ICT IN SCHOOLS

THE IMPACT OF GOVERNMENT INITIATIVES

An interim report April 2001

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INTRODUCTION

Background

01 In 1997 the Government announced its plans to encourage the widespread application of information communication technology (ICT) in teaching and learning in maintained schools. Its main intentions were to: equip schools with modern ICT facilities; create a National Grid for Learning (NGfL) containing educational information and study material; and organise a programme of in-service training for teachers and school librarians to enable them to make effective use of ICT in their professional work.

02 The Government set a number of key targets to be achieved by 2002, including:

- all schools, as well as colleges and public libraries and as many community centres as possible, to be connected to the NGfL;

- Britain to become a centre for excellence in the development of software content, and a world leader in the export of learning services;

- serving teachers to feel confident, and be competent, to teach using ICT within the curriculum;

- school leavers to have a good understanding of ICT, with measures in place for assessing their competence.

03 The Department for Education and Employment (DfEE) funding for the ICT infrastructure and generic training amounted to £657 million over four years and began in April 1998. This was distributed to local education authorities (LEAs) via the Government's Standards Fund (SF). In addition, the Government announced that, from April 1999, £230 million of Lottery funds would be available from the New Opportunities Fund (NOF) to help increase the competence of all teachers in their use of ICT in teaching and learning. The scheme would use training organisations, approved by NOF and quality-assured by the Teacher Training Agency (TTA).

04 The DfEE was given the role of formulating the ICT policy for education and steering the implementation of most aspects of the Government's ICT strategy for schools. This involved working with the ICT supply industry, LEAs, the TTA and the British Educational and Communications Technology Agency (BECTa). The responsibility for Lottery-funded teacher training was given to NOF, a non-departmental public body, sponsored by the Department of Culture, Media and Sport (DCMS), via policy directions drawn up in consultation with the DfEE and the TTA.

05 Each LEA had to provide matching funds to the SF allocations and seek support, where possible, from commercial partners. Initial allocations were made in line with published criteria and against LEA bids. However, from April 2000, allocations were made on a formula basis in order to make the system more equitable. In addition, some LEAs were identified as 'Pathfinders' to enable them to explore the value of particular patterns of networked provision or other facilities; some of these were funded more generously than most LEAs. The DfEE also made specific grants to various development agencies and software authors to support the creation of digital resources.

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06   Other significant funded schemes that were under way during this period included the distribution of laptop computers for headteachers and consultants working in the National Numeracy and Literacy Strategies (NNS and NLS). A pilot project in computer-aided design and manufacture (CAD/CAM) for design and technology (D&T) provided high-quality training and software for a small cohort of schools and was later extended to include 3,400 teachers in 2,100 schools.

07   All of this was set against a background of increasing use and awareness of ICT, with much information from Government sources being made available via several websites. LEAs were required by the Government to increase their use of communication by electronic means.

Evidence base

08   This interim report is based partly on the findings of OFSTED's national programme of school and LEA inspections, but mainly on visits to schools and LEAs by Her Majesty's Inspectors (HMI) and by Additional Inspectors (AIs) recruited by OFSTED specifically to evaluate the impact of the initiatives. The visits took place between June 1999 and December 2000 and included visits to 128 primary schools, 44 special schools, 401 secondary school departments and ten LEAs. The schools selected by HMI were those that had received at least a significant proportion of their NGfL grant and had been approved by their LEAs as suitable recipients of NOF-funded training in ICT.

09   The ten LEA visits were made by teams of HMI specifically to study the facilities and support for ICT provided for schools. These inspections involved interviews with senior staff during visits to LEA offices, and to a further 25 primary and 20 secondary schools that had participated in local ICT consultations and received direct support from their LEA.

10   Throughout the report, the term 'ICT' is used to denote infrastructure and resources and 'IT' to denote the subject. Since the implementation of the revised National Curriculum from September 2000, the subject has also become 'ICT', but for most of the inspection period the distinction between the two terms was used.

MAIN FINDINGS

11   *The impact on standards*

■   The implementation of the Government's initiatives in schools has contributed to recent improvements in pupils' IT capability. Standards of achievement in IT capability, however, remain lower than in most other National Curriculum subjects and continue to vary widely throughout all types of schools in all key stages.

■   There is emerging evidence[1] of a link between high standards across the curriculum and good ICT provision. However, the contribution of ICT to the raising of standards in individual subjects remains variable and is more marked in some than in others. The powerful new resources obtained with NGfL funds have increased pupils' motivation to learn.

1   *Primary Schools of the Future – Achieving Today; The Secondary School of the Future* – reports to the DfEE by BECTa.

The impact on teaching

■ In primary schools, access to a wider range of new resources has contributed significantly to an increase in teaching using ICT, albeit from a low baseline. In secondary schools, improved practice is emerging in teaching IT using the newly available resources. While effective use of ICT in teaching subjects across the curriculum is increasing, good practice remains uncommon.

■ Teaching with ICT in special schools remains a weakness. Teachers continue to have problems identifying ICT resources to match the range of pupils' capabilities and curriculum needs.

■ There is insufficient emphasis on the assessment of IT capability for formative purposes and to enable schools to obtain an accurate view of pupils' progress by the end of key stages.

The implementation by LEAs of ICT funding initiatives

■ The levels of LEA support for ICT vary greatly, but are often too low to meet the full range of schools' needs. Senior officers have often underestimated the level of funding required. It is common to find small ICT support teams fully stretched to meet the additional technical and administrative demands of the initiatives and therefore unable to support teachers adequately in classrooms.

■ Support and guidance for schools' ICT development planning are unsatisfactory overall, as are procedures for the approval of schools' plans.

Planning and management of initiatives

■ Schools' ICT development plans too often fail to make explicit the links between intended improvements in curriculum, resources and staff development. One in five primary schools, half of secondary schools and most special schools still do not comply fully with the National Curriculum requirements for IT.

Accommodation, resources and technical support

■ The introduction of computer suites in many primary schools has led to an improvement in some aspects of teaching and in pupils' IT capability.

■ The inappropriate location of suites of computers within special schools has often restricted their effectiveness. In secondary schools, difficulties in teachers' access to ICT for work across the curriculum often hinder progress because the resources are used mainly for specific IT and related courses.

■ Most primary schools and many special and small secondary schools have been unable to fund adequate technical support. The take-up of BECTa-approved NGfL-managed services has been very low because of the high cost of the services being offered.

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The impact of training programmes on teachers

■   The majority of teachers have not yet completed their NOF training programmes. The training for those teachers who have received it has contributed to an increase in their use of computers, but only rarely to the pedagogic expertise to help them make the most effective use of ICT in their lessons.

■   Training programmes that lack the intended subject-specific focus have been less effective in raising teachers' confidence to use ICT.

■   The need for teachers to use their own time for training, together with the lack of information about the range of training programmes from which to choose, has hindered progress.

