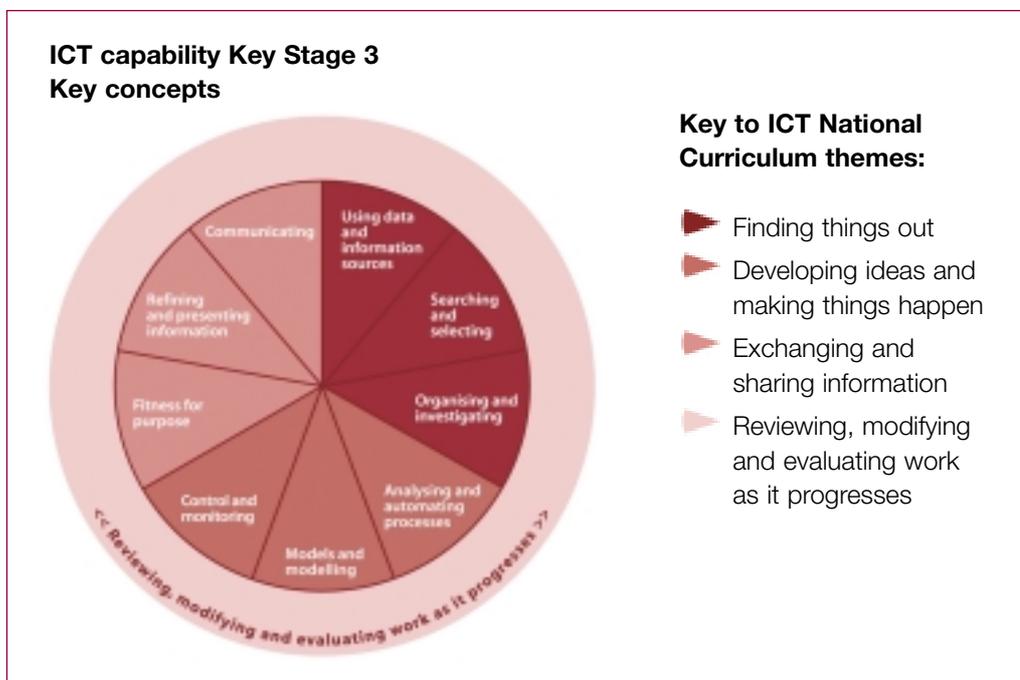
The diagram above shows the nine key concepts of ICT capability. Further guidance about each of these concepts can be found in Appendix 1.

In the *Framework for teaching ICT capability: Years 7,8 and 9* (DfES 0321/2002) each key concept is broken down into suggested yearly teaching objectives in Years 7, 8 and 9, to identify progression through the key stage. The yearly teaching objectives are displayed in full in Appendix 2.

The breakdown of ICT capability into the nine key concepts shown in the diagram helps identify the most appropriate areas of ICT to enhance teaching and learning in subjects. It is important that pupils are given sufficient opportunities to develop and apply the full range of their ICT capability in the curriculum.

Planning and sequencing ICT across the curriculum

Subject teachers need to know what they can reasonably expect a pupil to know, understand and be able to do at each point in Key Stage 3.

Schools will need to map and sequence the teaching of ICT capability. This will identify when subject teachers can reasonably expect to develop and apply pupils' ICT capability and move teaching and learning forward in their own subject. For example, once pupils have been taught appropriate search techniques on the Internet, including consideration of validity and bias, they can be expected to undertake purposeful research in other subjects and present their findings.

It is also important to consider the experiences of pupils at Key Stage 2. Again, individual schools will differ but Appendix 3 (extracted from the *Framework for teaching ICT capability: Years 7, 8 and 9* (DfES 0321/2002)) describes what most pupils should have learned in ICT by the end of Key Stage 2. This summary is based largely on pupils following the Key Stage 2 QCA scheme of work, or equivalent, during Years 5 and 6.

ICT as a teaching tool

So far we have reviewed the use of ICT as a learning tool for pupils and have acknowledged how pupils who are confident and proficient in ICT can bring with them opportunities for extending their **learning** as they use their ICT in other subjects in the school curriculum.

However, existing and emerging ICT **teaching** tools provide further opportunities to enhance subjects and add value to teaching and learning. For example, the use of interactive whiteboards, video projection units, microscopes connected to computers, prepared spreadsheets to capture and model data, CD-ROMs, presentations with video and carefully selected resources from the Internet all provide examples of how ICT can be embedded into subject teaching.

