



**Office for Standards
in Education**

ICT in schools

The impact of government initiatives five years on

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HMI 2050



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Introduction

1. Ofsted's inspection of the impact of government initiatives in information and communication technology (ICT) began in June 1999, with reports published in May 2001 and April 2002. This report, like the previous ones, draws evidence mainly from visits to schools, local education authorities (LEAs) and regional broadband consortia (RBCs) by Her Majesty's Inspectors (HMI) and Additional Inspectors recruited by Ofsted. Other evidence comes from Ofsted's regular section 10 programme of school inspections and from LEA inspections.
2. Between April 2002 and December 2003, inspectors visited 323 departments in secondary schools, 106 primary schools and 45 special schools, mostly for one day each. They also visited six LEAs in relation to their support for ICT, involving a total of 50 half-day school visits and interviews with senior LEA officers. Visits were also made to four of the eleven RBCs, involving an additional 24 school visits.
3. School visits in the autumn term of 2003 included a number selected in the expectation of finding good practice. Although examples from these schools have been used in this report, other data have not as they are likely to skew the overall statistics. Percentages quoted in this report therefore draw mainly on school visits prior to this period. Separate reports summarising evidence in primary schools, special schools and for secondary subjects can be found on Ofsted's website (www.ofsted.gov.uk).

Background: policy and funding

4. In 1997, the government announced its intention of encouraging the widespread use of ICT in teaching and learning in maintained schools. The main element of this programme, the National Grid for Learning (NGfL), provided a network of information and learning materials, and funding for schools via the Standards Fund. A supporting national programme of in-service training for teachers and school librarians was funded by the National Lottery's New Opportunities Fund (NOF).
5. These programmes have been key components of the government's ICT strategy for schools. Their implementation has been the responsibility of the Department for Education and Skills (DfES). The DfES has worked with the ICT supply industry, LEAs, the Teacher Training Agency (TTA), the British Educational and Communications Technology Agency (Becta) and the National College for School Leadership (NCSL). The NOF, a non-departmental public body sponsored by the Department for Culture, Media and Sport, managed and funded the teacher training programme, informed by policy directions issued by the government.
6. Funding for the work of the RBCs is allocated each year from central funds. These bodies were established in 1999 to develop the provision of broadband connections to schools through the purchase of an appropriate infrastructure. They vary in the extent to which they also engage in the provision of learning materials (content) for schools including the development of their own materials. Depending on the local arrangements with LEAs, some have also provided in-service training.
7. In 2003, the combined initiatives were relaunched as 'ICT in Schools', with continued earmarked funding for schools to purchase ICT hardware. Other significant funding schemes have continued including:
 - Laptops for Teachers – providing laptops to schools for teachers' professional use via LEAs on a pro rata basis. This follows schemes specifically for headteachers and special educational needs (SEN) co-ordinators. It is estimated that two thirds of teachers will have participated in this and related schemes by 2006.
 - Strategic Leadership in ICT (SLICT) – a programme of in-service training for senior school staff provided by the NCSL, Becta and the DfES. Following pilot courses for 2,000 staff in 2002–03, up to a further 10,000 teachers are targeted between 2004 and 2006.

- Curriculum Online – a learning materials scheme whereby approved software titles were brought together, categorised and made accessible to teachers via a single portal; this was combined with earmarked funding for schools through the Standards Fund.
 - Enhancing subject teaching using ICT – a scheme to provide online training materials for teachers in a range of subjects in primary and secondary schools.
 - Continued funding of the RBCs to provide broadband access for schools.
 - The Testbed Project – a detailed evaluation, managed by Becta, in three diverse areas where clusters of schools have been equipped to very high levels.
8. DfES funding for ICT in schools has increased substantially since it began in April 1998. In 2002–03 it totalled £510 million compared with £657 million over the years from April 1998. This has been distributed to LEAs via the Standards Fund. The DfES also made specific grants to various development agencies and software authors to support the creation of digital resources.
9. From April 1999 until December 2003, £230 million was made available from the NOF across the United Kingdom (£180 million in England – equivalent to around £450 for each teacher being trained), to help increase the competence of all teachers in their use of ICT in teaching and learning. The scheme was delivered through independent training organisations, approved by the NOF and quality assured in England by the TTA. LEAs were directly involved; over 75% were either accredited training providers in their own right or were receiving direct funding for supporting providers. They received direct funding of £20 million to support the programme. In England, about 96% of eligible teachers signed up for the programme and this far exceeded the target.

Main findings

- The combined impact of government initiatives for ICT in schools has been significant. The competence of staff in ICT has increased dramatically since 1997 and steadily since the last report in this series in 2002. Over 90% of teachers observed were competent users of ICT and the Laptops for Teachers scheme continues to have a major impact on this. Schools' ICT resources are now at record levels, comparing very well with other countries. This overall positive picture conceals wide variations in both the impact of training programmes and the provision of hardware. In particular, whole-school computer–pupil ratios in secondary schools often mask continuing difficulties of access for individual departments.
- The outcomes of the initiatives are more evident in improvements in pupils' achievements in ICT capability than in their application of this learning in other subjects. The incidence of the effective application of ICT in lessons across subjects is increasing slowly but steadily. The impact of ICT on teaching was rated satisfactory or better in 77% of the schools visited, a slight increase since the last report. The quality of teaching in lessons where ICT is used has improved, with 59% of lessons rated good or better.
- The gap between the best and worst ICT provision is unacceptably wide and increasing. In the most outstanding examples, ICT is starting to have a pervasive impact on the way teachers teach and children learn. But the quality, diversity and extent of pupils' ICT experiences vary widely between schools.
- The training programme funded by the NOF continued to disappoint in relation to its stated intentions, although it stimulated higher levels of ICT competence among staff and raised the profile of ICT training, giving it a whole-school focus, often for the first time. Expected outcomes were not met in about a third of schools and were met significantly in only another third, although the picture is considerably better in special schools. Where the training was successful, this usually involved the school taking a strong lead to ensure that it met their needs, sometimes through a change of provider. Improvements in providers' delivery of the training in the latter years of the programme often resulted from their response to the TTA's quality assurance measures.
- Where schools provided their own training for staff, sometimes with the help of external agents, this was generally much more effective than the NOF-funded training. The key factors of ownership, building on existing expertise and a shared approach by staff provide strong pointers for any future programmes of staff development.

- The level of technical support for ICT varies widely between schools. Where it is in place, it generally improves the reliability of ICT resources, which in turn significantly raises teachers' confidence to use ICT in lessons and that of headteachers and governing bodies to invest further in additional resources. Technical support is not always costed into schools' strategic ICT planning; it is most effective where it is integral to this.
- The government's initial target of connecting 20% of schools to broadband by August 2002 was met by the RBCs. By July 2003, they had ensured that 50% of all schools and 90% of secondary schools were connected to broadband. This has had a significant impact on the quality and range of work that schools can undertake. In particular it has made systems faster and more robust. Few schools as yet make significant use of applications that specifically require broadband.
- There has been continuing improvement in the quality and extent of support for ICT by LEAs. Some 20% are now judged as providing good support, with very few rated as unsatisfactory. Good support is characterised by a coherent approach that draws together the different strands of provision. Other significant factors include: professional, experienced ICT teams which maintain good working relationships with school staff; guidance and support materials that complement national strategies and other developments; and well-established, effective and varied systems for disseminating good practice.

Commentary

10. The positive influence of ICT in schools continues to rise and can no longer be denied. Although, as yet, ICT is by no means at the heart of our education system, it is now widely recognised as an essential tool for learning in the twenty-first century. Indeed, it is vital that today's children are enabled to take advantage of lifelong learning if they are to survive the constant pattern of change that is likely to mark their working lives. This means not only being comfortable with ICT as a medium, but also being able to exploit its potential to the full and understanding the ways in which ICT can make learning more effective.
11. The positive impact of financial support from the government has been noticeable mainly in staff confidence, record resource levels and improvements in pupils' ICT capability. The spread of ICT as a tool for teaching and learning has continued at a slow, albeit steady, rate. This is especially the case in secondary schools, where departmental organisation can hinder whole-school progress. As yet, the government's aim for ICT to become embedded in the work of schools is a reality in only a small minority of schools. More typical is a picture in which pupils' ICT experiences across the curriculum are sporadic and dependent on teachers; in many schools, opportunities to exploit the technology are lost on a daily basis.
12. There is no similar initiative with which to compare progress, given the sheer financial cost (including hardware replacement cycles of about five years) and the need to bring about fundamental change in approaches to teaching and learning. There is now good evidence to suggest that most teachers regard ICT positively, with only a residual minority of the profession reluctant to take their work forward with ICT. Teachers' use of computers for preparing lessons and learning materials, administration, assessment and tracking pupils' progress continues to grow steadily. However, many are unable to use ICT effectively in their teaching because of insufficient training of the right sort or, in secondary schools especially, because of problems of access, or both of these. The best uses of ICT bring clear benefits to teaching and learning that maximise the power of the computer to do things which are difficult or impossible to do in other ways and these are widely exemplified in this report. Thus teachers need to be discerning in their use of the technology and use more traditional methods when these would work better.
13. Another issue is the widening gap between the best and worst provision. The quality of use of ICT in any one subject varies enormously from school to school, and the typical picture in a secondary school is for a handful of departments to be working well with ICT. It is not always the

same handful. However, in schools that are furthest forward, ICT is starting to have beneficial effects in teaching and learning in **all** subjects.

14. Three such schools have recently been subject to 'ICT School Portraits' as part of the English response to the European initiative run jointly by European inspectorates. These are included in the case studies in Annex A. The full reports can be seen at <http://schoolportraits.eun.org> as well as on Ofsted's website (www.ofsted.gov.uk). Although each of these schools has developed in a unique way, what unites them (and others that are progressing well but not yet involved in this initiative) is the fact that developments were driven not just by ICT, but by a well thought-out approach to engaging pupils as learners. Only after fundamental issues of pedagogy and learning were identified was the place of ICT identified and established. In terms of 'e-learning', the focus was thus squarely on the learning rather than the 'e'.
15. Technical support emerges as a highly influential contributory factor in determining how well schools progress. The confidence that effective support brings to school staff is palpable, yet still many schools do not enjoy or cannot afford such support or have to make ad hoc arrangements as best they can to meet their needs. There is not yet recognition in many primary schools that technical support should be planned into the total cost of ownership of ICT. Technical support is most effective where it is central to strategic planning in school, and where there is mutual understanding between technical and teaching staff. The Framework for ICT Technical Support developed by Becta through its technical support advisory service serves a growing number of schools well.
16. Many in education continue to see a dichotomy between ICT as a set of skills, knowledge and understanding on the one hand and as a tool for learning on the other, while schools are required to offer an entitlement to both aspects. Ofsted's evidence continues to show conclusively that a complementary approach, in which schools achieve an effective, workable and realistic balance between the two, serves both agendas best. It is inconceivable, for example, that pupils might study ICT as a subject devoid of any contexts, including the many rich ones arising in other subjects. But, equally, schools need to recognise that pupils who fully develop their ICT capability get more out of applying what they have learnt to contexts arising in other subjects.
17. The ICT strand of the Key Stage 3 strategy aims to strengthen the important element of 'discrete' ICT and has made a good start in this. To help schools strengthen their complementary approach, however, the strategy needs to develop to ensure links between the two aspects of ICT, and this is currently planned as a next stage of development.