■   Many teachers have bought their own computers through Government schemes. Computer ownership has helped to boost teachers' confidence and basic ICT skills significantly.

Commentary

12   As a result of NGfL, improvements can be clearly identified in the levels and quality of ICT resources in schools and in pupils' access to information through the Internet. In turn, these have contributed to recent signs of improvements in teaching and in pupils' progress in IT capability. The NOF training programme, however, has not had the same impact, for a number of reasons. Firstly, only about half of all teachers have, to date, enrolled for the training and only a minority have completed it. Schools were initially hesitant in taking up the training programme because of their commitment to other national initiatives, such as the NLS and NNS. Secondly, the list of Approved Training Providers (ATPs) given to headteachers included little accompanying information from which to make informed choices. Thirdly, the requirement for teachers to train in their own time meant that progress in developing their professional skills in using ICT was slow. The full impact of the NOF programme may not, therefore, be apparent for some time yet. OFSTED plans to publish a fuller set of findings in 2002.

13   A key characteristic of the ICT initiatives has been their flexibility in allowing LEAs to provide the level of support that they judge schools want to purchase; in using the commercial market to give schools a choice of training provider; and, in allowing schools to use a variety of funding sources to improve ICT facilities. Too much flexibility, coupled with considerable competition among ATPs, however, has contributed to a fragmentation of effort, with training organisations, LEAs and schools independently seeking solutions to the same problems. This is in stark contrast with the more uniform approach of the NNS and NLS.

14   The level of NGfL funding has varied widely among schools. The different rates of funding for LEAs in the first two years were intended to enable LEAs to work within plans, and at a pace, that suited their circumstances. Significantly different levels of funding in schools clearly resulted from this early approach. This situation was exacerbated by the differing patterns of support in LEAs and of additional funding in schools. Further differences arose in those schools that benefited from their involvement in a range of other well-funded initiatives, such as Education Action Zones. Minimum

pupils to computer targets have been set for LEAs taking up the NGfL Standards Fund grant in 2001/02.

15   Many schools have made sound decisions in connection with short-term planning and managing ICT developments. However, long-term planning of ICT developments at both senior and middle management levels is not good enough. For example, schools have insufficiently developed strategic plans to link developments in the curriculum to staff competence or to replace out-of-date hardware. Also, support for ICT co-ordinators has tended to focus on technical matters rather than on enabling them to engage in professional and curriculum development and to monitor and evaluate their schools' ICT work. There is too little quality assurance of the implementation of schools' ICT development plans to ensure that initiatives are achieving their purpose. In particular, there is no means of knowing how well the pupils are attaining in IT in individual schools or nationally, apart from teacher assessment at Key Stage 3. Assessment of IT capability at the end of Key Stage 2 is rare.

16   BECTa runs an ICT Support Network for advisers and advisory teachers, but there are few national support networks to share and develop teachers' professional competence in ICT. In consequence, there are too few opportunities to pool expertise to take forward the national initiatives. There is also a danger that the shortage of well-informed, commercially neutral and educationally sound advice could be costly at a time of fast-changing technologies.

17   Despite these shortcomings, the availability and use of modern ICT resources are increasingly motivating teachers to develop their pedagogic skills and pupils to use ICT to learn. Where NOF training has been completed, it has often increased teachers' confidence in a range of ICT applications and the best examples have enabled teachers to make better classroom use of ICT. These factors, together with the early signs of improvement in standards and teaching in IT, provide cause for optimism.

Recommendations

18   At various levels there is scope for further improvements in the development and implementation of the Government's ICT initiatives.

At national level, the need remains to:

■   raise the profile of the NOF training scheme by re-stating and clarifying, for schools and LEAs, its intended outcomes, especially in terms of improvements across the curriculum;

■   evaluate the strengths and weaknesses of the competitive-market model in relation to NOF-funded ICT training in order to inform any future support;

■   develop the role of ICT in the NLS and further develop its role in the NNS and Key Stage 3 Strategy;

■   develop a reliable, consistent approach to the assessment of IT capability in all key stages;

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■   strengthen the involvement of Central Government agencies and subject and phase associations in providing coherent subject support for NOF trainers;

■   develop a national programme of In Service Training (INSET) for headteachers in managing ICT developments.

In LEAs there is a need to:

■   provide more support for schools in their ICT development planning;

■   increase the level of support for ICT leaders in schools in co-ordinating staff and curriculum developments and in monitoring and evaluating the work of their school;

■   provide focused classroom support to improve teaching, especially where there are known weaknesses in ICT;

■   monitor and evaluate progress in ICT standards and teaching in schools, following their receipt of NGfL and NOF grants, and produce clearer reports for the DfEE that focus more on outcomes.

In schools there is a need to:

■   clarify how the ICT curriculum is to develop intended patterns of access and what pupils should learn;

■   formulate long-term resource and professional development plans to support these intentions;

■   establish teachers' ICT needs in relation to the expected outcomes of NOF training and monitor the effectiveness of this training;

■   build on existing training programmes, by targeting continued support for those who need it most, so that their confidence in using ICT in the classroom continues to grow;

■   monitor and evaluate the standards of pupils' work in IT and the quality of teaching where ICT is being used.

PART A: IMPACT ON STANDARDS AND QUALITY OF TEACHING
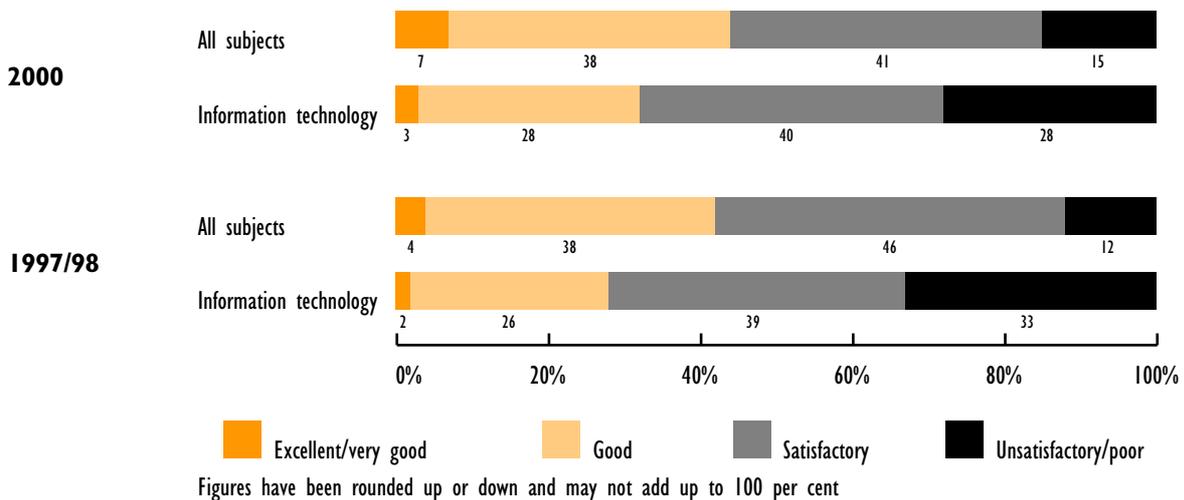
Standards of Achievement

19   Since 1998, when the Government's ICT initiatives were introduced, their combined impact has contributed to improvements in pupils' IT capability. Figures 1 and 2 show that this improvement in IT capability has been greater than in all subjects, but standards in IT remain lower than those in most other subjects.