The diagram on page 11, showing ICT across the curriculum, can therefore be extended to include ICT as a tool or medium for teaching. Clearly elements of the model will overlap and impinge on each other. For whole-school policies for ICT across the curriculum the challenge is to make the most purposeful use of the available resources across all teaching and learning. Opportunities to embed ICT suitably in subject-teaching need to be exploited, as appropriate.
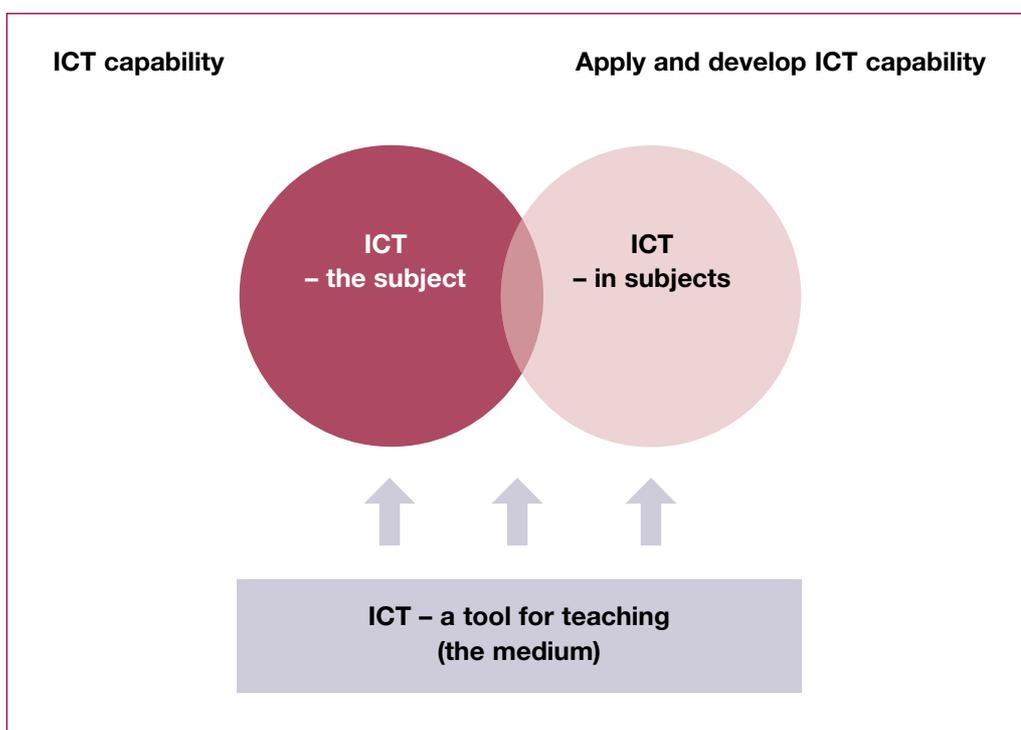
Use of ICT by a teacher may involve little or no use of ICT by pupils and, consequently may do little to apply and develop their ICT capability. However, use of ICT by the teacher can enhance and stimulate the learning experiences of pupils and contribute to the achievement of subject objectives. It is important to recognise the different contributions that ICT can make to teaching and learning and acknowledge the importance of each. A policy for ICT across the curriculum should consider all these elements and the relationships between them.

Some examples of how this could be done in subjects are outlined in section 4 of the *ICT in* ... series guides and included in detail on the accompanying subject-specific CD-ROMs. The DfES CD-ROM, *Embedding ICT @ Secondary*, also provides a series of subject-specific case studies focusing on teacher-use of ICT.

2 | *Managing effective use of ICT across the curriculum*

The importance of leadership

A series of reports by the British Educational Communications and Technology Agency (Becta), *ICT and Standards*, suggest that school leadership and ICT leadership are two of the five key factors ('ICT enablers') that play a vital role in supporting the effective use of ICT in schools and, in particular, ensuring the provision of good ICT learning opportunities. The phrase 'ICT learning opportunities' encompasses the amount and quality of opportunities provided by the school for pupils to develop their ICT experience. The reports suggest that the five key factors below are essential for the link between effective opportunities for pupils to learn with ICT and higher attainment, enhanced motivation and improved behaviour.

- ICT resources
- School leadership
- ICT leadership
- General teaching
- ICT teaching

There is a clear and positive relationship between good ICT learning opportunities and higher pupil achievement in secondary education ... Schools that make good use of ICT within subjects at Key Stage 3 and GCSE level achieve better results than those who do not, especially where such schools have access to good ICT resources. ... These findings therefore suggest that where secondary pupils have good ICT learning opportunities, they are able to apply and develop their ICT capability in subject-specific work and this in turn can have a positive impact on their achievements in other areas. This report also identifies a number of additional positive relationships between ICT learning experiences and other measures such as pupils' attitudes, behaviour and attendance, and the views of their parents about the school.

Secondary Schools – ICT and Standards: An analysis of national data from Ofsted and QCA by Becta 2003

Full report available at
http://www.becta.org.uk/research

The quality of leadership and the management of ICT in a school are critical to an effective policy for ICT across the curriculum, giving pupils maximum opportunities to apply and develop their ICT capability.

An effective whole-school policy and approach to ICT across the curriculum will normally be driven by a member of the senior leadership team, coordinated by middle managers and applied consistently in classrooms. Senior leadership teams will want to ensure that the substantial investment in ICT infrastructure and resources translates into improved teaching and learning gains. Successful delivery of ICT across the curriculum, which is focused on raising standards in ICT and on increasing diversity in teaching and learning in all subjects, requires careful tracking of pupils' capability in ICT and the development of opportunities across the curriculum to embed and enhance that capability. As such the premise here is no different from that of Literacy or Numeracy across the curriculum. Measuring the use of ICT to support teaching and learning will be a more reliable indicator of a schools' ability to raise standards than the ratio of computers to pupils or the age of the ICT facilities.

A key question for us is to ensure that the ICT that is being delivered beyond the discrete lesson is being applied appropriately to the skills, capabilities and the age of the children, and is building upon the firm foundation that we know for sure is being delivered in the discrete ICT lessons ... The worst thing would be to have made all of this investment [in ICT] and then to find that it was being used in an *ad hoc* and inappropriate manner. As with any other important area of the curriculum, the structure and making sure that it's actually happening in practice, and that everybody knows what's expected of them, is hugely important.

I want our students to have the most rich, creative and successful education that we can offer to them. We set very high standards at Sacred Heart and we expect that our students will have access to the very best resources and the most interesting teaching in order to make their education exciting, rewarding and highly successful, and ICT is a really critical way of doing that.