18. Evidence also shows a clear place for pupils' use of ICT across subjects where the learner is using ICT purely as the medium for learning and where prior learning in ICT capability is not utilised. The gains in such experiences include being able to control the pace and order of learning and the clarity of exposition through animated graphics or video clips. The role of the teacher in this activity paradoxically becomes more significant; the mix of human and computer interactions is the telling factor.
19. Continuing professional development has proved problematic, and has often been a cause of severe disappointment for schools and individual teachers. The NOF-funded scheme was over-ambitious for its time and had other significant shortcomings. It did not take sufficient account of teachers' and schools' current needs – even where these were audited – did not recognise the importance of teachers' involvement in making training work for them and did not always get the balance right between online and face-to-face training. Fundamentally, too, the need for competence with the technology drove the training rather than implications of the use of ICT for learning. In those examples where the NOF was successful, teachers collaborated and schools planned their professional development in ICT as an integral part of the school improvement process. It is to be hoped that the newly created online materials for continuing professional development are used in a way that takes account of this.
20. The NOF scheme had the laudable aim of promoting teachers' understanding of the pedagogic issues related to ICT use and their identification of what ICT adds or does not add in different learning situations. One important factor that often marks out the most effective use of ICT is the teacher's understanding of what the technology can do, what the pupils can do and how putting these two together can improve teaching and learning. The development of this understanding remains the single most pressing need in moving ICT forward.

Recommendations

At national level there is a need to:

- strengthen the focus of all aspects of support on ICT's contribution to improving teaching, learning and standards for all pupils through a range of initiatives that seek to bridge the gap between the best and worst practice
- ensure that the expertise that exists in subject, phase and professional associations, or that can be drawn upon by them, continues to be applied to aspects of training and other support for schools, including effective in-class support for teachers from professionals in the relevant subject or phase
- continue to earmark funding for ICT resources in schools, including laptops for teachers, in order to ensure that the current resource momentum is maintained
- extend the existing Strategic Leadership in ICT training programme for senior leaders in schools to include middle leaders (including ICT co-ordinators), LEA personnel and national strategy consultants; and ensure that staff understand the need for technical support to be central to strategic planning
- ensure that any future regional functions are firmly set in an educational context and complement LEA support: the focus needs to shift to supporting full use of broadband for more effective learning
- consider ways of stimulating schemes for sharing technicians in primary schools, including small ones
- establish a national structure of accredited training programmes for school-based technicians, incorporating schemes already available where appropriate.

At LEA and regional level there is a need to:

- seek further ways of embedding the understanding and planning of ICT across aspects of support aimed at improving standards
- move the support for broadband from its focus on infrastructure to ensure that more effective use is made of the opportunities offered by it. As part of this, the role of the RBCs should be reviewed and any continuation of regional support should be aimed squarely at exploiting the full educational benefit of broadband.

At school level there is a need to:

- develop approaches to evaluating the impact of ICT at different levels in school, so that staff are confident to assess its influence on teaching and learning
- develop electronic portfolios of pupils' work alongside the use of web- or intranet-based applications that enable assessed work to be easily accessed by teachers, pupils and parents
- ensure that adequate technical support is included as an essential element of planning for ICT and that this is central to the school's ICT strategy.

Section 1: Improving schools' ICT capacity

Equipping schools for ICT

21. Schools have responded in a highly positive way to the government's promotion of ICT and have, in varying degrees, improved pupils' ICT capability and their use of ICT as a tool for learning. ICT resources in schools are now at record levels, comparing very well with other countries. However, the gap in provision between the best and worst has increased since the last report. Overall, the leadership and management of policy and provision for ICT have continued to improve. Leadership of ICT was judged to be good or better in over two thirds of primary and secondary schools, and in just over half of special schools.
22. The impact of NGfL funding has varied widely. In primary schools, for example, it has had proportionately greater impact because they generally have less flexibility to augment spending from their delegated budgets and other funds. At the other end of the scale, NGfL has been less significant in individual schools. For example, many secondary specialist colleges have used the additional funding stemming from this status to extend their ICT resources significantly, often giving a major boost to their area of specialism. In secondary schools generally there has been continued growth in the level of expenditure from delegated budgets so that the proportion of NGfL funding as a percentage of the overall money spent on ICT has been considerably less than in primary schools. The latest DfES figures show that the average number of pupils per computer in 2003 was 7.9 in primary schools and 5.4 in secondary schools. Special schools continue to benefit from charitable donations in developing the best overall ratio at 3:1. The average annual expenditure on ICT was £11,300 in primary schools, £65,100 in secondary and £13,600 in special schools. A few schools enjoy the additional and often outstanding resources of a City Learning Centre and there were examples where these led to improved opportunities.
23. However, for many schools, and in particular subjects, the number of computers available to teachers and pupils remains inadequate. In spite of record spending levels and high overall pupil-computer ratios, many schools still struggle to provide adequately for the different ICT requirements. Even where a secondary school has a favourable overall ratio, this may not translate into appropriate levels of access for all subjects. Some 10% of primary and special schools and 20% of secondary departments have unsatisfactory access to resources. Furthermore, at a time of financial stringency there is anxiety in many schools about basic maintenance and replacement costs and whether these can be sustained.

24. The vision and understanding of senior managers in schools are crucial in setting a context in which ICT can flourish. In the schools that are furthest forward with ICT, senior managers have been involved in planning whole-school provision with a clear understanding of how ICT can enhance teaching and learning. In some secondary schools, the process of applying for specialist status has helped to sharpen the thinking of school leaders about the kind of school they want to develop and the place of ICT within it. Others have been helped by being part of a local ICT consortium, in which ideas have been shared. In general, the most successful ICT leadership is characterised by pragmatism, informed by clear educational principles and an ethos which encourages innovation and risk-taking.
25. In those schools with the best provision or the most improvement, there have been a number of critical factors. Firstly, the place of ICT informs rather than leads continuing discussion about effective classroom practice and engaging all pupils. Secondly, the role of ICT in supporting this involves all staff. Thirdly, the issue of resource deployment is addressed head-on, often with a move to more flexible approaches including, for example, sets of wireless laptops linked to the school's network and clusters of machines placed strategically around the school. Finally, the need for effective technical support is recognised as a central plank of the whole-school strategy for ICT. In a small but growing minority of mainly secondary schools, the location of learning materials and lesson plans on the school's intranet enables more extended and flexible patterns of access, increasingly including access from home for staff and for those pupils with the necessary resources.
26. Where resource planning has the most impact in secondary schools, departments are required to spell out what they intend to do with ICT equipment before they receive it. In other words, planning is driven by clearly defined needs. In one school, for instance, interactive whiteboards and laptop computers were allocated to teachers on the basis of need but were re-allocated if they were either not used or used ineffectively.
27. The best ICT suites provide pleasant learning environments, with good lighting, sufficient seating which conforms to health and safety standards, and enough space for non-ICT materials and activities to be accommodated. All too often, however, schools, especially those that are popular and overcrowded, struggle to find adequate space. ICT suites in such schools are often poorly designed and house too many computers; they impede teachers' sight lines and lack flexibility to allow different activities to take place. In some schools, ICT rooms have problems of heat and noise generated by the computers. Where ICT suites are complemented by clusters of desktop machines, ICT rooms in other subject areas and sets of laptops, teachers are more likely to be able to use ICT as part of their teaching. Data projectors

are now commonplace, while interactive whiteboards are growing rapidly in popularity and likely to be further boosted by the recent government announcements of additional funding for these.

28. The purchasing of wireless laptops can greatly increase flexibility. For example, in one specialist arts college they allowed performing arts teachers to capture the moment, without moving to a suite or waiting until the next lesson. In other schools, the use of sets of laptops on trolleys that can be wirelessly linked to the school network in different parts of the school has had a profound impact where this has been part of a co-ordinated and sustained drive to improve the uptake of ICT across subjects. While wireless links do not always facilitate multiple access to broadband applications via the internet, they nevertheless provide a very good solution for many of the applications that departments wish to use.

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Laptops can bring more flexible patterns of use

29. Where facilities in primary or secondary schools are good, pupils have access to modern and reliable networked machines and, as necessary, additional equipment such as scanners, colour printers and digital cameras. In most schools, pupils can use ICT equipment before or after school and during lunch hours, supervised by teachers, technicians or librarians, depending on location. Computer clubs or cyber cafés, sometimes open to the community, provide additional opportunities for equipment to be used, especially for those pupils without computers at home. In one primary school a weekly club for parents in the school's cyber café enabled children to support their parents in developing their ICT capability (in Lent Rise

Primary School – see Annex A). Home access to computers continues to increase, although schools rarely audit its scale or its impact on pupils' learning.

30. Broadband connections are now commonplace, providing speedy access to the internet via school or LEA-managed intranets, with access in most schools regulated by Acceptable Use Policies. For the most part, the systems work well, though schools in some areas have been plagued by technical problems and there remain problems of broadband not extending to some remote parts of the country. There is a need for school leaders and teachers to gain a better understanding of the benefits for learning that broadband can bring, beyond making systems more robust for existing applications. (See section on support from the RBCs.)

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Parents and pupils learn together in the cyber café

31. Schools are increasingly using their intranets to provide pupils with access to learning materials, often developed in-house. At the leading edge of developments, schools have started to make full use of their intranets to share resources for learning as well as teachers' planning (see Cramlington case study in Annex A). Pupils and staff can log on from home and access

the materials they need. This has major benefits, for example for revision or when pupils have been absent from school, or to allocate work to pupils when staff are absent. The semi-public nature of this approach also means that teachers benefit from sharing their work with each other. In another specialist technology college, the head was building up a team of non-teaching staff trained to transfer materials to the intranet and adapt these to make them more interactive.

32. Individual email accounts are becoming more common in secondary schools, as is the use of email by older pupils to send homework to teachers and to discuss ongoing work with each other. School websites provide a means of publicising the school and its activities, including those of different departments, although maintaining these can take up too much of the staff's time.
33. Pupils' access to a range of software, including CD-ROMs, can differ widely across subjects, often reflecting the degree of teachers' persistence in locating appropriate materials through, for instance, trade fairs, professional associations and their own subject networks. Standards Fund monies for 'e-learning credits' have generally been well used to purchase software, although teachers have sometimes been frustrated by the quality of the materials and the system's teething troubles in locating these via the Curriculum Online portal. This has recently improved.

Curriculum leadership

34. The co-ordination of ICT varies considerably in its effectiveness. It was good or better in 60% of secondary and special schools and 50% of primaries, but unsatisfactory in 10% and 20% respectively. Successful co-ordinators understand how ICT can enhance teaching and learning and have the skills to promote its development throughout the curriculum. As noted in previous reports, however, co-ordinators can still be overburdened with technical responsibilities which are more appropriately the work of technicians. Technician posts are not always easy to fill, or, particularly in the case of smaller primary schools, to afford. Ensuring there are sufficient qualified personnel to sustain and support whole-school developments in ICT is proving to be an intractable problem in some schools.
35. Where senior managers have worked in close partnership with ICT co-ordinators (and a systems manager where one exists), this has developed a shared understanding of what has to be done to improve provision and standards. Good or better co-ordination usually means subject co-ordinators or individual departments taking responsibility for ICT in their own subjects and working together with the ICT co-ordinator. Where co-ordination is weak it is often because the ICT

co-ordinator works without the full support of the senior management and does not have sufficient influence outside the ICT subject area. In secondary schools, ICT user committees often play a useful role in developing a whole-school approach, providing feedback on the effectiveness of developments and suggesting possible improvements. Increasingly, secondary, middle and larger primary schools have recognised the need to share responsibilities and have a team of staff undertaking different aspects of co-ordination.