Figure 1   Improvement in progress (how well the pupils achieve) in primary schools over time
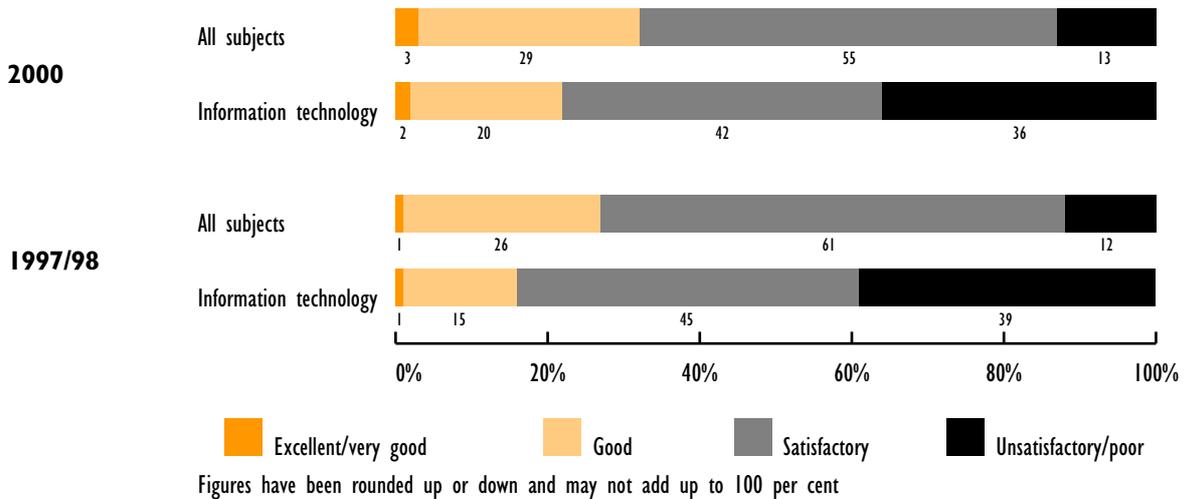
Figure 2   Improvement in progress (how well the pupils achieve) in secondary schools over time

Figures have been rounded up or down and may not add up to 100 per cent

20   Standards in IT continue to vary widely among schools in all key stages. There has been improvement in pupils' achievement, which is now good overall in one secondary school in three and in one primary school in five. In spite of this, achievement remains unsatisfactory in one-third of schools in Key Stage 1, in two-fifths of schools in Key Stage 2, in one-quarter of schools in Key Stage 3, and in one-third in Key Stage 4.

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21   The pattern is similar in special schools, where pupils' achievements in IT continue to improve but standards remain lower than in any other subject. Standards are unsatisfactory in one-quarter of schools, and good in only two-fifths of schools. Achievements in IT, however, are better in schools for pupils with emotional and behavioural difficulties (EBD) than in those for pupils with moderate learning difficulties (MLD) and severe learning difficulties (SLD).

22   In **Key Stage 1** standards still vary widely among schools. However, the majority of pupils are gaining confidence and competence with ICT and standards in basic IT skills are improving. There has been an increase in the number of pupils who can confidently use a mouse, enter small quantities of text, use a graphics package, and understand appropriate technical language associated with ICT. Pupils have greater awareness of ICT applications. They can use the basic commands that operate software, such as selecting a word or picture by means of the mouse. Pupils make effective use of art software, for example by working in pairs to discuss and explore the visual impact of their pictures by varying shapes and colour combinations. They make good progress in mathematics through the use of programmable robots. Such use generates much constructive talk, as pupils learn how to achieve increasing precision to make the robot obey their commands, and to make the link between turning and angles.

23   In **Key Stage 2**, the range of pupils' ICT experiences has broadened considerably. As yet the use of CD-ROMs and the Internet to find things out is limited. While pupils are becoming more competent at searching for information, they find it difficult to recognise what is important and then synthesise what they have found. Many pupils lack the reading skills needed to undertake a 'word search' or interpret the synopsis of a website. Where teachers have filtered the information, used a school or LEA intranet, or given very specific help, the searches are often more successful. Too often, however, there is little purpose to the search beyond the exploration itself, and pupils simply print out blocks of text, pictures, tables and graphs as ends in themselves. Although the use of e-mail as an aid to communication or creative writing is still relatively rare, pupils' skills are growing. Older pupils, in particular, are creating and sending their own e-mails, for example to experts in fields they are researching. Year 3 pupils reading *The Owl who was Afraid of the Dark* used e-mail as a means of dialogue with a 'barn owl' whose role was taken by a teacher in another school.

24   The use of word processing is widespread and pupils are becoming more experienced at using a keyboard. Following a brief introduction to the features of a desktop publishing (DTP) package, Year 6 pupils worked in pairs to create invitations to their Christmas party. Each pair was given a different target group, such as infant pupils, teenagers or parents. There was a strong emphasis on making the products clear and attractive and the pupils responded well to the challenge, using the features they had learnt. Too often, however, the tasks set are mundane and involve low-level skills entailing, for example, no more than copy typing from hand-written scripts. Few pupils have been taught to edit their text for improvement, other than using spell checkers.

25   In **Key Stage 3**, pupils increasingly make good progress in **finding things out**, working with the large amount of data now available. At best they achieve success in working with search engines and browsing in order to find material relevant to projects they undertake in IT lessons or in other subjects.

26   The skills of **obtaining and using information** are being applied more effectively across a range of subjects. In **English**, for example, CD-ROMs or Internet searches are sometimes used well to support the development of reading skills. Pupils make good progress where they have the skills to select relevant information, frame research questions to focus their searches, take concise notes, and recast information in their own words and for a specific purpose. The use of digital photographs and other pictorial material in **the writing of pupils with SEN** is particularly successful in encouraging reluctant writers to write at length in all subjects. In **mathematics**, wider access to secondary sources on the Internet is providing more 'real' data.

27   In Design & Technology **(D&T)** the availability of up-to-date, on-line material on the Internet allows designing to be informed by a much larger range of stimuli. In other subjects, pupils obtain and use ICT-based sources, locating, selecting and downloading information, using it critically to pursue an investigation. In **geography**, for example, teachers use Internet sites to provide pupils with the latest information on current geographical issues, such as photographs of volcanoes erupting and flood damage, as well as national and regional meteorological data. Increasingly, pupils are using a variety of general and subject-specific search engines. The more able can research topics using the Internet, post information onto their school's intranet and access it from home to continue their work. Pupils also use other sources of data. In **history**, for instance, pupils use databases to identify patterns which help to explain a hypothesis, relating, for example, to the origins and extent of a cholera outbreak.