(*Mrs Pat Wager, Headteacher, Sacred Heart High School for Girls, Newcastle*)

The Strategic Leadership of ICT (SLICT) programme focuses on the strategic role of headteachers in leading ICT in their schools. The programme offers the opportunity to build knowledge, skills and understanding of the key issues and impact of leading ICT. It has been developed jointly by the National College for School Leadership (NCSL) and Becta; further details can be found at **http://www.ncsl.org.uk**. NCSL suggests these ten possible features of an 'e-confident' school which provide a useful starting point for review and planning ICT in schools:

- high levels of staff confidence, competence and leadership;
- re-engineered teaching, learning and assessment, integrating effective use;
- leading and managing distributed and concurrent learning;
- effective application within organisational and management processes;
- coherent personal learning development, support and access – for all leaders, teaching and non-teaching staff;
- secure, informed professional judgement;
- appropriate allocation of resources to ensure sustainable development;
- availability, access and technical support;
- pupils/students with high ICT capability;
- school as the lead community learning and information hub.

Roles and responsibilities for ICT

The management of ICT presents a particular challenge to school senior managers. On one hand, ICT is a National Curriculum subject with its programme of study and associated requirements for resources and time. On the other hand, ICT has the potential to add considerable value to teaching and learning in other subjects.

Given the rapid changes in technology, and the impact not only on schooling but also on homes and leisure, school leaders face a considerable challenge. School senior leaders need to respond to the opportunities presented by ICT in learning throughout the curriculum, the legal requirements of ICT as a subject, and pupils' and teachers' growing but variable interest and expertise in ICT. They need to provide a cohesive curricular vision of how the school should move forward with ICT, allocate resources and support staff development. There is extensive advice on these matters on the Becta ICT advice website (**www.ictadvice.org.uk**).

In many secondary schools, responsibilities for ICT in the curriculum are split among several groups or individuals. For example:

- the headteacher and senior leadership team:
  - reporting to the governing body, provide the overall vision and set priorities for the future development of ICT. They will balance the needs of various departments for facilities and for professional and technical support. They will monitor and review progress regularly.

- the ICT coordinator:
  - usually a member of the senior leadership team, will be responsible for coordinating the cross-curricular use of ICT to support learning in all subjects, and for allocating equipment, accommodation and professional support for ICT throughout the school.

- the subject leader for ICT:
  - the head of the ICT department, will have responsibility for the teaching and assessment of the programme of study for ICT.

- all subject leaders:
  - will be responsible for ensuring that ICT is used productively to promote pupils' learning in their subject and will agree with the ICT coordinator the facilities needed to make this possible. They may also contribute to the assessment of pupils' performance at the end of Key Stage 3 by passing on a record of the level reached to the ICT subject leader.

Further guidance on the roles and responsibilities for ICT can be found in the *Framework for teaching ICT capability: Years 7, 8 and 9* (DfES 0321/2002). Advice on the role of subject leaders can be found in *Securing improvement: the role of subject leaders* (DfES 0102/2002).

Managing resources

The availability, deployment and use of resources for ICT have improved significantly but many schools continue to struggle to match the requirements for delivering ICT capability alongside the use of ICT in other subjects.

> More flexible deployment of ICT resources is possible through the use of clusters of computers for subject areas and sets of laptop computers linked wirelessly to school networks. Some schools have had notable success with the latter approach when they have combined it with well-judged professional development, and this has enabled them to address the balance of work between ICT in discrete courses and use across the curriculum.
>
> (*Information and communication technology in secondary schools: Ofsted subject reports 2002/03*)

Planning for a more flexible approach to the use of the available ICT resources may mean encouraging subject leaders and teachers to be much more specific about their resource requirements for ICT. This needs to be reflected in medium- and long-term curriculum planning, across all subjects, to identify clearly how ICT is to be used to move teaching and learning forward.

Valuable ICT resources can be tied up when ICT suites are used inefficiently, for example, when much of the lesson is led by the teacher using projection from the front, or when pupils need to spend considerable time away from the computers, planning or evaluating their work. Purchase and deployment of resources need to take account of clearly-defined teaching and learning methodologies identified in carefully planned departmental schemes

of work. Teachers can plan to use ICT in different ways, for example:

- the teacher using a laptop and projection unit from the front of the classroom;
- small groups of two to four pupils at computers working collaboratively;
- some pupils having access to ICT, others desk-based, working on related tasks;
- each pupil in a class needing sole access to computers for the whole lesson;
- pupils needing access to dedicated computers or peripheral devices such as scanners, printers, digital cameras;
- pupils needing access to computers and other ICT devices on a rolling programme throughout the lesson;
- pupils needing open access to ICT outside of lesson time, for example, after school, lunchtime, breakfast clubs;
- small groups of pupils, working around an interactive whiteboard, presenting to the rest of the class;
- a combination of the above.

Booking a central ICT suite, without careful consideration of the ICT resources required, may lead to inefficient use of resources.

There has been considerable investment and development in ICT resources in recent years, as schools strive to meet the Government's ambitious targets for computer-to-pupil ratios. While a number of models have been developed, many schools have focused predominantly on suites of networked computers where the premise is that pupils will always be working alone at a computer in a dedicated ICT room. As already discussed, this may not always be appropriate. To maximise use of resources, a more flexible approach is required. For example, schools should consider:

- basing clusters of computers in subject areas;
- siting sets of laptops for flexible use in a range of locations;
- wireless networking to enable access to the school's network from a range of locations;
- taking opportunities offered by new portable technologies such as personal organiser devices;
- laying out rooms to allow sufficient space for pupils to work away from the computers – especially for new installations;
- providing open access to ICT resources – including library ICT resources – during lunchtimes and before and after school;
- auditing the software that is available in departments to identify and remedy gaps in provision so that pupils have sufficient opportunities to apply and develop their ICT capability in all subjects;
- ensuring that use of ICT is carefully planned into departmental schemes of work so that the exact nature and timing of demands on ICT resources are clearly identified;
- monitoring and evaluating use of ICT across subject departments to inform future purchase and deployment of resources;
- ensuring there is equality of opportunity and access for pupils to apply and develop their ICT capability across the curriculum.