36. Whole-school development planning for ICT continues to improve in primary and secondary schools, reflecting the earlier requirement of NGfL funding arrangements for schools to submit plans to their LEAs. The best planning is rooted in ongoing analyses of subject and whole-school needs and current priorities, and a clear understanding of the requirements of national strategies. The overall picture is less healthy in special schools, however, where plans generally relate to the acquisition and replacement of equipment, and few refer in sufficient detail to developing either the ICT curriculum or the use of ICT in other subjects. It is very rare for development plans to express outcomes in terms of raised achievement.
37. The monitoring and evaluation of a school's ICT work by senior managers generally show improvement, in part because of the performance management system, which often includes ICT-related target-setting and reviews. At least half of all primary headteachers monitor teachers' use of ICT as part of their performance management and link targets to raising pupils' attainment in ICT. A move towards more robust curricular and departmental scrutiny is also evident in many secondary schools, placing ICT within a broader drive to improve standards. Nevertheless, in a few schools, senior managers do not yet have a comprehensive picture of the quality of ICT provision; this points to a lack of systematic evaluation against clearly defined expectations. In some schools, specific surveys of ICT use across subjects and year groups, conducted by the ICT co-ordinator, have provided information which has fed usefully into the development planning process.
38. In secondary departments, ICT leadership continues to be variable in quality within and across subjects. In some schools, Advanced Skills Teachers (ASTs) are making a significant impact – as in one art and design department where an AST had successfully introduced ICT into the art curriculum – as well as doing effective outreach work in ICT and art across the county.

Technical support

39. The amount and quality of technical support vary considerably between schools. Many large secondary schools now have a team of technicians headed by a network manager. A few primary schools enjoy excellent support, sometimes shared within a cluster of schools. Others have derived benefit from schemes within an Education Action Zone (EAZ) or have bought into LEA or private schemes. In one school, a mutually beneficial arrangement with a local university ensured that undergraduates on a computing course provided technical support for the school, while undertaking a research-focused one-year placement as part of their course. In another:

The school has recently taken on a modern apprentice ICT technician, who is working alongside the systems manager. Together they effectively maintain all ICT resources. They also provide free technical support and training at a local primary school which has had a positive impact on the quality of teaching and learning in ICT.

40. Good in-house support almost always improves the reliability of the resources and boosts the confidence of the staff. Conversely, the lack of technical support in some schools seriously inhibits the use of ICT in teaching. In such schools, teachers are often reluctant to use the computer suite because of the risk of hardware failure, and the ICT co-ordinator is frequently called out from his or her own lessons in order to deal with technical problems.
41. Primary schools generally have insufficient technical support. The minority who are involved in shared schemes within clusters of schools, or across LEAs generally achieve good value for money. Where they receive additional subsidised help from a partner secondary school, this brings economies and further benefits in terms of closer working relationships between the schools. One middle school which had lost its technician employed an ex-pupil to provide temporary technical support.
42. Technical support is most effective where it is an integral part of the strategic ICT planning in the school, and where there is good mutual understanding between technical and teaching staff. Support available from Becta's procurement and technical support advisory services has been well received by those schools using it. The Framework for ICT Technical Support, for example, provides a very helpful checklist for senior staff to ensure that technical functions work as effectively as possible. Most schools, however, do not make a systematic cost-benefit analysis of their technical support and it is rare for senior management to make use of the information available on how their network is used.

LEA support for ICT

43. Ofsted's LEA inspections show that LEA support for ICT remains much improved compared with the start of the inspection programme, and indeed of the government ICT initiatives. In the second cycle of LEA inspections, 65% had improved their ICT support compared with their previous inspection, with 46% moving from an unsatisfactory position. About 20% of the LEAs now provide good support for ICT. The best occurs in LEAs able to draw together the different strands of support. For example, where there is good advice on procurement of resources, this is most effective when allied to sound advice in resource deployment and curriculum planning. Other key characteristics of effective support include: a clear strategy that makes sensible and appropriate links between education and corporate Information Technology, including internet and broadband provision; good planning for ICT that is strongly focused on raising attainment; a range of well-embedded strategies for disseminating good practice in ICT; and support for the transition of pupils moving between schools.
44. A major focus of LEA activity has been support for the introduction and delivery of the ICT strand of the Key Stage 3 Strategy, and this has been at least satisfactory in most LEAs. The provision of support for schools in their development of the use of ICT to enhance teaching and learning has proved more problematic. Support often continues to be located – or at least is perceived to be – in an ICT specialist context. In order to develop more pervasive support, the work of other officers and advisers needs to extend to embrace ICT more than it does, for example within the contexts of subjects and phases.
45. Given the changes in LEA functions in recent years, it is unsurprising that support for development planning for the use of ICT in secondary subjects has been limited, with only 46% being satisfactory. In contrast, however, it has been satisfactory or better in 83% of primary schools. Teachers have often benefited from spin-offs from in-class support in other national strategies and direct support is now needed in developing ICT work across subjects. The DfES's planned 'Hands on Support Scheme' should go some way towards addressing this need, provided that headteachers recognise the need for funds to be spent in this way and can identify suitable sources of support.
46. Effective support leads to significant and progressive improvement in pupils' achievements in ICT across all key stages and to growing awareness and use of ICT in teaching and learning across subjects. Some of the features distinguishing the good LEAs from those that are satisfactory are:

- effective support for teachers in moderating their assessments of pupils' ICT work
- effective support for applying ICT across the curriculum, with good working relationships between school staff and experienced LEA ICT teams
- well-established, effective and varied systems for disseminating good practice
- guidance and support materials that complement other curriculum developments and national strategies
- the work of support teams carefully targeted to meet school needs
- effective use of data and information to analyse performance, address specific issues or support needs and to target training
- a clear picture of standards across all schools informing the setting of appropriate targets for ICT
- strategies and support to improve transition between key stages.

Case studies of three of the LEAs visited as part of this sample are provided in Annex B.

Regional Broadband Consortia support for ICT

47. The most successful RBCs have fully met their aim of extending schools' access to broadband, providing faster and more robust connections. This, in turn, has boosted the confidence of teachers in the potential of the internet as an effective teaching, learning and management tool, leading to more use and a higher level of productivity. This picture is not universal, however, and there have been continuing technical problems in some regions while, in others, some LEAs have opted for a different route to broadband provision. There are also wide variations in the value for money for schools in different regions.
48. A less successful aspect of the work of the RBCs has generally been the provision of learning materials for pupils. These often incorporate existing commercial sites and sometimes involve materials developed by teachers in the consortium's schools. The provision of such educational materials has had varied impact across regions and across schools within a region, but has generally not led to significant levels of use. In one RBC, however, an online survey facility, usable through the RBC's portal, provided a useful tool for both the LEA and school management.

In one school, an ICT co-ordinator had used the online survey tool to gather information from all pupils about their access to ICT outside school. The data obtained allowed the co-ordinator to present the school's headteacher with a report about pupils' home use and this informed whole-school planning. The online survey tool saved the co-ordinator's time in designing the questionnaire and sped up the capture of electronic data by pupils, the analysis and the report writing. This tool and process can be re-used next year.

At an LEA conference for ICT co-ordinators, the LEA support team used the online tool to survey how delegates ranked the impact of different elements of local and national support for ICT so that they could use this information to inform their own strategy. They were also able to discuss outcomes of the survey during the conference itself.

49. The evidence from lessons shows that broadband access can increase pupils' motivation, improve the pace of lessons and use of time, and lead to better quality outcomes. It enables fast access to a wide range of websites and fast, easy downloading of large files. The provision by some RBCs of personal portals or Virtual Learning Environments for teachers and pupils provides some scope for developing more personalised learning. However, there have been generally limited levels of support for effective broadband use and very little in-class support has been given for this. Schools were rarely well informed about videoconferencing or publishing on the internet and there was little sharing of this expertise across schools. In a few cases, the arrival of broadband actually stopped videoconferencing in schools which had earlier used an ISDN line for this.
50. It was also rare to find knowledge at senior management level about the cost effectiveness of broadband facilities. There is limited awareness of what might indicate value added, such as the usefulness of content, or the extent of home-school contacts via the RBC portal. Few systems' managers monitor patterns of use by individuals and groups, use of applications, internet sources and bandwidth. This means that significant management information is being lost.
51. Good practice and critical debate about the use of broadband applications have not yet been adequately promoted by RBCs or LEA teams. There has been no systematic professional debate about how best to unlock the potential of broadband and insufficient raising of teachers' expectations by helping them to develop their pupils' learning, for example through generating and publishing content or through the use of communities to share and discuss learning. The following good example of work in one school could have been extended to others with some moderation of the discussion:

A teacher working with a year group on controversial issues used a discussion facility to engage pupils in a debate about fast foods and smoking, and whether advertising them should be banned. This generated a lively email exchange within the school via the RBC portal. The freedom with which pupils addressed the issues and their familiarity with one another gave this discussion a distinctively informal flavour and could be developed further orally or in writing in due course.

52. These findings give rise to the question of what, if any, regional role is needed for education now that the expansion of broadband across public services is to be taken up by Regional Aggregation Bodies (RABs). Any work by regional bodies such as RBCs in supporting schools further should be set clearly in an educational context, should focus primarily on the learning benefits and should seek to enhance co-ordination between the RAB, LEAs and schools. The focus thus needs to move explicitly from infrastructure to making full use of this new resource for more effective learning. RBCs should complement LEA support, for example in forging links with LEA school improvement teams. Their capacity to do this currently varies widely across the regions.

Section 2: Staff development

NOF-funded training

53. There have been some slight improvements since the last report. The expected outcomes of the NOF-funded training have been met significantly in about a third of all schools; in another third they have not been met at all. In retrospect, the expectations of the NOF-funded ICT training were over ambitious. The overall stated aim was to 'equip teachers with the necessary knowledge, skills and understanding to make sound decisions about when, when not and how to use ICT effectively in teaching particular subjects.' There were a number of factors that militated against widespread achievement of this aim. The ICT needs of many teachers were more basic than the scheme had expected, while others had already developed a high level of expertise, often through their own efforts. The majority of NOF training was insufficiently differentiated to meet such varied needs and this included some schools where LEA ICT teams were funded to deliver the training. The approach adopted by many secondary schemes used electronic communications and distance learning, with limited face-to-face training. This proved frustrating to teachers. They wanted opportunities to discuss practical software problems or pedagogical issues arising from their use of ICT. Many became disillusioned when they found the bulk of the NOF training was self-study to be undertaken in their own time.
54. The programme exceeded expectations in terms of the number of teachers and school librarians involved; a total of 396,000 staff signed up for the training. As the programmes progressed, however, teachers became resistant to training that was inappropriate to their needs. Much training made a limited contribution to their awareness of subject-specific ICT applications and did not encourage them to consider pedagogical issues of teaching and learning with ICT. NOF figures show a high proportion of teachers completing the course, but this did not always equate to meeting the NOF expectations. Some teachers sailed through with no challenge; others reported that they carried out the set tasks, but this had no impact on their teaching.
55. The main advantages of the NOF-funded ICT initiative have been in developing teachers' levels of ICT competence and in raising the profile of ICT training. Its whole-school focus acted as a useful impetus for secondary subject departments and individual teachers to go beyond what was offered by the schemes and address their personal and professional ICT needs. Without the impetus of the NOF scheme, some schools would not have given ICT staff development the priority it has received over the past few years.