28   Increasingly, there are good levels of achievement in IT capability. In particular, these occur in **developing ideas and making things happen**, where pupils are able to undertake technical manipulation and carry out complex operations within a growing range of new applications in order to develop and refine their ideas. For example, more pupils are competent in using DTP, incorporating text, graphic images and illustrations into a published newsletter.

29   Progress in **exchanging and sharing information** is improving with the greater availability of display technology and sophisticated presentation software. Many pupils now demonstrate good presentation skills, particularly in the creation of informative web pages and multi-media presentations. Pupils are highly motivated by putting together attractive displays using a mixture of text, graphics, sound, and moving images.

30   In **English**, pupils' standard of written composition is raised where they use word processing to help them draft, review and edit imaginatively, and exploit the provisional status of the word-processed text to full effect. In **modern foreign languages (MFL)**, through use of text manipulation and tutorial software, pupils are improving their awareness of language, as well as their vocabulary retention and pronunciation. In **mathematics**, pupils' knowledge and understanding of graphs are enhanced through graph plotting packages and graphics calculators. The immediacy of response, the moving pictures and the ability to zoom into the graph allow pupils to identify and interpret key features. Pupils make good progress in the use of spreadsheets when they are able to observe the effects of changes in improving simple models, recognise the difference between an estimate and an exact solution, and solve increasingly complex equations. In **art**, in a unit on self-portraiture based on digitised images, pupils quickly explored a wide range of mark effects, drawing styles and photographic retouching through the use of computer software.

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31   In **Key Stage 4**, pupils frequently use word processing and DTP software to **review, modify and evaluate** their work. The enhanced facilities in schools now allow pupils to look more quickly at their sources of information and at their own work. For example, in **music**, pupils who had composed a trio for brass instruments evaluated their performance using a keyboard, edited their parts and printed out a score. In **physical education (PE)**, pupils used a digital video camera and replay device, to allow feedback and improve the quality of evaluation. Most pupils are highly motivated by such work and are willing to evaluate presentations given by others.

32   In **English**, pupils make good progress in **speaking and listening skills** through effective small group work at a terminal and through planning, reviewing and improving ideas, for example to produce a 'media' product such as a magazine. Pupils, in addition, make good use of projectors and relevant software to enhance the impact or aid the organisation of their presentations. This is also apparent in other subjects. For example, in a well-planned **religious education (RE)** lesson, pupils made a high-quality presentation using an electronic whiteboard, involving still and moving images as well as sound.

33   The use of e-mail for teaching and learning is rare, although in **English**, pupils are beginning to send drafts of their work to other pupils or the teacher for comment. In one school, e-mail allowed Key Stage 4 and 16+ **science** students to make strong links with scientists working in business and in educational research in order to share problems and obtain information.

34   Despite the positive examples above, progress in the development of ICT skills in subjects is slow. In particular, pupils do not have the discrimination skills needed to tackle complex ICT applications. In obtaining ICT-based information a great deal of time is often wasted in inefficient use of CD-ROMs and Internet searches. Pupils do not have suitable strategies for efficiently and selectively searching the data available. Sometimes the content of a site is not fully explored and understood before they move on to another that appears on the surface to be more interesting.

35   For too many pupils, the location of information remains an end in itself, and they present information unprocessed. In order to progress, pupils require much more sensitivity, determination and understanding to handle large volumes of potentially relevant information, as well as strategies for focusing on the most useful material for the purpose in hand. Too often the use of ICT involves unnecessary extra work or unproductive waiting, such as when finding and downloading a map from the Internet or printing graphic images.

36   In **special schools** the influence of ICT on pupils' achievements varies greatly. In schools with the best practice, ICT has greatly raised the potential for pupils to achieve, for example enabling a Key Stage 4 pupil with severe learning difficulties (SLD) to undertake musical composition within a GCSE course. ICT enables many pupils with physical disabilities and visual impairment to access the curriculum with a degree of independence that would otherwise be impossible. Their specialised systems give them access to an increasing range of materials. Pupils with difficulties in oral communication often make good use of ICT to communicate through devices that are increasingly portable and practical. The developing use of digital images, for example from a digital camera or scanner, gives pupils who are unable to read access to the skills and

advantages of literacy. In a small number of schools, particularly hospital schools, the use of good quality ICT is increasing dramatically, so that the nature of pupils' work has changed for the better and, as a consequence, their progress is beginning to improve. The level of ICT work, however, is often too low, characterised, for example, by copy typing or by the use of resources with a poor match to pupils' capabilities, such as trivial drill and practice software.
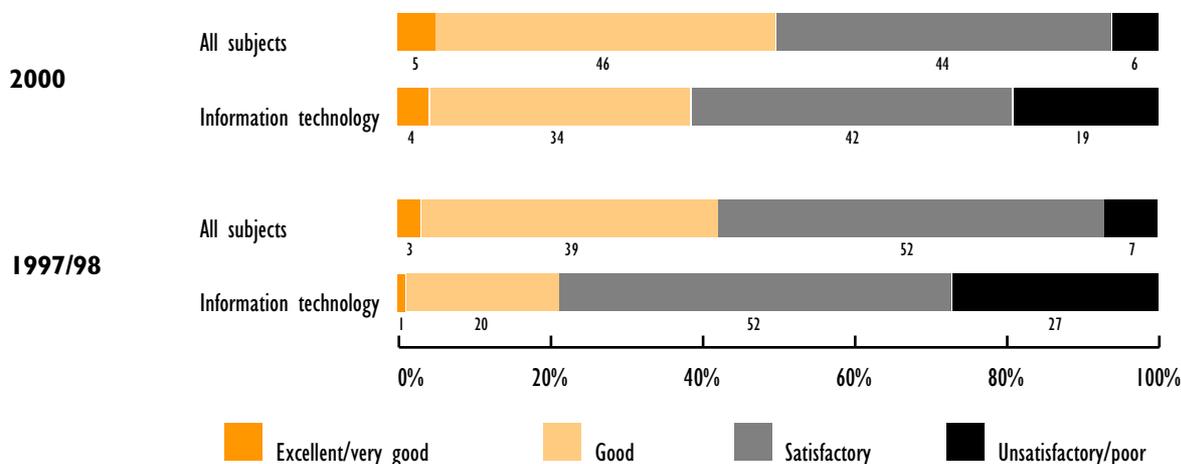
Teaching

37   The increase in teachers' personal and professional use of computers is a clear benefit emerging from the Government's ICT initiatives. Following NOF-funded and other training, teachers are becoming more skilled in using ICT facilities such as e-mail, Internet, Intranets, digital cameras and multimedia facilities. Teachers who have had their own computers with Internet access at home are discovering relevant sites on the Web, often identified through the NGfL site operated by BECTa. Although this does not automatically lead to effective teaching and learning, teachers have grown in their confidence to plan to use ICT applications in their lessons. Their use of ICT to prepare presentations with the use of an OHP or electronic whiteboard and better-designed worksheets has given them confidence to expect more of children. Newly qualified teachers with good levels of ICT skill are beginning to be deployed in schools of all types, and they often provide a good source of stimulus and support for established colleagues.