Advice and guidance on many of these issues, including technical support, is available at the Becta ICT website (**www.ictadvice.org.uk**).

Case study

This is a seven-form entry 11–18 school with 1164 pupils (225 in the sixth form). All pupils in Years 7, 8 and 9 have discrete lessons in ICT. At Key Stage 4 there are two GCSE groups and, currently, one group taking GNVQ ICT. There is one AS group and one A2 group in the sixth form. The school has three dedicated computer suites (each with 27 computers), a learning resource centre (20 computers), and distributed networks in English (10 computers), D&T (15 computers), mathematics (10 computers) and science (10 computers). The science department has a set of 30 Acorn PDAs that are used for data-logging activities, and the mathematics department has three class sets of graphical calculators. All teaching rooms in the school have network access points so that individual computers or laptops can access the network. Several teaching rooms have projection units and three portable units are available for booking. The ICT technicians organise a booking system for a range of peripheral devices including digital cameras, video cameras, webcams, control equipment and sensors.

IT1	Mo	Tu	We	Th	Fr
P1	Y7	Y13	Y9		
P2	Y8	Y13	Y10	Y9	
P3		Y7	Y8	Y7	Y8
P4	Y10	Y11	Y11		Y11
P5	Y10	Y11	Y11		Y9

IT2	Mo	Tu	We	Th	Fr
P1	Y7	10G	Y9		Y10
P2	Y8	10G		Y9	Y10
P3		Y7	Y8	10G	11G
P4	Y10	Y11	Y11	10G	11G
P5	Y10	Y11	Y11		Y9

IT3	Mo	Tu	We	Th	Fr
P1	Y7	Y12	Y9	11G	Y10
P2	Y8	Y12	Y10	11G	Y10
P3				Y7	Y8
P4	10G	11G	Y12	Y13	Y11
P5	10G	11G	Y12	Y13	

The timetable shows that the ICT teaching rooms are heavily used. With three full-time teachers of ICT teaching a total of 61 hours, there are only 14 hours when the ICT suites themselves are not booked. There are plans to reduce the number of computers in the ICT rooms to 18 so that pupils studying ICT as a discrete subject have room for 'off-computer' planning and preparation. This will allow for the creation of another room of 18 computers and a further nine computers to be redeployed into clusters in subject areas.

In this school the use of the distributed networks is closely monitored, to maximise total usage, and there is a drive to see these resources as 'whole-school' rather than departmental. When departmental ICT resources are not used effectively they are re-allocated to ensure maximum use.

The school management team, through their line management procedures, monitor use of resources against schemes of work. Departmental responsibility for forward planning is therefore high, and all departments are asked to request their blocks of time for ICT during the timetabling period, and to confirm their bookings in the half-term before they come into effect. This has had the effect of tightening up schemes of work and has seen the use of ICT in subjects being much more focused.

Ad hoc use of ICT continues through the use of the Learning Resource Centre with plans to extend access to breakfast and after-school clubs as well as lunchtimes. There are phased plans in place to move to a wireless networking environment so that existing and new resources can be used more flexibly. There are also plans for the purchase of two class sets of 15 laptops and/or handheld computers for pupils to use during subject lessons. A technician/teaching assistant will upload the pupils' data to their personal work areas on the network.

What principles is the school applying here?

1 Planning for network development and extension is central to school planning: all teaching rooms have network points.

2 Computer rooms are laid out so that pupils have sufficient space for off-computer work.

3 Departments are very clear about their planned use of ICT.

4 Schemes of work are monitored against planned use of ICT: forward planning is checked against application.

5 All ICT resources are seen as school resources.

6 Development and use of a learning resource centre have been important factors to increase access.

7 There are plans for more use of portable machines to allow greater flexibility.

8 Phased plans are in place to move to a wireless networking environment, to allow access to the network from a wider range of locations around the school.

9 Projection facilities are available in teaching rooms, either fixed or available through a booking system, with access to the network for whole-class teaching and sharing of work by teachers and/or pupils.

10 The school is planning to use teaching assistants and technicians more flexibly.

Managing pupils' ICT experiences

As discussed in Section 1, it is critical that there is a mutually supportive link between the teaching of ICT as a subject and the application of ICT in other subjects. Pupils need to be given opportunities across the curriculum to apply and develop the ICT capability taught in ICT lessons. These opportunities should be consistent across all classes, not dependent on the particular member of staff. There needs to be equality of opportunity, as well as access, for all pupils. There are implications here for subject leaders to ensure that staff in their department share good practice and ensure staff development in this area. The subject-specific *ICT in* ... guides, accompanying this ICTAC pack, consider this challenge in more detail.

Ensuring that pupils are building on the ICT capability that has already been taught has implications for scheduling schemes of work, both for the subject areas and for ICT. This is a complex exercise, involving all departments, and needs a whole-school approach and leadership to ensure maximum effectiveness. Some schools have set up ICT across the curriculum working groups to ensure that there is ongoing dialogue between subject leaders, the ICT subject leader and the ICT coordinator in the school. Monitoring the effectiveness of such a policy is a key role for the senior leader with responsibility for ICT and will include a review of teachers' understanding of:

- what is meant by ICT capability in the ICT National Curriculum;
- which aspects of ICT capability are particularly significant for their subject;
- the ICT capability that pupils will have been taught in each term;
- the new opportunities that they can exploit, using pupils' ICT capability to add value to teaching and learning in their subject;
- the implications for individual and departmental training.