56. As the scheme developed, some of the most significant problems evident in the first two years were ironed out. This was often because of the mechanisms set up by the TTA who were appointed by the NOF to manage quality assurance. There were also examples where teachers were successfully supported by the training in ways which were transferable to other contexts. Although often critical of programmes, teachers still recognised value in receiving training in using ICT. This was particularly true where all staff in primary and special schools trained together and the training made them focus on specific software that they might otherwise not have used.
57. Where the training was successful for secondary teachers, it was carefully tailored to meet their individual needs, had relevant subject tasks and provided helpful feedback from knowledgeable tutors. Smaller providers who focused on specific subjects tended to achieve higher levels of success for teachers and generally made a more positive impact on the quality of teaching with ICT.
58. As a result of the NOF training, staff in many special schools are now ready to engage in discussion of the curricular issues related to ICT, but there is often no external mechanism to take this forward by promoting or supporting such discussion. Most teachers are now reasonably competent users of ICT, but few have reached the stage where they are able to think as imaginatively about ICT applications as they do about their use of traditional resources.
59. The exclusion of teaching assistants (TAs) from NOF-funded training emerged as an anomaly in primary and special schools where they are essential members of the teaching team. However, some providers recognised the value of including TAs in the training and over 12,000 eventually took some part in the scheme. Over the last two years, increasing numbers of TAs have undertaken other courses, often provided by the LEA, local colleges or commercial organisations. Trained staff can respond to pupils' changing needs more effectively by selecting suitable additional software or by changing options within the software. Trained TAs have been especially successful in a number of special schools in using ICT to produce teaching resources such as material printed in symbols, literacy games for home and school use, and specially adapted worksheets.
60. In the final year of the NOF training, although lessons had been learned, there was still a good deal of dissatisfaction and some schools took the initiative to change provider, or renegotiate the training agreement. Such changes usually resulted in improvements in the training. For example:

One 11–16 **inner-city comprehensive** was disillusioned with the provision from its chosen local consortium. It felt that the trainers did not understand its teachers' needs and had pitched training inappropriately. The school negotiated for the consortium to train key members of school staff in each faculty and they then acted as in-house trainers. Subsequently, a high proportion of staff completed the basic training and some achieved success in more advanced modules. This proactive approach by the school had turned around the scheme. However, the cost was considerable in terms of the time spent by the deputy headteacher, who led the scheme, and the staff trainers to maintain staff morale and enthusiasm.

Continuing staff development in ICT

61. Whether or not the NOF-funded training met the needs of staff, the embedding of ICT depended to a high degree on the quality of follow-up or in-house professional development provided by schools.

In one secondary **grammar school** in which most staff have good ICT skills, the two NOF in-house trainers have continued as facilitators for staff ICT support. They provide informal help, but mainly draw on in-house expertise to advise others. When common needs are identified, those with the appropriate skills deliver formal training as part of the school INSET programme.

Following the completion of NOF training, a 5–11 **primary school** with 400 pupils has taken seriously the need for all staff to be confident in the use of computers. A whole-school action plan was drawn up and is updated annually. A specific ICT focus is identified for each year, and exact targets are set as part of staff development performance agreements. In addition, at least one non-pupil day is allocated annually, together with necessary twilight sessions, to ensure all staff can meet the targets. The school has used a mix of in-house training, LEA courses and the employment of private consultants to cover both ICT skills and their use in subject teaching.

A day **special school** for pupils with moderate or severe learning difficulties, aged 3–16, provides a wide range of staff development opportunities. These range from twilight courses in specific software to whole-school training in the ICT suite of a local training organisation. The school development plan sets clear training objectives. These include the effective use of the software toolbox, especially the assessment tool, and the adaptation of the Key Stage 3 ICT strategy to meet the needs of pupils in the school. There have been 16 different ICT courses available for teachers and support staff in the last two years. Five have been undertaken by individuals, seven by all staff and the remainder by small groups which have included governors.

62. While this presents a positive picture, many schools no longer consider ICT training for teachers to be high on their professional development agenda, and not all schools feature ICT training in their school improvement planning. Few schools have a well thought out professional development strategy for ICT and it is common for in-service training to be catered for only by short-term, practical responses to perceived needs. For example, many schools have arranged, in the past year, for some training on the use of interactive whiteboards as they have acquired these.
63. Senior managers with responsibility for staff development are not always well informed about teachers' current ICT skills. Few schools regularly update the staff skills' audit as a basis for professional development planning in ICT. Thus training can be the result of individual enthusiasms rather than recognised need. Sometimes subject leaders such as the head of department in a secondary school can have an important role in staff development, as in this example:

A geography head of department in a team of three teachers, realised that her colleagues lacked good ICT skills and did not have the confidence to use computers in the classroom. She explored ICT applications, and used them with her classes to ensure they were manageable and reliable before she expected others to use them. The teachers observed her teach with the application – she often teaches their classes – before they used the resource themselves. With such support, the whole department was beginning to use ICT imaginatively and effectively.

64. Effective in-house ICT training is often led by ICT co-ordinators, ASTs or teachers who are self-taught innovators. It occurs via drop-in workshops, formal sessions on specific software, written support materials or through sharing practice at staff meetings and whole-staff training days. Such training is usually linked closely to curriculum needs and supports specific applications in a school. For example, many schools have recently trained their staff in the use of presentation software and email systems. Co-operation between schools within clusters has often brought great rewards.
65. Where technical support staff are able to extend their roles into staff development for other staff, this can prove highly effective. In one special school, a TA had undertaken ICT training provided by the LEA:

Over time, the TA's role had evolved into that of a technician and went on to include: production of very effective guides to ICT applications such as using the digital camera; liaison with the technician from the nearby secondary school; accessing training intended for mainstream schools and cascading this into the special school context; and seeking the best value from ICT suppliers.

66. Working alongside others in the classroom is often the most effective form of in-service training. In one secondary school the ICT co-ordinator was available for 20 hours a week to provide staff support negotiated for each individual teacher. In a primary school the Education Action Zone (EAZ) team had worked alongside class teachers. In both cases there was a clear impact on the quality of teaching. The growing use of coaching for teachers (see case studies for Cramlington and Dene Magna schools in Annex A) has also helped teachers to develop their expertise in using ICT resources to improve the engagement of pupils within a broader context of teaching and learning. A particular problem facing secondary schools is how to provide professional development in specialist subjects. The following examples show how the problem has been successfully addressed in **music** and **art**:

One school engaged a trainer to train teachers to use music composition and sampling software. This helped teachers to produce differentiated resources for Key Stage 3 pupils so they made better progress with performing a Beatles song, and to support GCSE pupils more effectively with their composing activities.

An art teacher followed an LEA course for one night a week over a term. This resulted in an exhibition and an impressive portfolio of evidence, indicating that she had explored a wide range of applications. She stressed the value of working with other art specialists since she was the only art teacher in the school.

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Students using music composition software for AS Level coursework

67. Where ICT hardware has been made available to teachers, this has been a catalyst for professional development. The 'Laptops for Teachers' initiative has had a very significant impact in this regard, but so too have digital projectors and interactive whiteboards to support whole-class teaching with ICT. Laptops allow teachers to use ICT at home, so providing for much more flexible use. But the availability of hardware is not enough on its own. Many teachers say they do not start using ICT properly until they have their own laptop with all the school software, so they can become confident with the applications and plan for pupils' learning. In this context, the most effective professional development results when new resources are targeted carefully and their impact on what happens in classrooms evaluated thoroughly. In one secondary high school, senior managers saw the allocation of laptops as part of the school's continuing professional development strategy:

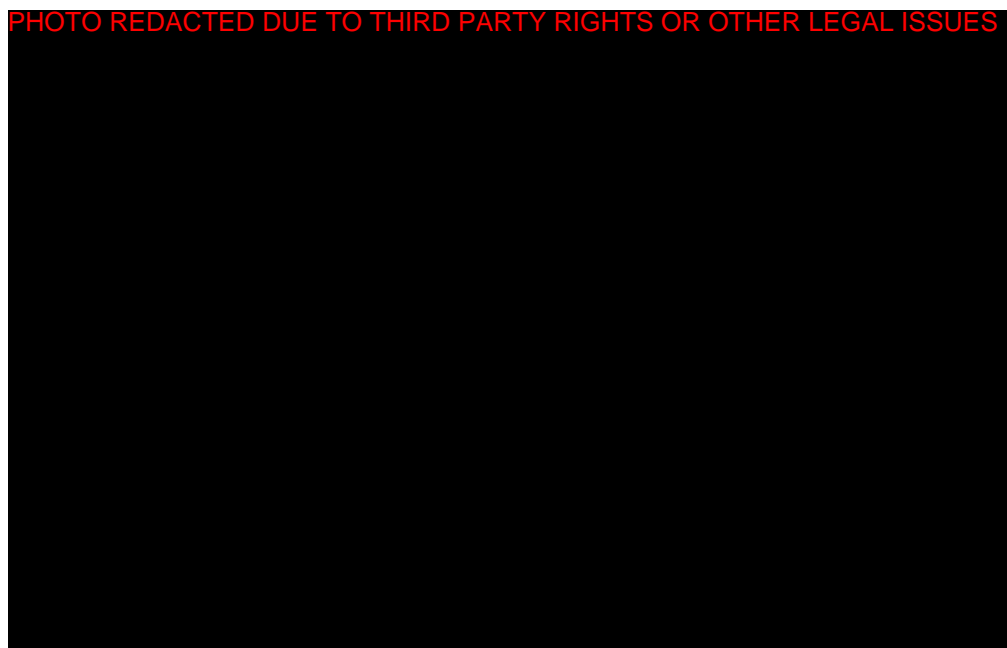
Teachers set out how they intended to use the equipment, established an action plan, and evaluated their use a year later. Line managers monitored the use, but also expected teachers to reflect on how well the ICT resource had helped them to meet their teaching objectives, complete administrative tasks and identify what they needed to do to be more effective. In this way the allocation of laptops had been a strong incentive for the self-evaluation of ICT skills.

Section 3: The impact of ICT on standards, teaching and learning

Primary schools

Pupils' achievement using ICT

68. There has been a steady increase in pupils' levels of achievement in ICT in primary schools. Pupils respond very positively to the use of ICT, they engage well with lessons, their behaviour is good and their attitudes to learning are very good. These factors bring clear benefits to their learning, which was found to be good or better in 62% of lessons where ICT was used. In general, where pupils are encouraged to apply their ICT skills to their learning across the curriculum, they often make more rapid progress in other areas of their work. There is clear evidence that, where ICT is used effectively to reinforce learning in literacy and numeracy, pupils make good progress, especially those who previously displayed poor behaviour and negative attitudes to learning.
69. In the Foundation Stage and Key Stage 1, most pupils develop independence in saving, retrieving and printing their work for themselves. They learn to use word-processing, for example, to rearrange sentences into a correct sequence within a story or poem. Some use word and picture banks to produce illustrated pieces of writing. Pupils' keyboard skills vary considerably and some schools work hard at keyboard familiarity. This can be helpful, providing it is kept in balance with the work it is seeking to enhance.



A reception pupil uses an interactive whiteboard in a literacy lesson

70. In Key Stage 1, many pupils learn to improve the appearance of their text. Most are familiar with art packages and use these to create a range of pictures: for example, an Egyptian mural using ancient Egyptian symbols which pupils select from a menu. Pupils generally make good use of ICT in mathematics, for example to develop their understanding of place value. They manipulate shapes and construct tessellating patterns. They also use ICT to draw pictograms to represent data and identify number patterns, for example, on a hundred square.
71. In Key Stage 2, most pupils gain confidence in using computers and are keen to develop their skills. Higher-attaining pupils demonstrate the ability to manipulate and develop text and check their spelling. Pupils are able to evaluate, select and develop information from remote sources such as the internet and incorporate this into their work. Pupils display high levels of interest and concentration and talk enthusiastically about ICT; this makes the learning more enjoyable. Older pupils can access online resources which help to develop their research skills. This has proved of particular value in history and in geography where, for example, pupils compare the climate of different countries.
72. Older pupils can make and use spreadsheets confidently, for example to produce graphs to illustrate weather patterns, record test results, calculate totals and work out averages. They can enter information into a simple database, ask questions of this to determine patterns, and display the information in various ways. Pupils have developed good search skills when using the internet and other resources. They can make web searches efficiently by progressively narrowing down terms.
73. Pupils can produce multimedia presentations, combining and adapting information from the internet with illustrations, texts and sound:
- Pupils were learning how to use page transitions, hot links, sound buttons and animated graphics. They collaborated well in pairs and, being confident computer users, many pairs were quickly able to extend the range of features they used by experimenting with the functions available. Pupils grasped new learning with ease and extended existing skills to develop new capabilities.
74. There are many good examples where pupils with special needs are enabled to participate and achieve well using ICT, in particular in presenting their work legibly and attractively. This improves their self-esteem and confidence as learners. The following example relates to the use of ICT by an autistic pupil in Year 6:

The pupil had mastered all of the technical skills required to use his laptop. The quality of his handwritten work was poor, but he could produce good

work when it was word-processed. He was able to see clearly what the teacher was writing on the interactive whiteboard as this also appeared on the screen of his laptop. Without the use of ICT this pupil becomes frustrated, which aggravates his potentially disruptive behaviour.