38   The quality of teaching IT in **primary schools** has improved for the second year running and Figure 3 shows that this has been at a faster rate than in all subjects.

Figure 3 Improvement in teaching in primary schools over time

| | Excellent/very good | Good | Satisfactory | Unsatisfactory/poor |

Figures have been rounded up or down and may not add up to 100 per cent

39   Teachers' confidence in teaching the subject continues to grow. There is good teaching in well over half the IT lessons in both key stages. This is due in part to the NGfL initiative, which has given teachers access to a wider range of more reliable hardware to support their teaching. This access, together with INSET, has led to a greater focus on ICT in teaching than in the recent past.

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40   Many schools recognise the potential benefits of using ICT to support the teaching of literacy and mathematics, and are increasingly using ICT in literacy hours and daily mathematics lessons. Practice, however, remains patchy. The best teaching in literacy hours usually involves the use of prepared texts on the computer for editing by pupils, for example in changing or inserting adjectives and adverbs. In ICT suites, the use of an interactive whiteboard with these literacy activities has given good opportunities for effective whole class teaching and demonstrations. Good mathematics lessons incorporating ICT often involve the teaching of spreadsheets or use of adventure programs. These lessons also feature the use of relevant programs, for example to practise co-ordinates or number bonds, where the computer-based activity closely matches the lesson's objectives.

41   Less successful use of ICT in core subject teaching typically stems from weak links between the computer task and the lesson objectives. Too many teachers select software packages for their visual appeal rather than their relevance to lessons. In one case, a primary science lesson revolved around a science program, which, although quite stimulating, placed very few demands on pupils, who watched a simulation of materials dissolving, rather than carrying out experiments of their own.

42   Although the use of computer suites is growing, much of the teaching of IT takes place in ordinary classrooms. Individuals or groups of pupils are set ICT-based tasks, while most work away from computers. The increase in resources has meant that this practice has become easier to manage over a period of time. Teachers are becoming skilled in setting up such arrangements, but there remains a considerable variation in how well the pupils learn when working at computers. Successful classroom practices usually occur when teachers take care to ensure that pupils understand what they have to do and what they have to learn.

43   The quality of teaching IT has also improved in **secondary schools** over the past two years at a faster rate than in all subjects, as shown in Figure 4.

Figure 4 Improvement in teaching in secondary schools over time
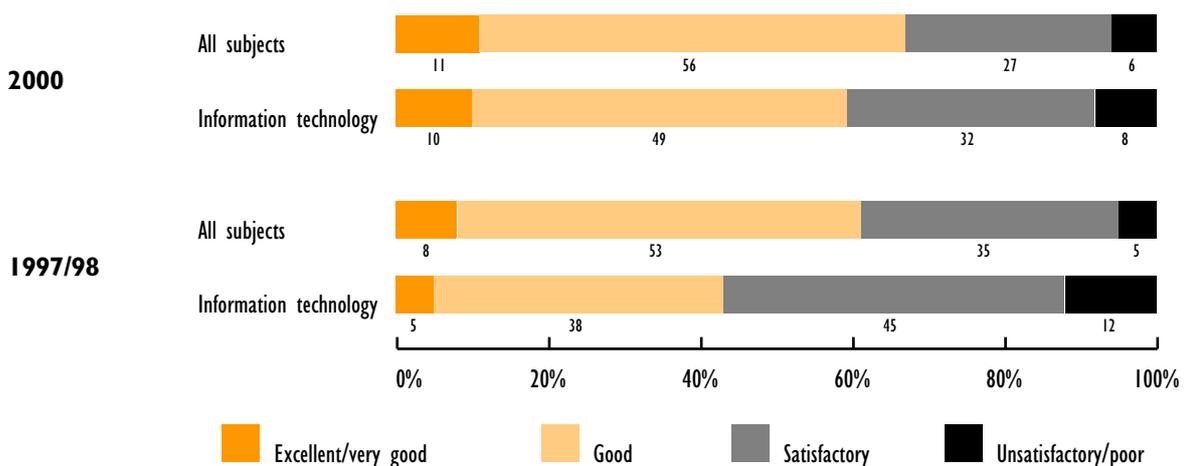
Figures have been rounded up or down and may not add up to 100 per cent

44   Good lesson planning and preparation frequently occur where teachers identify suitable websites for an Internet search, perhaps downloaded onto an intranet. Where ICT is used well for whole-class teaching it supports demonstration, whether in ordinary

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classrooms or computer rooms. Increasingly effective use is being made of opportunities for class teaching where there is an interactive whiteboard and projector, enabling all pupils to see a screen, or where the classroom layout enables ICT work to be interspersed with other activities. This often results in more progress being made than where pupils sit one or two to a screen throughout the lesson.

45   In particular subjects such as **science**, teachers use ICT effectively to demonstrate processes in action. In **D&T** workshops and design studios, illustration and explanation are enhanced and teachers tend to plan these parts of their lessons more carefully, knowing that they will easily be able to use or adapt the material again. Similarly, presentational software is improving the quality of introductions to lessons. Some teachers use prints of key slides as prompts following their presentations. In a few schools teachers use network software that enables them to switch pupils' monitor screens so that can all look at the same sequence of procedures for direct demonstration and instruction, or at specific examples of pupils' work, to set standards. In **PE**, the use of a split screen is often invaluable as a tool to analyse and evaluate movement to compare pupils' performance with that of an ideal model.

46   A small but growing number of teachers are increasingly able to use the capacity of ICT to raise expectations of their pupils. For example, in a Year 7 **English** lesson the teacher developed pupils' word-processing, drafting and editing skills to produce a 100-word story. They used the school's intranet to gather information and data, which were used selectively in their writing, and a digital camera to photograph relevant images, which they imported into desktop published presentations alongside their text.

47   Across subjects there remain significant weaknesses in teaching using ICT. Only a minority of teachers are capable of managing ICT resources and organising the classroom to ensure that effective subject learning is taking place. Many teachers still have difficulty in deciding when, and when not, to use computers, while others are reluctant to use them at all. Teachers who have had experiences of faulty technology are often sceptical about the capacity of ICT to help raise standards.

48   IT is one of the least well-taught subjects in **special schools**. There are weaknesses, particularly in the selection of ICT resources to match pupils' curricular needs, as well as a lack of awareness of how ICT can enhance pupils' learning. For example, pupils in one school were introduced to databases through the manipulation of data they did not understand and which had no interest for them; there were no plans to make real use of databases subsequently.