Again, the subject-specific *ICT in* ... booklets and other materials included with this ICTAC pack offer guidance and support as to how departments might achieve this.

Use of ICT must be appropriate to the subject, to support the learning objectives of that subject. Whether pupils are applying low-level or high-level ICT capability, or whether only the teacher is using ICT, the fundamental principle is that it must add value to teaching and learning in the subject.

> ICT resources are not a panacea for all eventualities. In some situations they will be the best way to convey or consolidate a new concept, but not always. ICT needs to be planned carefully into departmental schemes of work so that pupils make good progress. Teachers can check whether use of ICT is appropriate by asking whether it will:
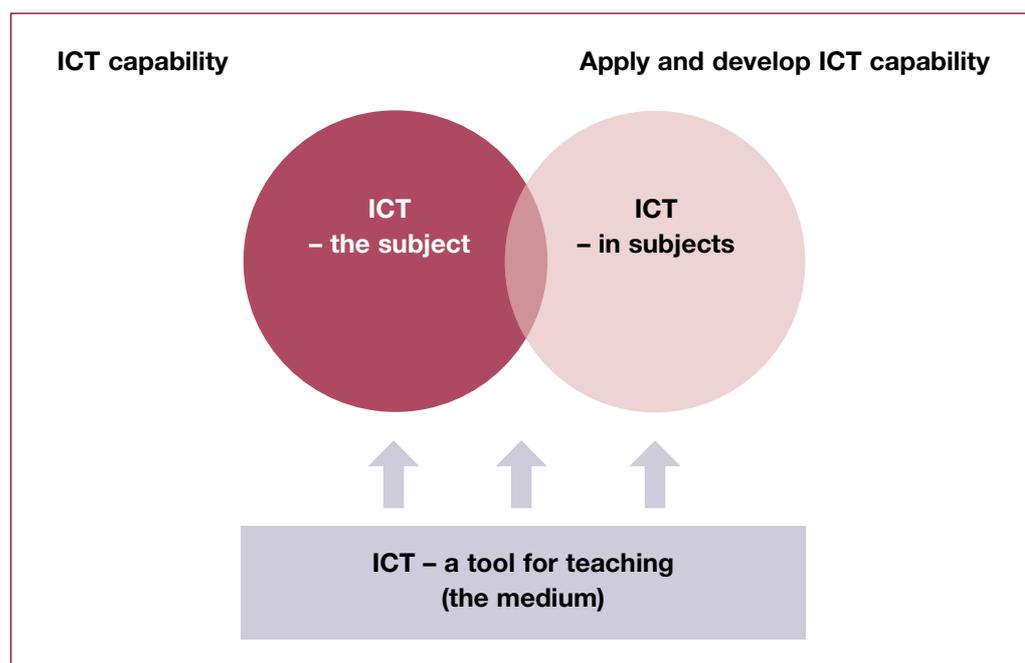>
> ■ allow pupils to investigate or be creative in ways not possible otherwise;
>
> ■ give them access to information not otherwise readily available;
>
> ■ engage them in the selection and interpretation of information;
>
> ■ help them to think through and understand important ideas;
>
> ■ enable them to see patterns or behaviours more clearly;
>
> ■ add reliability or accuracy to measurements;
>
> ■ enhance the quality of their presentations;
>
> ■ save time, for example, spent on measuring, recording or writing.
> *Framework for teaching ICT capability: Years 7, 8 and 9* (DfES 0321/2002, *Chapter 6, Using ICT across the curriculum*)

Continuing professional development

Investing in continuing professional development is a key component in the effective delivery of ICT across the curriculum, and in raising standards of teaching and learning. Reviewing staff expertise and confidence in the use of ICT is a useful first step. School leadership teams will already have data about the number of teaching staff who have benefited from training in the use of ICT, for example, through the New Opportunities Fund, the Laptops for Teachers programmes and the Hands On support initiative. Identifying how those teaching staff have used their training is a vital next step and will help to establish the training needs they have within their personal and professional development programmes.

Here it may be useful to revisit the diagram introduced on page 11 and revised on page 14.

ICT capability   **Apply and develop ICT capability**

ICT – the subject   **ICT – in subjects**

ICT – a tool for teaching (the medium)

If some teachers have developed an extensive repertoire of teaching strategies, focusing on teacher-use of ICT (ICT the medium), further development should encourage those teachers to develop strategies for the consolidation of pupils' ICT capability in subject teaching (ICT in subjects).

This *ICT across the curriculum* (ICTAC) pack offers a suite of materials to support professional development in ICT across the curriculum. The materials are designed to be used flexibly and, if you have chosen ICT across the curriculum as your whole-school priority, will be supported by your LEA's lead ICTAC consultant.

The section that follows outlines some possible approaches to using the resources in this ICTAC pack.

3   *Next steps*

Some discussion points follow for prompting an analysis of your current position and possible routes forward using the materials in this ICTAC pack.

Reviewing your current position

discussion points

School policy

■ Do we have a clear and consistent policy for ICT across the curriculum?

■ If so, when was this policy last reviewed?

discussion points

Leadership – roles and responsibilities

■ Who in the senior leadership team has overall responsibility for ICT across the curriculum?

■ Who is the subject leader responsible for teaching the National Curriculum ICT programme of study?

■ Who is the ICT coordinator responsible for coordinating the use of ICT across all departments?

discussion points

National Curriculum ICT

■ How is the National Curriculum for ICT taught in your school?

■ Is there discrete provision for ICT lessons throughout Key Stage 3?