75. There has been a notable increase in the use of ICT for creative purposes. In a small but growing minority of schools, pupils are able to shoot and edit digital video or animation sequences, using special effects and showing an understanding of how images can be manipulated to convey emotions or show stereotypes. Pupils explore and simulate the works of well-known artists, compose simple melodies and design fashionable clothing. Nevertheless, this area of ICT is still underdeveloped in many schools. In one school, pupils in Years 4, 5 and 6 made effective use of digital cameras and videos to produce animation and short films:

The pupils in Years 4 and 5 made figures out of plasticine and painted boxes to create backgrounds. They captured single shots and moved their figures to match their storyboard. The images were then put into a sequence to create a cartoon to which they added their own soundtrack.

Pupils in Year 6 used a digital video and an editing suite to produce a short film highlighting the different activities at their school. The pupils downloaded recordings confidently into the computer. They edited their work, adding titles, fade-ins and fade-outs as well as commentary. They displayed high levels of ICT skills and capability and a very mature attitude.

76. In a few schools, pupils make safe and effective use of email. They exchange messages with pupils from other schools both in the United Kingdom and abroad. This has sometimes helped to raise the attainment of pupils who were previously identified as being reluctant readers and writers.
77. As well as developing their ICT capability, in some schools ICT contributes to pupils' achievement in other subjects, as in this Year 3 numeracy lesson on number problems:

Pupils were completely absorbed and eager to call out answers. As soon as a correct answer was called out, the teacher 'clicked' on the screen which instantly displayed a new number problem. Pupils wrote the correct sequence from the numbers on the screen, on their handheld mini-whiteboards and then held them up for the teacher to see: for example, 4, 3, 7 gives $4+3=7$. Pupils also used the interactive whiteboard pen to drag the numbers into the number problem to make it work. They then moved on to use the interactive whiteboard to compare the time on standard and digital clock faces. They were motivated by the use of the interactive whiteboard and helped by the large, clear display.

Teaching using ICT

78. The increase in teachers' competence and confidence with ICT is reflected in the quality of teaching in ICT lessons and, to a lesser extent, in the growth of effective use of ICT in other subjects. The momentum of improvements has been sustained and consolidated over the past two years, with more teachers using ICT regularly and imaginatively. The use of digital projectors and interactive whiteboards is becoming more widespread and continues to result in some very high quality teaching.

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Teacher using interactive whiteboard in a Year 5 literacy lesson

79. Good teaching was seen in over 60% of lessons involving ICT, compared with 54% of all lessons in primary schools in section 10 inspections in 2002–03. The impact of ICT on teaching was rated as good or better in 53% of schools, compared to 46% in Ofsted's survey two years ago.
80. Government ICT initiatives have provided a significant catalyst in these improvements. Teachers' planning, skills, knowledge and understanding have improved since 2001–2002. This is mainly as a result of widespread support in a number of areas, including in-service training, sharing of expertise within and between schools, support from LEA advisory staff and technical support. In many cases, teachers' own enthusiasm for ICT and their growing confidence enable them to make effective use of technology. Where teachers have access to ICT for their own personal use as well as to plan lessons, they are more competent and self-assured in their classroom use of ICT.

81. Teachers are increasingly using ICT to assist them with lesson planning and preparing resources, although this requires an initial investment of time in developing the required ICT skills. There has been an increase in the use of materials produced by others, often from internet sites, and adapted by teachers to suit their own pupils. The power of email to send materials to others or to email from home to school is also valued and used by an increasing number of teachers.
82. Successful practitioners do not use ICT just for the sake of using it. They ensure that the use of the technology enhances the quality of teaching and learning and, where it does not, they make use of more traditional methods. They maximise the power of the computer to do things which are difficult or impossible to do in other ways.
83. Many good examples of this involve the use of interactive whiteboards and/or data projectors. Interactive whiteboards are becoming increasingly prevalent, despite their cost, with teachers using their power and versatility to produce some excellent lessons. For example, in a very good Year 5 and 6 English lesson, the teacher used an interactive whiteboard and a suite of computers as a means of exchanging information and developing reasoning skills in a way which would not have been possible as a paper exercise. This also increased levels of pupils' participation and discussion:
- The teacher used a multimedia presentation to introduce a scenario about a robbery. The use of the interactive whiteboard made it very easy for pupils to sequence the events. Pupils worked collaboratively, speaking and listening to each other while trying to establish the facts of what took place. They worked in pairs to compose and send questions to their teacher using email. They used the teacher's answers to help them to deduce who the robbers were, how they escaped and where they went. As the lesson progressed, pupils began to write emails which were more succinct. Their questions became increasingly more focused, intelligent and logical. The pupils remained completely absorbed for the duration of the lesson and the teacher monitored their progress through their emails. These exchanges also provided the teacher with good opportunities for assessing achievement and progress.
84. Teachers make effective use of interactive whiteboards to engage pupils by utilising large and colourful text, shapes, data, illustrations and animation, including the use of digital video and other materials from the internet. These images can help to bridge the gap between concrete and the abstract ideas. It is possible to simulate a broad range of resources such as clock faces and coins, and explore volume and capacity as well as angles that increase and decrease. When their use is well planned, interactive whiteboards can improve the pace of lessons, and thus the amount of work done. They also have the flexibility to enable teachers to retrieve

work from a previous lesson in order to reinforce ideas or make cross-curricular links. In one example, work on maps in geography was instantly retrieved and linked to a lesson about co-ordinates in mathematics.

85. In a particularly good Year 4 **geography** lesson, an interactive whiteboard was used to enrich the quality of teaching and learning about topography:

The interactive whiteboard was used to display an aerial photograph of England. The teacher made effective use of technology to superimpose highlighted lines to identify features such as rivers and high ground. The teacher's good subject knowledge and use of a high-quality resource with attractive graphics ensured that the pupils engaged immediately and with enthusiasm. The lesson progressed at a brisk pace as pupils acquired new knowledge quickly. This was demonstrated as they used technical vocabulary to identify significant topographical features with increased accuracy and confidence.

86. Where primary schools have a broadband connection, teachers are able to use animated graphics and video in order to engage pupils in different aspects of learning. For example, Year 4 pupils in a mathematics lesson on co-ordinates made very good use of web-based software as a direct teaching aid via broadband, which meant the interactive and gaming features of the software worked at a high speed:

The teaching was very good, with telling interactions between teacher and pupils and good use of questioning. The teacher was very confident and completely at ease with the software being used. Pupils went on to work in pairs on a paper-based co-ordinates game. Levels of motivation and enjoyment were high. This was very effective use of broadband to enable software to be used in an engaging way that interested the pupils in the mathematics.

87. Many teachers have become more aware of the potential of ICT for matching work to the individual needs of pupils. It is often relatively easy to produce differentiated examples, or to use programmes which have an inbuilt degree of progression. Many also capitalise on the motivating power of ICT to address the needs of particular pupils or groups of pupils. Reluctant mathematicians, for example, will often concentrate on repetitive work when competing against a computer programme. For example, two boys worked collaboratively in a good Year 1 numeracy lesson, using the interactive whiteboard to consolidate their number skills. The programme allowed for the level of difficulty to be adjusted to match the competence of the pupils:

The boys used a programme in which they were presented with a set of numbers to drag and drop to make a sum work. The level of difficulty

increased and the time allowed for each sum was reduced as the pupils progressed. They shared ideas and strategies as they went. They concentrated very well and for a long period of time. The fact that they got steadily faster in providing the correct answer showed that their skills were developing rapidly.

88. Reluctant writers often become motivated when using electronically generated word lists or when they can see a more polished piece of writing aided by a word-processing package. ICT lends itself well to shared writing, with pupils working together, listening to and supporting each other. In some schools, there is clear evidence that teachers plan opportunities to help the pupils work collaboratively to develop these skills.
89. Motivation can also be raised through the potential of ICT for stunning visual presentations, as in this example of a very good Year 2 literacy lesson. The teacher projected onto a screen a story from a big book about children lost in a cave and then linked this work to the website about the Lascaux caves in France, allowing pupils to enjoy a virtual tour of the caves:

When scrolled down, the text revealed a picture of the prehistoric French cave paintings of Lascaux. This provoked cries of pleasure from the pupils, who wanted to see more of the cave paintings. This brought the text to life and added an extra dimension to the lesson and promoted very good discussion among the pupils who eagerly talked about what they thought would happen next in the story. As a result, pupils worked well together producing shared writing which was interesting and which made good use of adjectives to describe the caves.

90. Despite the improvements noted above, there remains around one lesson in ten where teaching is unsatisfactory. The overall impact of ICT on teaching was good in about a third of schools, satisfactory in a third and unsatisfactory in a third, suggesting a widening gap between the best and worst examples. Some of the weaker teaching is associated with unhelpful accommodation or resource deployment such as when the printer is situated elsewhere in the school.
91. Weak teaching can also reflect poor subject knowledge. For example, problems arise where pupils' ICT skills, knowledge and understanding are not matched to the requirements of the task. This works both ways. Sometimes teachers use procedures which are too complex for the pupils, whereas in other lessons teachers are unaware of the high levels of ICT capability of pupils, especially home users. Class lessons are not always sufficiently challenging for all the pupils. For example, pupils sometimes learn a skill more quickly than expected, and then mark time as the

teacher is not sufficiently confident to skip part of the lesson or use extension material to move them on. The use of a single text for all pupils often fails to challenge some sufficiently, even though it is not difficult to provide two or three texts to match the pupils' needs more closely.

Special schools

Pupils' achievement using ICT

92. In most special schools, the use of ICT is still insufficient to have had a significant effect on achievement, but when pupils use ICT, the quality of their learning is usually enhanced. Most often, they work with a greater degree of independence. This is the case in a wide variety of settings. A young pupil may focus for a long period of time on a matching activity, for example, or an older pupil who is a reluctant writer may be willing and confident to work for a long period at the word processor.
93. The use of computer-printed symbols enables many children who are at a very early stage in developing literacy to have some independence in literacy lessons and in reading instructions and recording outcomes in other lessons. For pupils with physical disabilities which preclude handwriting and handling printed material, the effective use of ICT transforms their learning experience. In schools with the most advanced practice, such applications have moved on from supporting independent writing to enabling pupils to work independently at such activities as searching the internet and editing still images and video.
94. The regular and appropriate use of ICT can greatly raise the expectations of teachers and parents as to the potential of very young pupils and those with severe disabilities, as in this example from a nursery class:

A three-year-old girl with communication and learning difficulties was part of a group working with the TA, being supported in using a digital camera to take photos around the room for a later group discussion session. In a play period after this session, she chose a large toy camera to play with. She took great care arranging a large doll in one of the specialised seats, fastening the safety straps. She then moved around the seated doll, studying it through the camera viewfinder and pretending to take pictures. This was far more complex play behaviour than might have been expected.

95. Given suitable access systems, older pupils with physical disabilities can far exceed their expected levels of achievement.