49   There is a considerable gulf between the most and least effective teaching of IT. On the one hand, in a small number of special schools, particularly hospital schools, ICT is beginning to affect positively the way teachers teach and pupils learn. In these schools, use of the Internet brings in new materials and supports pupils' own research and communication with pupils in other schools, both in this country and abroad. CD-ROMs bring 'library' research into the classroom. On the other hand, despite the long-established availability of information and training, many special schools remain poorly informed about the wide range of specialist materials available. As a result, too many pupils with disabilities are unnecessarily disadvantaged.

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PART B: IMPLEMENTATION OF INITIATIVES IN LEAs AND SCHOOLS

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The role of LEAs

50   When the Government introduced the NGfL and other initiatives, LEAs were generally very keen to respond positively. Many **senior LEA officers** saw ICT as important, which, in turn, led to effective bids. In some LEAs, for example, the director and key elected members took a close personal interest in developments, particularly where ICT was related to other priorities such as social inclusion, lifelong learning, or community links.

51   Where senior officers failed to give a strong lead, ICT staff often worked in isolation, and this held back both planning and implementation of NGfL-related provision. In **constructing their bids**, a few LEAs lacked the professional expertise to inform decision-making, while others failed to consult schools adequately. Constructing the bid required effective consultation by the LEA with its schools, with other Local Authority services and with suppliers of telecommunications services. Not all of these groups had the necessary understanding of schools and their particular equipment needs. Delays were caused where, for example, suppliers were slow to provide the necessary data about technical features of their services or products and their costs, and where LEAs were slow to commit the necessary matched funding. In producing an ICT section in their Educational Development Plan (EDP), a number of LEAs and their commercial partners made wrong assumptions about schools' needs, which also led to delays, or decisions taken by schools on the basis of poor or partial advice.

52   The best LEA strategies, in the most successful bids, included a coherent and co-ordinated programme of implementation, linking schools' ICT development planning with the installation of ICT equipment and infrastructure. They also included the provision of support for teaching and learning and for monitoring schools' progress.

53   Early support and guidance for **school development planning in ICT** were, in the best cases, thorough – for example using a team of advisers and advisory teachers to scrutinise plans and moderate each other's judgements. This led to a productive professional dialogue with schools and, where appropriate, to more careful consideration by the schools of how developments in resources, training and curriculum related to each other. However, LEAs often gave insufficient attention to the approval of ICT Development Plans, although such approval was a requirement for NGfL funding and NOF-funded training. For example, in some cases, there had been no dialogue with schools and their plans consequently gave little or no indication of how ICT provision would develop.

54   Currently, LEAs only rarely provide sufficient and effective challenge to, and support for, the development of ICT in **special schools**, especially with regard to NGfL network installations and training. Schools receive little useful guidance on curricular issues, the

design of any new ICT suite or the choice of resources. This lack of guidance reflects reluctance both on the part of LEA advisers about becoming involved in special schools, and on the part of schools to seek support from the LEA.

55   A key role for LEAs includes monitoring and evaluating the progress of NGfL developments in their schools, but this aspect of LEAs' work is generally weak. Even where an LEA provides sound INSET courses for schools, or in particular subjects, it is rare to find LEA officers with a good overview of current ICT developments in their schools or sufficient understanding of whole-school issues relating to ICT. One small LEA overcame this deficiency by undertaking a review of ICT in all schools, pairing link advisers with the specialist ICT adviser in visits to secondary schools.

56   In the best instances, school **ICT development plans** establish a clear vision for future sustainable developments: senior managers take full responsibility for their delivery and actively monitor and evaluate progress. Such plans detail how various sources of ICT funding are linked to serve the priorities for ICT, including staff development. They are also shared and agreed with staff, and are complemented by individual subject development plans.

57   Most ICT development plans, however, are weak in one or more respects. Initially, many schools did not see the NGfL initiative as an opportunity to consider all aspects of ICT provision or to plan for developments over several years, but merely as a paper exercise to be followed in order to obtain funding. Many plans are, therefore, insufficiently detailed to indicate important links between intended improvements in the curriculum, resources and staff development, and they lack success criteria in relation to learning outcomes for pupils. The monitoring and evaluation of ICT developments are very weak.

58   Many ICT co-ordinators receive insufficient support from senior management. As a consequence, they are often unable to bring about the changes necessary to implement ICT developments. They find it difficult, in particular, to monitor the quality of teaching and learning alongside managing a wide range of technical resources, and to liaise with other subject leaders and teachers. In secondary schools, ICT managers have a key role in developing the ICT initiatives across the curriculum. However, they often find it difficult to fulfil that role owing to a lack of effective whole-school policies and strategies for ICT development.

Curriculum planning

59   In many **primary schools**, teachers' planning for ICT successfully identifies the context for its use and the software required. However, it makes little reference to teaching strategies which use ICT, the IT capability being addressed, the outcomes expected or the assessment of pupils' IT capability. Because **secondary schools** now have more resources as a consequence of NGfL funding, many have increased the provision of discrete IT courses in both Key Stage 3 and Key Stage 4 to ensure the adequate delivery of the National Curriculum requirements. In a third of secondary schools visited by HMI, inadequate consideration was given to planning a range of coherent ICT experiences across the curriculum and ensuring appropriate progression in IT capability. Although increasing numbers of pupils have access to modern computers at home, very few schools take account of this when planning their ICT curriculum. Few schools have surveyed pupils to assess the availability of ICT in homes.

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60   In a small but growing number of schools, improved resources now allow explicit and regular ICT provision to be made as an entitlement for all pupils. In **history**, for example, all pupils in one school take part in two substantial activities per year based on work involving ICT and, in another, all pupils engage in one major desktop publishing task in Year 7 and a major project in Year 9. Such provision provides departments with the opportunity to evaluate and improve tasks year by year, incorporating changes into continually evolving schemes of work.

61   Schemes of work for ICT in **special schools** are generally a poor reflection of actual practice. The most frequently neglected areas are control technology and the use of databases and spreadsheets. There is little reference to ICT in schemes of work for other subjects, although NOF training is encouraging teachers to audit the use of ICT across the curriculum. Assessment, recording and reporting of pupils' ICT skills and progress are usually weak, even where ICT practice is good.

62   Schools for pupils with severe learning difficulties are making increasing use of computerised systems with specialised switches and other access devices to give pupils control of their environments. Where this use is well planned, it greatly enhances the educational and developmental element in pupils' use of 'multi-sensory rooms'. In some hospital schools, the additional ICT resources of good quality provided by the Government's initiatives, allow them to plan for the imaginative use of e-mail and video-conferencing. This development is revolutionising pupils' access to the wider world and to their own schools, and is supporting pupils during prolonged periods of convalescence at home.