■ What use is made of the Key Stage 3 National Strategy's ICT sample teaching units and training materials?

discussion points

ICT in other subjects

■ How do teachers of other subjects know what ICT capability pupils are bringing to their lessons at each stage?

■ Do all departments have use of ICT clearly planned and signposted in their schemes of work?

■ How do you ensure that subjects are building on ICT capability that pupils have already been taught? How is this scheduled across the year groups?

■ Does the use of ICT in subject teaching add value to teaching and learning? How do you know?

■ What use is made of ICT as a teaching tool?

Resources

- How are ICT resources currently deployed across the school?
- Does the current deployment of ICT resources give maximum efficiency of use?
- How are future resources to be purchased and deployed?
- How does the availability of resources match the requirements of the departmental schemes of work?

Continuing professional development

- How is the expertise that exists in individual departments shared with other teachers in the department or across departments?
- What ICT training have staff currently undertaken, for example, *NOF, Laptops for Teachers, Hands On Support and ESTUICT (Enhancing Subject Teaching Using ICT)*?
- How do you identify and respond to staff development needs?

Monitoring and evaluation

- How do you monitor and evaluate the effectiveness of the policy for ICT across the curriculum?
- How do you ensure equality of opportunity and access for all pupils?
- How do you monitor the use of ICT in departments?

Moving forward

Below is a suggested route forward for senior leadership teams, after they have read this management guide.

1 Watch the video (about 25 minutes), supplied on the management guide CD-ROM. The video outlines how one school, Sacred Heart High School for Girls, Newcastle, has approached the use of ICT across the curriculum. Use the discussion points above and the video to identify:

- what you are doing successfully already;
- what you are not doing but could be done with minimum changes;
- what you are not doing and for which changes would need greater consideration and planning.

2 Identify areas for development, based on your discussions and the issues raised in this management guide.

3 Decide whether to set up this project by:

a organising a whole-school development focused on all departments;

b starting with two or three departments only.

If you decide that ICTAC will be your whole-school focus for this year, then your LEA's lead ICTAC consultant will be able to support and assist you in planning routes forward.

Using the other materials in the ICTAC pack

There are 12 subject-specific *ICT in* ... guides within this ICTAC pack. There are also 12 subject-specific CD-ROMs containing video clips and examples of lessons. The *ICT in* ... guides give detailed guidance on how these resources may be used as part of a departmental session. Each guide contains a 'Next steps' section for subject leaders to take forward with their respective departments. There are also 12 posters in the pack, which outline the nine key concepts of ICT capability and show how some of these concepts can be applied and developed in the different subjects.

Possible models

The materials could be used as part of a whole-school training day, where staff are brought together at the beginning to work together on:

- establishing the current position as a school;
- identifying areas of existing good practice in departments;
- assessing the impact of the ICT strand of the Key Stage 3 Strategy;
- establishing a clear and consistent understanding of ICT across the curriculum;
- raising awareness of the ICT that pupils are taught in ICT lessons;
- reviewing the whole-school development plan for ICT across the school.

Subject staff could then work in departments, using the materials in the ICTAC pack and focusing on the next steps section in the *ICT in* ... guide to help them.

Issues arising from departments could then be fed back into the whole-school action plan to establish routes forward.

Alternatively, a school may decide to focus on two or three departments, to be viewed as a small-scale project to evaluate the impact of ICT in the subjects. They could be two departments well-established with ICT, or two departments which hitherto have made little use of ICT, or a mixture of both. Evaluation from such a project could then inform future roll-out across other departments in the school.

Appendices

Appendix 1

Key concepts

Finding things out

The theme **Finding things out** is concerned not only with finding information from a wide range of sources but also with recognising that the user must judge the quality of content found.

Pupils are taught to make judgements about the validity, reliability and bias of various **data and information sources**, and to select information relevant to a task, using, for example, CD-ROMs or the Internet. They are taught that the way in which different types of information are combined conveys meaning. For example, pupils recognise that the arrangement of text, graphics and numeric data in an advertisement is intended to persuade us to buy a product.

When **searching and selecting**, pupils are taught to use search engines to find appropriate information, to refine their searches, to make them more effective and to select relevant information by reference to its origin and quality. For example, a pupil searching the Internet for information about global warming might select the data found on a website with a .org or .gov suffix because it should be more reliable.

When **organising and investigating**, pupils are taught to retrieve and collect information for a specific purpose or task. They process the data in various ways to find something out, draw conclusions or answer hypotheses. They are able to present their findings effectively. For example, pupils may develop a hypothesis about the effects of a local building project. To test this hypothesis they would create a questionnaire to collect and record people's attitudes, process the data in a spreadsheet or database and use their analysis to support or refute their hypothesis, finally using graphs to present their findings.

Developing ideas and making things happen

Developing ideas and making things happen is concerned with using ICT to process, develop or display information efficiently.

Pupils are taught to **analyse** problems, breaking them down into component parts, and to **automate processes** to increase their speed and accuracy. For example, pupils may develop their understanding of efficiency by using master pages in publications to explore a range of possibilities before making a decision.

Pupils are taught that they can use **models and modelling** to represent a situation or process on screen. They explore patterns and relationships by changing variables and rules and can use this technique to answer 'What if ... ?' questions. For example, pupils may explore a spreadsheet model of the relative costs of running a mobile phone by changing the number of minutes used per month (changing variables) to see what the phone would cost if ... . They may then develop the model by including the number of free text messages (changing rules).

Pupils are taught to develop computer-based systems to **control and monitor** situations. They analyse the problem and design, create, test and refine a solution. For example, in a science experiment pupils may develop a system to measure temperature, light and humidity, using a range of sensors incorporating a subroutine for each sensor, with appropriate sampling rates, and triggering an alarm when a condition is met.