A Year 7 pupil with little control of her limbs used a chin-switch to control a laptop. She was editing a sequence of video clips which she had shot earlier

in the term. The pupil was sorting out the best order for the clips and selecting sound effects from a collection within the editing program to replace the random noises from the classroom which formed the original soundtrack. While the pupil was able to control the computer quite readily via an access program, the video camera had not yet been adapted to her control. A recent leaver from the same school had gained an A* at GCSE for work in the same field, filming with a video camera clamped to his electric wheelchair or mounted on a head-strap.

96. A small number of schools have realised the potential of ICT for the use of pupils' own digital images to accompany their writing. Where pupils have learned to integrate their own pictures and those taken from sources such as the internet into their writing, some of the most reluctant writers have surprised their teachers by their willingness. In some schools, pupils have also been successful in the use of digitised film, as in this music lesson in a school for pupils with moderate learning difficulties:

A computer and a video projector were used in a music lesson to play a clip from a silent film. At the beginning of the lesson, the pupils previewed the film clip and discussed the sound effects they had developed in earlier lessons, and the timing of the effects relative to the film. A small group of pupils took responsibility for handing out high-quality percussion instruments around the class. When the film was played again, pupils accompanied the action very competently with their chosen instruments. They paid close attention to the events of the film so as to time their contributions perfectly.

97. When pupils learn to use presentational software, this often extends their willingness to write and to share their work with other members of the class. This has been particularly successful in the small number of schools for pupils with emotional, behavioural and social difficulties (EBSD) where it is used.
98. These examples notwithstanding, the full potential of ICT to raise pupils' achievements across the curriculum has not been realised. One reason for this is that the selection of subject-specific software is limited and the use of ICT merely provides additional work within the lesson rather than challenging pupils and extending their achievements. Machines are too often to be found switched off in lessons where they could be contributing strongly to the achievement of individuals, especially reluctant writers. There is a particularly strong contrast in schools for pupils with EBSD between pupils' levels of ICT capability in ICT lessons and the expectations of teachers of this in other subjects. It is not unusual for older pupils to be undertaking such advanced activities as website design in ICT lessons and yet to be making little use of ICT across the curriculum.

99. It is exceptional for pupils to make regular use of the internet. Most use is made in ICT lessons. The greatest use of the internet by pupils is made in schools for those with EBSD, but, even here, the most frequent use is made within specific ICT lessons and in lessons in other subjects where the teacher happens to have a high level of enthusiasm for ICT. Where pupils in all kinds of school have regular access to the internet, they often develop surprisingly high levels of skill and of insight into its use.
100. Pupils make very little use of email. Where there are email links, these are generally on a whole-class basis with other schools as a result of personal links on the part of teachers. Few schools have links with schools abroad, so that the potential for exchange of information on topics as varied as culture and climate is not realised.
101. Pupils have little access to practical activities with ICT such as the use of control technology and data logging. This is a missed opportunity as pupils with EBSD often respond particularly well to such practical activities, while those with physical disabilities can experience a unique degree of personal control of objects in their environment through the use of control technology. Data logging can enable pupils with learning difficulties to gain an insight into a variety of situations such as changing light and temperature conditions which they otherwise have difficulty in grasping.
102. Where pupils have open access on their computers to a wide range of software and facilities, achievement is sometimes low because they become distracted. With the youngest pupils, for example, this may involve them in finding their way back to desktop or menu pages and selecting activities other than those planned for the lesson. Older pupils can have equal difficulty in staying on task when they are aware of a whole range of other options for activity on their computers. This provides new challenges for teachers in managing pupils' use of ICT.

The quality of teaching using ICT

103. The recent initiatives have increased the amount of ICT use by teachers and have made many more confident with ICT. Even so, it is one of the less well taught subjects in special schools for all age groups. This is particularly so at Key Stage 1. The quality of teachers' planning is lower than for most other subjects, notably at Key Stages 1 and 2. The programmes of study for ICT are less likely to be delivered in full for primary-aged pupils than in any other subject, although this contrast is less distinct for secondary-aged pupils. More generally, few teachers have yet reached the stage where they can think innovatively about their use of ICT in class, or be sure that the activities they are selecting will stretch the pupils' abilities or provide new insights within the subject being taught.

104. Most schools now have teachers who make some use of the internet, and in some schools, extensive use has greatly enhanced the quality and immediacy of resources in lessons. Pictorial material is generally the most successful teaching and learning resource. However, many internet sites contain dense blocks of text which are a barrier to many pupils in special schools. Furthermore, few schools are aware of any great number of useful internet sites, and there is a widespread unmet need for guidance on subject- and topic-related sites for pupils with special needs.
105. It is very rare for teachers to use the internet to find professional material related to specific educational needs or medical conditions, despite the wealth of information of this kind which is available. The potential for the internet to support the exchange of teaching materials (particularly ICT-based material) is almost completely unexploited as yet. As a result, most of the schools with the best practice hold valuable stocks of thoughtfully developed ICT-based teaching materials which are not shared with other schools facing the same challenges.
106. More teachers are now using images projected on to a large screen, and it is characteristic of these lessons that pupils pay attention and are prepared to engage in discussion of what they see. The use of digital images involving classmates and familiar locations is particularly successful in drawing pupils into discussion. Although facilities of this kind are limited in schools for pupils with EBSD, these pupils often respond very well to opportunities for discussion and exploration of ICT images.
107. Many special schools now have one or more interactive whiteboards. When they are used well, lessons across the whole range of subjects are transformed, particularly where abstract concepts are illustrated with animated representations on the board. Whiteboards are most often used well in literacy lessons where pupils are able, for example, to label items on the screen and to manipulate text as their peers watch.

In a school for pupils with a wide range of learning disabilities, Year 5 and 6 pupils in a small class took turns to match speech bubbles to the characters on the screen by dragging the bubbles about the screen. The scene represented an episode from a commercial reading scheme in use with the class. All the pupils could see the possibilities for a variety of matches and this provoked a good level and quality of discussion. The teacher was pleased that so much of the discussion was between pupils rather than with adults.

108. The use of whiteboards in ICT lessons to demonstrate activities such as accessing the internet also supports pupils' learning well. However, in only a small proportion of schools are whiteboards being used to full effect. In many schools, too few staff have had sufficient training to gain confidence

in their use or to take any imaginative steps in using the new technology to meet the special needs of their pupils.

109. Assessment of pupils' ICT capability is a general weakness, and few special schools are able to provide a clear account of pupils' current attainments in ICT. Fewer still can present a profile of pupils' progress over time. Where records are maintained over a period of time, they tend to adopt different formats from year to year so that comparisons are difficult, or they focus on pupils' experiences with ICT rather than their acquisition of key skills and knowledge.

Secondary schools

Pupils' achievement using ICT

110. The impact of ICT on pupils' achievement tends to be most pronounced where departments use it in an extensive and sustained manner, but further research is needed before ICT can be identified as more than a contributory factor. These same departments are often ones which are also well managed, have effective teachers and provide good accommodation. The impact on standards is more significant where pupils have regular access to ICT resources, but very limited where work using ICT is sporadic or not sustained beyond a single lesson.
111. Pupils' achievements were good or better in 54% of lessons in this survey and this reflects the average figure from section 10 inspections from 2001–2003. This figure varies widely between subjects, however, and within particular subjects, from school to school. The proportion of lessons where achievements were unsatisfactory was somewhat higher in this sample than the average figure for the section 10 lessons over the same period.
112. One of the main contributions of ICT to subject learning is in the retrieval and exchange of ICT-based information, which pupils understand, evaluate and summarise. Pupils make wide and increasingly effective use of the internet and CD-ROMs to retrieve specific information and data. The introduction of broadband in many schools has enabled the faster downloading of resources such as video. This can prove a very rewarding activity in the context of a well-planned subject lesson, for example where the pupils have to respond to or alter in some way the information they gather. In **design and technology (D&T)**, for example, effective use of the internet can bring considerable realism and motivation, as in the following example from a Year 10 class in an inner-city school:

Pupils were introduced to the task – to design and make a perfume bottle (concept model) and packaging, based on ‘retro’ styling. This lesson focused on research into design influences to help pupils to generate and develop their own design ideas better. Each pupil had personal access to the internet. Their searches were made very purposeful by the teacher’s clear introduction and supporting handout. This included appropriate words and phrases for internet searching and helped pupils to find five useful websites containing sources of ‘retro’ design images. Pupils readily selected, cut and pasted images from the website into Word documents and then annotated them critically. They focused on image, lettering and stylistic features, some on particular periods, such as the 1920s and 1970s, while others searched a range of websites before deciding how to proceed. The lesson drew upon and reinforced existing ICT skills and improved pupils’ understanding of how designers use research to gather ideas and develop their designing capability.

113. Able pupils, in particular, evaluate the information they collect and make practical use of it, for example in D&T, in formulating design specifications, developing design ideas and comparing the suitability of materials, ingredients and components for the products they intend to make. The interpretation and evaluation of information are the keys to raising attainment. Too often, however, large quantities of information are simply downloaded into coursework with little understanding or critical awareness of its content, while the scope for pupils to plagiarise work implies the need for increased vigilance by teachers.
114. Increasingly, schools are recognising the value of locating learning resources on their intranet to support learning in a more flexible way both in and out of the classroom. This brings a range of benefits, as in the following Year 10 **modern foreign languages (MFL)** lesson:

Pupils worked individually at computers redrafting a model text from the present tense to the perfect tense, applying their knowledge and understanding from the previous part of the lesson. When necessary, they were easily able to refer to the earlier presentation, stored in their area of the network. Pupils were asked to write a passage using the past perfect tense with reflexive verbs for homework and were given the option of emailing it to their teacher for comment before redrafting for accuracy a final version to hand in. The use of ICT supported pupils’ understanding of grammatical structure in a novel way. It highlighted language patterns memorably and at the same time provided an electronic reference that they could consult at any time, enabling all learners to revise their understanding both in and out of class time and to achieve good standards. Access to their teacher via email also provided these pupils with the opportunity to revise their knowledge and understanding.

115. Whether using the internet or an intranet, ICT has facilitated more extensive research and enquiry, either open or guided, in subjects such as **history**. The following is an example of good attainment in a carefully structured evidence-based task.

Year 8 pupils worked on computers to answer the question 'How united was the United Kingdom in 1707?' They were directed towards a stored file that dealt with the general issue of bias, providing pointers. Pupils were then presented with seven quite challenging sources about the Act of Union. Drawing on their prior knowledge, they had to make inferences in order to decide which of the sources showed the United Kingdom to be disunited. The task was effective in itself, making pupils think about the sources and their origin. The gain from the use of ICT was in the encouragement to read extendedly, to use links to find out more about the origins of the source, and to cut and paste significant phrases. Some pupils went further than required, bringing textbooks to bear as well as using new websites. This was a productive session. The lesson could have been taught simply with a card sorting exercise, but this would not have had the same potential for extension or using links for research.

116. When pupils use ICT well for research in **religious education (RE)**, there is also a clear improvement in their capacity to enter imaginatively into others' situations (such as through virtual tours or reading accounts of people's personal dilemmas), and in their understanding and analysis of key concepts.

In one Year 10 lesson, pupils gleaned information for promotional leaflets for and against abortion, using the website of the Society for the Protection of Unborn Children, text books and other sources, organising information in such a way as to think about their own response to the issue and to promote their chosen cause.

117. In **science, mathematics** and other subjects, ICT has enabled a higher level of analysis to take place than would otherwise be the case. The range of applications here is now much wider than previously. For some time, ICT has enabled pupils to focus more quickly on the graphical results of their **science** experiments through datalogging. There is now good use of ICT-based data for analysis, investigating patterns and drawing conclusions in around two thirds of science departments, for example in studying the law of constant composition in chemistry in Year 10 and projectile motion in Year 7. Asking 'what if' type questions of computer models, for example in **mathematics, business education, science** and **geography**, is a powerful way of developing pupils' understanding of key concepts, but this remains relatively rare.