Accommodation and resources

63   Access to accommodation for ICT use in schools varies widely, but, since its introduction, NGfL funding has enabled many schools to improve their ICT facilities. A majority of **primary schools**, for example, have used NGfL funding to develop computer suites or computer rooms. In a significant minority of large primary schools, accommodation is used imaginatively by providing a room or area for as many as 16 computers. This allows for whole class activity, often complementing the use of individual computers in the classroom. Many other schools have appropriately grouped computers in shared areas close to two or more classrooms, enabling whole or half classes to make simultaneous, effective use of the resources. Most **secondary schools** have used the additional facilities to increase and improve the provision of computer rooms for discrete IT courses, although the lack of access by teachers in other subjects frequently limits developments in the use of ICT in those subjects. However, some departments make effective use of a smaller number of computers in or near specialist rooms.

64   Where **special schools** have installed computer suites, many are in inappropriate locations such as corridor spaces and unventilated former storerooms. For pupils with profound and multiple learning difficulties and with physical disabilities, there are often unresolved problems of access to the equipment in computer rooms. The majority of such installations have not, as yet, contributed well to the use of ICT within subjects. Generally, there is little awareness of how ICT can help to overcome the problems associated with split sites or dispersed buildings on a large campus. In one hospital school, however, NGfL funding has provided a solution to the problem of having a split

site by installing cabling and wireless hubs into the wards and scattered specialist rooms from the school base and using wireless technology to link with its other site across the city.

65   In all types of school, NGfL funding has frequently led to an immediate increase in **centralised networked ICT facilities**. Many schools have improved library and open-access resource centre facilities, thus extending the availability of ICT resources for independent work by pupils. In the early stages of the initiatives, schools were often frustrated by unreliable networks and delays in linking schools to intranets organised by their LEA or local institutions. The quality and reliability of network services have improved gradually during the course of the initiatives, but, in half the schools visited by HMI, there were continuing problems of reliability and cost.

66   Most LEAs have developed an **intranet** for their schools, with information and Internet links for pupils, teachers and parents, and also **websites** that help users to navigate easily through the information and contents. In a few cases these have been developed independently, but some LEAs have created them in partnership with others in their region, or with commercial service providers. Such intranets vary in quality. A few are more robust, reliable, easy to use, and responsive than the rest because they have been expertly designed and benefit from regular maintenance. Most networks are, however, slow to link schools to functioning intranets and are unreliable. A few LEAs have linked schools with libraries and museums via their intranets, providing pupils with easy access to resources. In one LEA, sponsorship by a national telecommunications company allowed the public libraries to be connected to the intranet, enabling all schools to access the libraries' information database and to make reservations. Generally, however, **community links** are underdeveloped.

67   About a third of primary schools and nearly two-thirds of secondary schools have created their own web pages and are starting to involve pupils in publishing their work and maintaining the site. A few schools are becoming more adventurous and extending access to their intranets from pupils' homes, to increase the opportunities for online learning.

68   The **educational content** of many Internet sites improved over the period of the inspection. For example, several Internet Service Providers (ISPs) provided teachers and pupils with helpful interfaces and pointers to useful content on the Internet. BECTa was commissioned by the Government to create a national **NGfL website**, to include a **Virtual Teacher Centre** (VTC) to help address teachers' professional needs. Although the design and development of this site took many months to complete, owing to very careful planning and consultation, the NGfL pages now provide helpful pointers both to Government-approved information and to other educational material. While the value of the VTC and its use are increasing, it is in need of a higher level of maintenance in order to keep subject information relevant and up to date.

69   Many schools have invested in **interactive whiteboards and computer projection equipment**. Generally these have led to more effective whole-class teaching, with all pupils able to see a large, clear display. Pupils too have made good use of this new equipment, for example in illustrating a prepared talk with the aid of presentational software. In particular, the use of interactive whiteboards is bringing benefits to pupils with SEN, for example by making teachers' presentations clearer and more interesting,

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and by providing instant notes via printouts of the text and examples used in presentations. In an effort to provide more flexible access to ICT resources for pupils, some schools have increased the availability of **laptop computers**. Many teachers have benefited from the DfEE scheme for part-funding computers, although demand has outstripped the available funding. Other teachers have benefited significantly from Government schemes to provide laptops for personal use.

70   In specific subjects in secondary schools, NGfL funding has been used to purchase specialised ICT equipment. For example, in **art** much good work is associated with newly bought peripherals, such as scanners and digital cameras. In **PE**, a few departments have purchased a digital video camera and replay facility. There is increasing availability of hand-held devices in **mathematics**, with more powerful calculators that can be used to display graphs, capture and analyse data, manipulate algebraic expressions and solve equations. These devices can significantly enhance mathematics teaching, especially where teachers can provide demonstrations via an overhead projector.

71   Overall, in all types of school, NGfL funding has raised levels of **ICT resources** leading to a substantial improvement in the ratio of pupils to microcomputers. However, in many schools, the quality, age and accessibility of ICT resources pose continuing problems. There also remain significant differences among schools. For example, in the primary schools visited by HMI, the pupils to computer ratios varied from 30:1 to 5:1 and in secondary schools from 20:1 to 4:1. It will be difficult for those schools with relatively few computers to achieve increased use of ICT across the curriculum once teachers have completed their NOF training. Requirements for funding in 2001/02, however, set LEAs target pupils to computer ratios of at least 11:1 in each primary school and 7:1 in secondary schools. Although most **secondary schools** have used NGfL funding to make significant improvements to their ICT accommodation, there remains a growing demand for access to ICT equipment from many subject departments and more often than not it outstrips supply. As a result, the general lack of access to ICT resources for subject areas frequently limits the development of ICT across the curriculum.

Technical support

72   The increased level of networked ICT resources in secondary schools has led to improved levels of **technician support** in some. Where technical help is readily available, teachers are able to concentrate on pupils' learning without feeling anxious about faulty equipment. These technicians are often highly skilled and many provide very good support to both pupils and teachers when the networks are in use. Primary and special schools have responded in a variety of ways to the increased scale of technical issues created by having more equipment. For example, a few large primary and special schools either employ their own technician or deploy a suitably skilled member of staff. Also, a few groups of schools have combined to share the costs of a full-time employee. More often, however, schools have sought less expensive alternatives. For instance, one school uses technology students on work placement from a nearby university while others use technically-skilled classroom assistants to take on this role. The effectiveness of the latter in helping pupils to learn depends, critically, on how well they have been briefed by teachers and whether worthwhile tasks have been set for pupils. A few LEAs support schools well by providing prompt and effective technical help when it is needed, but continuous access to reliable, affordable, support remains a problem for the majority of schools.

Managed services

73   When its ICT initiatives were first introduced, the Government expected that schools would need managed services for ICT on order to provide 'a one-stop shop' to deal with all technical problems. BECTa defined the standards of service and provided exemplar contractual arrangements, which could be used to specify various levels of high-quality support for ICT in schools. It was hoped that schools could use them to make long-term arrangements to secure adequate maintenance and renewal for their ICT facilities. Some approved managed services would also provide for the leasing and replacement of equipment over a period of years. After a rigorous process of selection and negotiation, BECTa approved a group of providers of such NGfL-managed services. These were commended as giving value for money and complying with exacting standards of service.