Exchanging and sharing information

This theme relates to the process of communication. Pupils are taught to recognise common forms and conventions used in communications and to use this knowledge to present information appropriately to a specified audience.

When **exchanging and sharing information**, pupils are taught to consider **fitness for purpose**. They review and evaluate the effectiveness of their work and are able to justify the choices they have made. They are able to use this critical evaluation to develop and improve their **presentation** of information, **refining** it for the purpose and audience. For example, pupils may use digital video to create an advertisement for overseas visitors to their locality. They may refine their work further by devising criteria drawn from an analysis of existing TV advertisements, during which they identify the common forms and conventions.

They are taught to use ICT to **communicate** effectively with wider and remote audiences. For example, pupils may use e-mail or online questionnaires to gather information from pupils in other countries, recognising and understanding the technical issues involved and the rules governing such communications.

Year 7 teaching objectives

Finding things out

Using data and information sources

- Understand that different forms of information – text, graphics, sound, numeric data and symbols – can be combined to create meaning and impact.
- Identify the purpose of an information source (e.g. to present facts or opinions, to advertise, publicise or entertain) and whether it is likely to be biased.
- Identify what information is relevant to a task.
- Understand how someone using an information source could be misled by missing or inaccurate information.

Searching and selecting

- Search a variety of sources for information relevant to a task (e.g. using indexes, search techniques, navigational structures and engines).
- Narrow down a search to achieve more relevant results.
- Assess the value of information from various sources to a particular task.
- Acknowledge sources of information used.

Organising and investigating

- In an investigation:
  - design and use an appropriate data handling structure to answer questions and draw conclusions;
  - design a questionnaire or data collection sheet to provide relevant data;
  - check data efficiently for errors;
  - investigate relationships between variables;
  - use software to represent data in simple graphs, charts or tables, justifying the choice of representation;
  - derive new information from data, e.g. averages, probabilities;
  - check whether conclusions are plausible;
  - review and amend the structure and its data to answer further questions.

Developing ideas and making things happen

Analysing and automating processes

- Use automated processes to increase efficiency (e.g. templates, master pages).
- Represent simple processes as diagrams, showing:
  - how a task can be broken down into smaller ones;
  - the sequence of operations, and any conditions or decisions that affect it;
  - the initial information needed (e.g. room temperature, prices of items).

Models and modelling

- Use software to investigate and amend a simple model by:
  - formatting and labelling data appropriately (e.g. formatting cells to display currency);
  - entering rules or formulae and checking their appropriateness and accurate working;
  - explaining the rules governing a model;
  - predicting the effects of changing variables or rules.
- Test whether a simple model operates satisfactorily.

Control and monitoring

- Implement a system to carry out a simple control task, including some that involve sensed physical data, by:
  - compiling sets of instructions, identifying those which can be grouped to form procedures or loops;
  - testing and refining the instructions.

Exchanging and sharing information

Fitness for purpose

- Recognise common forms and conventions used in communications and how these address audience needs (e.g. columns of text in newspapers, graphics and enlarged print in posters, hyperlinks on websites).
- Apply understanding of common forms and conventions to own ICT work.
- Use given criteria to evaluate the effectiveness of own and others' publications and presentations.

Refining and presenting information

- Plan and design the presentation of information in digital media, taking account of the purpose of the presentation and intended audience.
- Use ICT to draft and refine a presentation, including:
  - capturing still and moving images and sound (e.g. using a scanner, digital camera, microphone);
  - reorganising, developing and combining information, including text, images and sound, using the simple editing functions of common applications;
  - importing and exporting data and information in appropriate formats.

Communicating

- Use e-mail securely and efficiently for short messages and supporting material.
- Know how to protect personal details and why this is important.

NOTE: Objectives highlighted in colour are related to reviewing, modifying and evaluating work as it progresses.

Year 8 teaching objectives

Finding things out	Developing ideas and making things happen	Exchanging and sharing information
Using data and information sources • Understand how the content and style of an information source affect its suitability for particular purposes, by considering: – its mix of fact, opinion and material designed to advertise, publicise or entertain; – the viewpoints it offers; – the clarity, accessibility and plausibility of the material. • Devise and apply criteria to evaluate how well various information sources will support a task. • Justify the use of particular information sources to support an investigation or presentation. **Searching and selecting** • Extend and refine search methods to be more efficient (e.g. using synonyms and AND, OR, NOT). • Explain the advantages of the methods used by different search engines and programs to search for data in various formats. **Organising and investigating** • In an investigation: – use software options and formats to store, retrieve and present electronic material efficiently; – explore and interpret collected data in order to draw conclusions; – assess the consistency of conclusions with other evidence. • Understand: – how data collection and storage are automated in commerce and some public services; – the impact of electronic databases on commercial practice and society; – potential misuse of personal data.	**Analysing and automating processes** • Automate simple processes by: – creating templates; – creating simple software routines (e.g. style sheets, web queries, control techniques on web pages). • Consider the benefits and drawbacks of using ICT to automate processes (e.g. using wizards, templates). • Represent simple design specifications as diagrams. **Models and modelling** • Develop ICT-based models and test predictions by changing variables and rules. • Draw and explain conclusions (e.g. 'the best value for money is obtained when …'). • Review and modify ICT models to improve their accuracy and extend their scope (e.g. by introducing different or new variables and producing further outcomes). **Control and monitoring** • Develop and test a system to monitor and control events by: – using sensors efficiently; – developing, testing and refining efficient sequences of instructions and procedures; – assessing the effects of sampling and transmission rates on the accuracy of data from sensors. • Understand how control and monitoring has affected commercial and industrial processes (e.g. telecommunication, health and transport services).	**Fitness for purpose** • Recognise how different media and presentation techniques convey similar content in ways that have different impacts. • Understand that an effective presentation or publication will address audience expectations and needs (e.g. the audience's levels of literacy, familiarity with a topic). • Devise criteria to evaluate the effectiveness of own and others' publications and presentations, and use the criteria to make refinements. **Refining and presenting information** • Plan and design presentations and publications, showing how account has been taken of: – audience expectations and needs; – the ICT and media facilities available. • Use a range of ICT tools efficiently to combine, refine and present information by: – extracting, combining and modifying relevant information for specific purposes; – structuring a publication or presentation (e.g. using document styles, templates, time lines in sound and video editing, navigational structures in web media). **Communicating** • Understand some of the technical issues involved in efficient electronic communications (e.g. speed and bandwidth, size and type of file, features of different browsers and mail software). • Use ICT effectively to adapt material for publication to wider or remote audiences (e.g. as web articles or sites).