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A laptop group comes to terms with correlation in Year 9 mathematics

118. One of the most pervasive influences of ICT on pupils' achievements has been in multimedia presentation. In **business studies**, for example, this has had a significant effect on the quality of coursework presentation. Portfolios are often produced to a high standard and include good-quality word processing or desktop publishing, graphical representation and imported pictures. The ease of redrafting and restructuring work has generally led to work which is better and more clearly presented.
119. Many pupils now produce their own presentations in different subjects. If set within the context of the subject and serving the learning objectives of the subject, this can sharpen their thinking, forcing them to analyse and focus on particular issues or arguments. In the following example, a higher-attaining Year 9 pupil made a **history** presentation on a subject of her own choosing, Elizabethan portraiture:
- The pupil made sophisticated use of the software. The presentation was structured into sensible questions about the problems facing Elizabeth, leading towards the need for propaganda. A wide range of media was used in the presentation including photographs, a timeline/family tree, and 'scrolls' with the main points of the talk. The pupil read a complex accompanying text, showing good interpretation. Other pupils praised the presentation and made suggestions about how it could be improved.
120. As well as providing a medium for editing and presenting work, word processing can be significant in improving pupils' thinking about a subject as an integral part of a broader activity. Word-processing is helpful where

tools are used to compose, assemble, shape and redraft text, but in some cases this does not add to the subject learning, and in a few cases slows it down with slow copy-typing when tasks could have been completed much more effectively by hand.

121. Some subjects benefit from subject-specific ICT applications. In **D&T**, for example, the widespread use of simulation software has had particular benefits. Whereas previously pupils had to try out ideas by assembling components from time-consuming and sometimes unreliable kits, they are now able to quickly test out their design ideas on screen and the consequences of their decisions become immediately apparent. This encourages pupils to think as designers and it improves the pace of learning and their productivity, as in the following Year 10 example from a GCSE course in system and control:

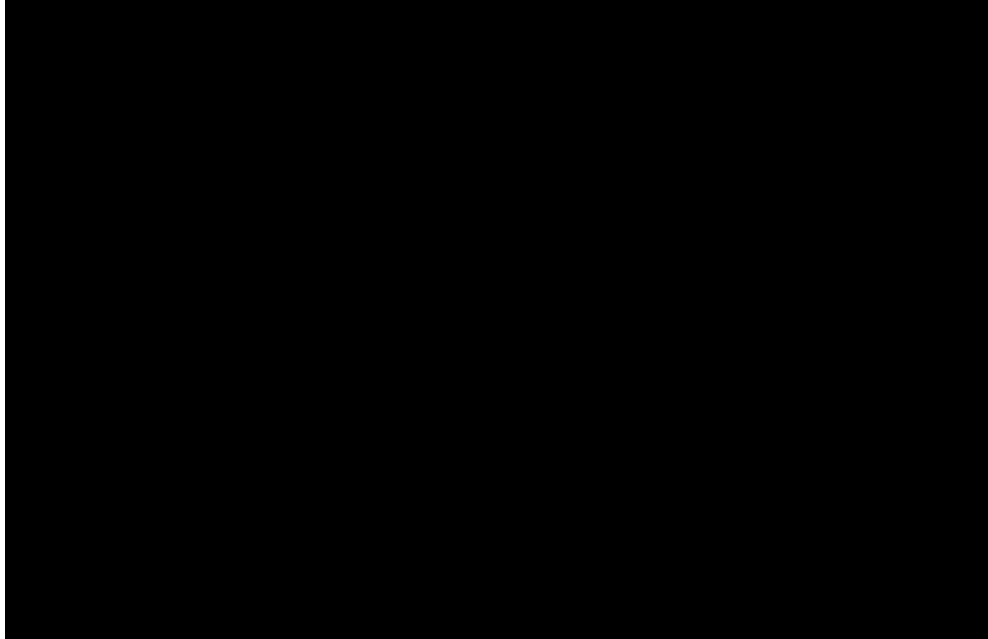
Pupils were using commercial software to model, evaluate and, in the case of the abler ones, design electronic circuits on the theme of a burglar alarm to be displayed for advertising purposes at a store counter. Most had developed a circuit to meet their individual specifications and were importing this into commercial printed circuit board (pcb) software to develop the circuit and finalise its layout. Each pupil had individual access to a computer in this well-equipped ICT room in the D&T suite. A wide range of circuits and pcb layouts reflected the intense individual concentration of pupils supported by effective prior learning of the functions of components and helpful, clear instruction sheets produced by the teachers. The software had enabled much experimentation as pupils had explored circuits and modelled changes. ICT was enabling pupils to think more clearly and achieve more than they did in the past.

122. Developments in computer-aided designing (CAD), especially in Key Stage 4 and post-16 D&T, have had a substantial effect on standards. An intensive implementation and training programme has been mounted by the Design and Technology Association and was heavily supported financially by the DfES and the private sector. This programme has brought industry-standard design software into many schools and a licensing agreement which enables pupils to install and use it on their home computers, thus giving them scope for further study. The use of CAD is more effective in raising pupils' performance as they develop ideas in detail rather than as they conceive these initially: the latter is best carried out with more traditional means of design sketching or model making. When not well used or where expectations are low, ICT can have the opposite effects; it can also convey a spurious impression of D&T capability which, on close analysis, is more a reflection of the capacity of the hardware and software than it is of the efforts of the pupils.

123. Some of the best work in **geography** is with Geographical Information Systems (GIS). This resource enables pupils to explore patterns and relationships, to test hypotheses, to analyse large quantities of data, and to recognise that the interpretation of large quantities of data is complex and yields a range of possible answers.
124. The potential of ICT for creativity is demonstrated in **music**, where ICT has generally had a positive impact on teaching and learning, enhancing the development of a wide range of musical skills. In a significant minority of schools, there is a direct correlation between increased use of music technology at Key Stage 3 and numbers of pupils opting to study music at Key Stage 4. There is also increasing interest in music technology at post-16 level. In the following lesson, the school had used arts college funding to equip a music technology room, principally for use at Key Stage 3. Computers were linked to MIDI keyboards, enabling pupils to work in pairs. Year 7 pupils were asked to compose a piece using a pre-recorded template, created by the teacher using sequencing software:

The template showed a clear structure, with the introduction and subsequent sections being labelled in different colours. Pupils composed within the given structure, but were encouraged to focus on timbre – experimenting with a great variety of tone colours and blends. They made improvements to their work throughout the lesson, and were very confident in their use of the software. Most of the pupils' work was of a good standard, with some very good examples. The emphasis on structure, organisation and continuous revisiting and improvement has also had a positive impact on the pupils' composition work using acoustic instruments.

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Year 12 music technology students in a recording studio

125. Like any tool used effectively in **art and design**, ICT requires the application of handling skills in combination with such qualities as imagination, perspicacity and vision, and at least some understanding of how meanings are made. Where standards and achievement are high, all these factors are evident in pupils' work. Pupils learn not only how to use the software, but also to think creatively and critically. For instance, in a project to design a school mascot:

Year 8 pupils began work using clip art body part resource sheets to draw from. They created their own characters – in some cases the product of long-sustained experimentation – by assembling different body parts. This involved them looking critically at existing mascots from other sources, for example football teams. Having settled on a final design, they drew the body parts and photocopied these on thin card. These were carefully cut out and assembled as a working model using paper fasteners to allow for movement. The model was then scanned in five different positions and colour-ways. Not having any animation software, each scan was inserted into a presentation software sequence, with zero seconds between each slide. 'Loop' was then selected and the slide show played, thus 'animating' the character. Finally, pupils looked at images of Claes Oldenburg's installation projects and, in the light of this, took digital photographs of the school grounds and placed their mascots as 'sculptures' into these environments.

126. Increasingly, work in the **performing arts** and **physical education (PE)** is making use of the technology to enable pupils to review and analyse their work in an immediate and more detailed way. This applies to physical activities in PE and to listening and composing in music.

A Year 9 dance class working in small groups used a digital camera and a video camera to help them analyse and evaluate improvement in their performance. Having completed a warm up using individual work cards prepared on the computer, they revised and improved individual technique to develop fluency and precision in twisting and circling movements. Afterwards, the class was brought together to look at an album of digital photographs showing the progress in their work over the past three lessons. They took turns in small groups to view the video recording of the routine they composed the previous week. Together with the teacher they identified and discussed two aspects of the performance that they would like to improve. The pupils worked with high self-esteem and rapid progress was made.

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Year 12 PE students capture trampoline work on digital video

127. Where good ICT capability is combined with strong contexts in other subjects, the work that pupils achieve can be of a very high standard. In a Year 10 GCSE **expressive arts** lesson, for example, pupils learnt to use an advanced animation package and were highly motivated by the quality of what they could produce. The effect of this work meant that the course was a very popular option in the school. The ICT demands of this application are significant and yet the work the pupils achieved also had considerable artistic merit. One pupil had based his coursework on 'No more Hiroshimas', the poem by James Kirkup. He used other pupils for the narration and the incidental music, the latter being composed by another pupil as coursework. In the lesson observed, the teacher made effective use of this and other examples of coursework to raise expectations of Year 10 pupils:

Pupils responded to the technical aspects of the work as well as the graphics and poetic imagery. They were motivated by the possibility of their work being put on the school website. The exemplar material was of exceptional quality. The objective for this group was to produce an animation on a Christmas theme. The teacher provided good pointers for the pupils in order to keep their ideas practicable. For example, he reminded them about the need for structure in order to shape their work – typically to have a clear storyline and ending. Pupils had used storyboards but were at the stage of interpreting these within the

limits of their expertise. More able pupils had progressed towards animated scenes, while the less able were still working through linkage issues. Many had computer access at home and had readily extended ideas from lessons at home. This has been encouraged with the use of portable hard drives.

128. The use of ICT does not always lead to improved learning or attainment. It is now an important core skill for teachers to recognise when ICT adds value and when more traditional approaches would work better. Ways of organising pupils' learning with ICT within lessons can also affect the impact on pupils' learning.

The quality of teaching using ICT

129. There is evidence of the steadily increasing impact of ICT on the quality of teaching across the range of subjects of the curriculum. Teachers increasingly use ICT for planning, notably the preparation of worksheets, presentations and other learning resources, the recording of assessments and the tracking of pupils' progress. However, some teachers who are confident users for personal and administrative purposes still shy away from using ICT in the classroom. Although strengths can be found in all subjects of the curriculum, both the take-up and use of ICT across subjects remain inconsistent, with considerable variation from school to school.
130. Opportunities to use ICT are often lost for a number of reasons, most frequently a lack of access to suitable accommodation and resources, especially where schools have tied up their ICT resources in computer rooms or suites. Where schools have opted for sets of laptops on trolleys, wirelessly linked to the school's network, this has often had a marked beneficial impact on the use of ICT across subjects. Although this approach brings additional financial costs and has limitations in many internet-based uses, it nevertheless can provide a much needed boost to work in a variety of subjects.
131. The debate continues about whether ICT should be taught as a subject or only used in context. This assumes an either/or approach, whereas Ofsted's evidence suggests that, in order to develop the skills, knowledge and understanding that characterise ICT capability as well as the application of these to teaching and learning, a balanced approach is needed. In some circumstances this capability may be enhanced through application in other subjects. But more normally, the objectives of the host subject are paramount, with pupils applying their existing ICT skills in unfamiliar contexts. A good example was in a **geography** lesson where pupils used their skills with digital imaging software to 'clean up' digital photographs for a brochure to encourage tourists to venture into their local area.