74   In practice, however, schools have been very cautious about using NGfL-managed service arrangements, often being put off by the high costs involved. Most LEAs offer technical support to schools, and, in the majority of schools visited, support was contracted either to the LEA or to a commercial supplier or consultant. Increasingly, though, schools attempt to keep their expenditure low by employing a technician to undertake maintenance, with particular aspects of support contracted to the LEA or a commercial supplier.

75   The real costs of ownership of ICT hardware and other resources, particularly maintenance, staff training, renewal of software licences and stationery, have generally been underestimated significantly by LEAs. The speed of developments in technology has significant implications for the sustainability of some of the current initiatives. Currently, few headteachers and their governors manage budgets sufficiently well to sustain ICT developments in the longer term.

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PART C: TRAINING

The NOF-funded programme

76   Schools in receipt of NGfL funding, and with approved ICT development plans, were allocated NOF funds for training teachers. The training concentrated mostly on the subjects in the National Curriculum for secondary teachers and on the core subjects for primary teachers. The 'expected outcomes' of the training were published by the TTA and included the competences teachers needed to use ICT to teach a subject effectively. Schools had to take steps to ensure that teachers' training needs were identified, both in terms of ICT skills and pedagogy.

77   NOF training has been most successful where it has been preceded by thorough preparations. However, no consistent national assessment of teachers' professional ICT requirements was undertaken in relation to the expected outcomes for NOF training. Generally, teachers' needs with regard to the pedagogical use of ICT in their subject or phase were not ascertained effectively in advance by schools or ATPs. The needs analysis materials provided by the TTA were used infrequently.

78   The selection and take-up of NOF-funded training were slow at the outset, but increased rapidly during 2000. Several schools spent a considerable amount of time deliberating over the choice of provider. Others followed local consensus, often resulting from conferences with ATPs organised by their LEA. Frequently, the lack of access to sample course materials was a significant factor in delaying decisions. There were frequent misunderstandings by staff development co-ordinators in schools about the expected outcomes of the training, despite having received an information pack from NOF. It is a matter of concern, therefore, that so many schools committed themselves to an ATP without being clear about the training they would receive.

79   In the early stages, almost all the training plans ran behind schedule as a result of delays in the production of materials, training of trainers, or installation of hardware. Most of these early problems were resolved with second or third cohorts and ATPs generally responded well to criticisms made in the first year. There were continuing problems, in particular, where the training failed to recognise teachers' different starting points. A key issue was the availability of time for teachers to undertake and follow up the training by consolidating and practising what they have learnt. Some struggled to fit training in with their other work, both at school and home. For primary teachers in particular, there was the additional difficulty of phasing in ICT training at a time when the NNS was also being introduced. In spite of the intention, the lack of a subject-specific focus in the training programmes is a major weakness. Subject materials are often last to be introduced and their quality remains very mixed. Subject applications are referred to, but matters of pedagogy are generally not sufficiently explored.

80   The greatest benefit for those teachers who have completed the NOF training has been the increased confidence it has given them to use ICT. In secondary schools, NOF training has led to an overall increase in the frequency of ICT use in subject teaching, particularly in the use of the Internet, spreadsheets, presentational software and e-mail. Good training has taught teachers when and when not to use ICT. It has also made many of them more adventurous in their teaching.

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81   In general, the impact of NOF and other in-service training is most positive in schools where:

■   staff are motivated to improve their teaching and to attend in-service ICT training that gives them strategies to do so;

■   subject leaders are committed to developing the potential of ICT in their subjects;

■   there is systematic planning for the use of ICT in schemes of work;

■   there is a coherent whole-school or departmental approach, ensuring that staff can share strategies, give mutual support, and build upon each other's experiences.

82   The success or otherwise of training depends, therefore, as much on the context in which it operates within the school as on the quality of the training provided. At best, headteachers imaginatively provide training time, and closely integrate NOF training with other forms of in-service training. They also build on the impetus generated by NOF training by taking account of what teachers have learnt in subsequent professional development initiatives. However, in view of the fact that the expectations of training are not clear to many schools, they are not well placed to evaluate its effectiveness. As a consequence, much of the NOF ICT training is not on course to fulfil its potential.

LEA support for teaching and learning

83   LEAs continue to provide INSET for teachers and non-teaching staff, based on their needs as perceived by officers or requested by schools. Many use external partners and occasionally capitalise on the expertise of the schools themselves. Most INSET programmes comprise a mixture of courses focusing on the individual teacher's skills in using specific software and on the application of ICT in classrooms. These courses are generally well regarded by teachers, though in many cases they do not provide sufficient opportunities to discuss teaching methodology.

84   In the best INSET, LEAs help to address the needs of all teachers. They also establish a clear relationship between current course provision and professional development available under the NOF scheme. For example, two LEAs visited by HMI each provided a clear pathway for teachers to progress in their IT competence and their professional ability to apply ICT in curriculum contexts through different levels of provision, leading to Master of Arts modules provided by a local university.

85   There has been little or no systematic networking of leading teachers and schools to ensure a sound basis for supporting the development of effective subject pedagogy using ICT. As a consequence, teachers with particular interests and expertise too often operate in isolation and lack the stimulus of professional dialogue.

APPENDIX
GLOSSARY OF TERMS

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Approved Training Provider (ATP): An organisation approved to provide training for teachers under the NOF programme. The training is funded by NOF through allocations to schools. The training offered is quality assured by the TTA on behalf of NOF.

Digital camera: A camera that stores photographs in digital format.

Electronic mail (e-mail): The sending and receiving of messages via the Internet. Users who subscribe to the Internet are given unique addresses, which enable them to send messages to, and receive messages from, other users.

Hardware: A general term for referring to computers and, often, other peripheral devices such as printers that connect to computers.

Infrastructure: The cabling and network components that enable computers to exchange information.

Internet: The worldwide 'network of networks' connected by telephone communication systems. The Internet enables the transfer of information such as text, pictures, databases and e-mail, and provides other services such as news.

Internet Service Provider (ISP): A commercial company, LEA or other institution, which provides 'gateway', access to Internet services.

Intranet: A restricted network that uses the style and search facilities of the Internet on information held locally within the network itself. An intranet usually has its own connection to the Internet in order to receive information.

Managed Service: A service provision which looks after an entire segment of a school's ICT infrastructure and use, including the hardware, software, communications, links to the intranet (if any) and to external networks, as well as the provision of Internet and e-mail facilities. Such services are to be quality assured by the BECTa on behalf of the DfEE.

Network: A network connects computers together so they can share the use of software and peripherals such as printers and access to the Internet. A school network is likely to be a LAN (local area network). A network connecting different buildings on a large campus or various schools/homes is a WAN (wide area network).

Software: The applications (or programs) which run on computers.