NOTE: Objectives highlighted in colour are related to reviewing, modifying and evaluating work as it progresses.

Year 9 teaching objectives

Finding things out

Using data and information sources

- Select information sources and data systematically for an identified purpose by:
  - judging the reliability of the information sources;
  - identifying possible bias due to sampling methods;
  - collecting valid, accurate data efficiently;
  - recognising potential misuse of collected data.

Searching and selecting

- As part of a study, analyse high-volume quantitative and qualitative data systematically by:
  - exploring the data to form and test hypotheses;
  - identifying correlations between variables;
  - drawing valid conclusions and making predictions;
  - reviewing the process of analysis and the plausibility of the predictions or conclusions.

Organising and investigating

- Construct, test and document the development of a database system which shows:
  - a design specification;
  - appropriate means of data input and validation;
  - systematic testing of processes and reports;
  - evaluation of the system's performance and suggested modifications.

Developing ideas and making things happen

Analysing and automating processes

- Automate ICT processes (e.g. use software to merge mail, create macros in an application program).
- Represent a system in a diagram, identifying all its parts, including inputs, outputs and the processes used (e.g. to validate data).

Models and modelling

- Design and create ICT-based models, testing and refining rules or procedures.
- Test hypotheses and predictions using models, comparing their behaviour with information from other sources.

Control and monitoring

- Use ICT to build and test an efficient system to monitor and control events, including:
  - testing all elements of the system using appropriate test data;
  - evaluating the system's performance;
  - annotating work to highlight processes and justify decisions.
- Review and modify own or others' monitoring and control systems to improve efficiency (e.g. use more efficient procedures, reduce the number of instructions or procedures, add an element of feedback).

Exchanging and sharing information

Fitness for purpose

- Produce high quality ICT-based presentations by:
  - creating clear presentations, sensitive to audience needs;
  - justifying the choice of form, style and content.
- Use knowledge of publications and media forms to devise criteria to assess the quality and impact of multimedia communications and presentations, and apply the criteria to develop and refine own work.

Refining and presenting information

- Use a wide range of ICT independently and efficiently to combine, refine, interpret and present information by:
  - structuring, refining and synthesising information from a range of sources;
  - selecting and using software effectively, justifying the choices made.

Communicating

- Apply knowledge of the technical issues involved to communicate information efficiently (e.g. choose suitable file types to speed up transfer, use mail lists to speed up communication, use website tagging and hyperlinks to speed up searching).
- Understand the advantages, dangers and moral issues in using ICT to manipulate and present information to large unknown audiences (e.g. issues of ownership, quality control, exclusion, impact on particular communities).

NOTE: Objectives highlighted in colour are related to reviewing, modifying and evaluating work as it progresses.

From Key Stage 2 to Key Stage 3

This appendix describes what most pupils should have learned in ICT by the end of Key Stage 2, particularly those aspects that relate to the yearly objectives in Key Stage 3.

Finding things out

By the end of Year 6, most pupils should be able to:

- identify the information they need to complete a simple task or solve a simple problem;

- use simple search techniques, including indexes and lists of contents, to find information;

- prepare information for use in a task by downloading relevant pieces or collecting them from various sources;

- classify information for use in a database and understand how a suitable structure is created;

- recognise different types of information such as text, numbers, graphics;

- enter data into a database, search it and present data in simple tables and graphs;

- check that information is accurate and reasonable;

- discuss what might happen if information is entered into the computer incorrectly or not downloaded completely.

Developing ideas and making things happen

By the end of Year 6, most pupils should be able to:

- combine text, graphics and sound to develop and present their ideas;

- reorganise information for a particular task or problem;

- create, test and refine a simple sequence of instructions to control events or make things happen;

- use datalogging equipment to monitor changes, for example, in light, temperature or sound;

- use simple spreadsheet models to explore the effect of changing variables and answer straightforward questions;

- identify patterns revealed by simple models or simulations.

Exchanging and sharing information

By the end of Year 6, most pupils should be able to:

- use e-mail;

- use software to create stories, animations, presentations, displays and posters;

- consider the needs of different audiences, such as parents, peer groups, younger or older pupils;

- recognise the need for quality and accuracy in their presentations of work and ideas;

- work in groups to solve problems and complete tasks.

Reviewing, modifying and evaluating work as it progresses

By the end of Year 6, most pupils should be able to:

- review what they have done and consider how they might improve their work;

- evaluate other people's work and get ideas for their own;

- describe their use of ICT and how they might have completed a task using other methods;

- compare their use of ICT with other people's;

- recognise the benefits of using ICT for particular tasks;

- describe some uses of ICT outside school and the impact it might have on people at work and at home.

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