132. For this balanced approach to work well, teachers need a good knowledge of the pupils' ICT capability. Too often this is lacking, and as a consequence pupils repeat activities such as internet research and the use of multimedia presentations from year to year but without any noticeable increase in challenge or complexity and without utilising the learning that has taken place in ICT lessons.
133. A particular strength of ICT lies in its potential to support continued improvement as pupils develop and refine their products. With ICT products, pupils can focus on issues of quality and there is scope for discussion about the criteria to be used in making improvements. This is a central and unifying feature of the discrete ICT curriculum, but it also has obvious advantages to a wide range of work in other subjects. Where pupils are able to demonstrate and discuss their improvements through successive saved versions of their work, this benefits both ICT and the host subject. In one **art** department, for example, pupils kept electronic files which showed how a piece of work had developed over time. This, when used in conjunction with other evidence such as sketchbooks, provided insights into pupils' decision-making processes and progress:

In a tutorial with her teacher, a Year 11 student, with reference to images in a zip file, described the choices she had made when developing a digitally produced design for a book cover based on Bauhaus principles. As well as the digital evidence, she also referred occasionally to her sketchbooks.

134. Sometimes effective uses of ICT occur within familiar contexts but the results are outstanding because of the impact of the teaching on the quality of the pupils' work. This involves teachers' knowledge of both the subject and the software being used and the right balance of work at and away from computers. In the following Year 10 mixed ability **media studies** class, the teacher used desktop publishing to elicit very high quality products from the pupils, matching standards found outside school. Pupils had analysed the content and format of a range of magazines aimed at young people and were now working on an A3 spread for their own magazine.

By the end of the lesson, pupils showed that they could: set up an A3 page; insert photos into text boxes and crop, where necessary; present a picture underneath the text as watermark; amend pictures through fading one side of the picture; scan photos into their file; insert bubbles into pictures; and add distorting effects to their design, where appropriate. What distinguished this lesson from many others were: a high level of teacher knowledge; time (in a two-hour lesson) for pupils to think about and improve their work; an effective balance in the lesson between work using the computer and whole-class discussion away from the machines; and good use of the technology for specific subject aims.

135. Broadband has enabled more powerful applications to be used, including animated graphics and video materials. In a Year 9 **history** lesson exploring Victorian housing conditions, the teacher used an interactive whiteboard and projector to demonstrate the link between census and pictorial evidence. The broadband connection enabled fast access to the resources and seamless movement between them which kept the lesson moving forward, captured the attention of the pupils.

The teacher recapped on previous learning, then used a data projector linked to census resources on the web to explore ways in which Victorians lived. He linked to a census map of the Borough and then identified three areas for comparison; these were also shown on a modern day map of the area making good use of locations well known to the pupils. Good use of the zoom facility meant that each area could be highlighted in detail and then pictures of houses in one street shown. These were then linked to the relevant census returns which were used as a focus for discussion. The use of ICT focused attention very clearly on the concepts being developed and the availability of digital images helped students to link the census information to the houses themselves (size, condition, construction). The teacher had also made the link to a modern estate agent's information on one of the houses to show how much it would cost today.

Pupils recorded some of the key information as they went along on a prepared matrix. They responded very positively and were very keen to answer questions which challenged their thinking. They made their own hypotheses from the pictures (for example, one side of the street was wealthier as it had trees). ICT was used very effectively to make the links between the census information and the pictures and this kept the pace of the discussion high.

136. Teachers' use of ICT to improve their own presentation and exposition has grown rapidly and there are effective examples in every subject of the use of data projectors with or without interactive whiteboards. In the best examples this was very effective in involving pupils and developing their understanding, as in this **history** lesson with a Year 9 top set:

A very well planned lesson involved pupils in work on aspects of trench warfare. The lesson began with pupils using an interactive whiteboard to contribute to a sorting task, matching definitions with words associated with trench warfare. The task was slower than other methods, but had good gains in acquisition of knowledge. This was followed with a video clip of a night patrol and the accompanying worksheets. Use of the whiteboard enabled the teacher to make the explanation of task and consolidation explicit. The clarity of signposting of tasks was excellent. Key strengths of this lesson were: pupils' use of the interactive features of the whiteboard; the teacher's ability to pull up files swiftly, allowing clarity of signposting of tasks so pupils all knew what they were doing and to draw upon previous work/learning; and the quality of video presentation, which used a digital projector with broadband connection.

137. The flexibility and visual power of the interactive whiteboard can often engage lower-attaining pupils and encourage better concentration. In a very low ability **MFL** set, the teacher used the interactive whiteboard to consolidate pupils' knowledge of how to talk and write about their hobbies. Classroom assistants supported the two pupils with statements:

The lesson began with a revision of pupils' oral knowledge of hobbies (for example, je regarde/je joue au/je fais du) using projected images and symbols as cues. Pupils responded eagerly to each new picture. When they had responded, the teacher dropped in the text which they read aloud in chorus, and individually. The teacher paid very good attention to accents and pronunciation, which accounted for these pupils' unusually good pronunciation at such an early stage. The electronic presentation enabled the teacher to move swiftly and smoothly from image to image, back and forth as needed, moving the lesson on at a good pace. The pupils concentrated intently and were clearly motivated by the professional and colourful images and text.

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Using the interactive whiteboard in French

138. The presence of an interactive whiteboard, however, does not ensure good teaching. There are dangers that activity at the whiteboard may eclipse the pupils' own use of ICT to develop their learning and that the presence of this expensive equipment distorts the balance of lessons.

139. For all of these good examples of using ICT, counter-examples can still be found where it was used poorly or where things just went wrong. Poor use includes low-level activities such as copying up, word-processing corrected text from exercise books, interrogating websites that have not been thoroughly checked by teachers before use, and wasting time on font, style or importing pictures to the detriment of the subject learning. Things go wrong where they have not been tried in advance, through logistical problems, or where the pedagogy has not been adjusted to suit the ICT accommodation and activities. Sometimes the teacher is insufficiently knowledgeable about the software and is unable to give the right level of support to the pupils.
140. When ICT fails to add value to teaching and learning in other subjects, it is often because the planning has been driven by the technology and not the subject-matter itself. Unless teachers can readily identify why they or their pupils are using a particular application in a specific learning context, the outcomes are unlikely to be improved. In some lessons, the use of ICT can be counter-productive, as when web resources are used for no obvious purpose, when paper-based information would have been more useful and flexible.
141. In only a few schools is there an understanding of the need to develop pupils' higher order skills of retrieval, synthesis and communication in order to exploit the resource more fully. Few schools, for example, have an information policy encompassing sensible and appropriate use of various information sources, awareness of the provenance of sources used, teaching note-making skills, the avoidance of wholesale copying and pasting and the implications of web sources for assessing pupils' work.
142. The work being developed as part of the ICT strand of the Key Stage 3 Strategy has not yet been widely applied beyond the subject ICT itself and one of the barriers to improving achievements in subjects is teachers' lack of awareness of what pupils can do. The Strategy is now developing materials that will link ICT capability more effectively across subjects. In D&T, for example, questionnaires are often devised and analysed using ICT but, especially at Key Stage 4, they are often trivial and seemingly carried out merely to meet coursework assessment requirements. There are specific sample teaching units in ICT that address questionnaire design and this could lead to more profitable joined-up learning across the curriculum. Similarly, the Strategy's challenging materials for modelling with spreadsheets have the capacity to take pupils into more sophisticated work in subjects such as science, geography and mathematics.

Annex A – School case studies

The case studies for Cramlington Community High School, Egguckland Community College and Lent Rise Primary School are summaries of fuller 'ICT School Portraits', completed as part of a European project under the auspices of the Standing International Conference of Central and General Inspectorates of Education.

The full versions can be found at <http://schoolportraits.eun.org>

Cramlington Community High School is a community school and specialist science college, mainly serving a small town in Northumberland, with 1,600 students aged 13–18 years.

Rather than use ICT to drive transformation in a teacher-centred approach, the school has tried to create more student-centred classrooms in which ICT can play an effective part in what students do. ICT has therefore been used to underpin the school's well-developed approach to teaching and participative learning. Although the main thrust has thus been ICT as a cross-curricular skill, the vocational GNVQ courses in ICT have been popular options.

The school has a network of 700 computers, supported by a team of two full-time technicians. There is access to the internet from all classrooms via a broadband (10Mb) link. Laptops for staff are funded either by the government's Laptops for Teachers scheme or by the school itself. Recent developments have included the purchase of ten interactive whiteboards.

The school takes great pride in the quality of its teaching and has rigorously researched the best methods and approaches worldwide. It analyses students' learning styles and actively teaches them thinking skills. ICT is a key part of this teaching and learning strategy and permeates almost every lesson, sometimes supporting the learning and at other times enhancing it. ICT use is in harmony with a wide range of other approaches.

The school makes very good use of its own website and intranet. These systems are managed by a team of web developers and technicians employed by the school. The intranet is well developed and well used across the school. All teachers produce lesson plans to an agreed format which are then attractively presented, illustrated with suitable graphics, and which include links to other web-based resources. These are uploaded onto the intranet for all students and staff. The system now enables access for staff and students from outside school. Students without internet access at home can access the system through the resources in the library and Learning Resources Centre (LRC).

Materials created by teachers and students in class are also used for subsequent assignments during private study periods. Sixth form students have 20% of their curriculum devoted to structured private study. Their work is emailed to teachers

after the private study periods and promptly marked. Students are expected to take responsibility for their own learning lower down the school as well, and this is made possible mainly because of the availability of ICT and information sources in many areas of the school. The LRC is very popular with students at all times of the day.

To underpin the development of independent learning, Year 9 students spend over one tenth of their time in a 'Learning-to-Learn' course. This aims to help them identify their own orientations and capacities for learning. It also helps them to make best use of ICT in their learning as they move through the school, preparing them for investigative, creative and analytical tasks that they encounter in most of the rest of their school subjects. These lessons take place in the 'Discovery Zone', adapted from an existing building and designed specifically to stimulate and enhance different styles of teaching and learning. Large spacious rooms house well-designed furniture to enable students to use computers individually or to take part in group work around a table, with or without a single computer. As in other classrooms there is an interactive whiteboard which can be used by teachers or students.

The ethos of the school requires teachers to exploit the potential of ICT; they are supported in doing this through expert technical support and pedagogic advice and this enables them to innovate and push forward the boundaries of their work. Staff have adopted new approaches over a period of time and school training days have supported them in seeing how their work could be supported and extended by the use of ICT. Coaching of staff in the classroom is available from a specified teaching and learning coach who works alongside teachers. There is a strong ethos among the staff of reflection on practice, review, sharing and evaluation, including observing each other's practice in order to improve their work.

ICT is contributing to a culture of success and helps to improve the personal productivity of staff in a number of ways. Firstly it focuses their planning onto a wider range of resources designed to enhance learning; secondly it raises important questions about how the students learn; and finally it enables teachers to collaborate by sharing resources and ideas. The school has successfully combined a number of concurrent developments. In particular it has ensured that ICT is fully integrated within a broader process of developing pedagogy. The high-quality strategic leadership, curriculum planning, technical support and professional development have all contributed to the school's distinctive progress. Strong leadership is the single most significant factor in ensuring that all of these characteristics came together in a coherent way through the vision and single-mindedness of the senior management team and in particular the headteacher.

Eggbuckland Community College is an 11–18 comprehensive school catering for 1,500 students in a suburban area of Plymouth. The college has Technology College status.

The distinctive progress made at Eggbuckland is connected with a clearly articulated philosophy of learning, with ICT serving this deeper purpose. The vision for the college notably includes reference to young people managing their own learning and their own lives. The importance of students developing the skills of presentation and teaching, collaboration in groups, teamwork, communications and understanding how they learn and adapt effectively is implicit in the college's approach.

The college now enjoys the services of three full-time ICT technicians, all of whom are line managed by the vice principal. There is a student–computer ratio of 3.5:1 and many of the machines available to students are laptops. Most staff have a college laptop. In some groups the students have their own laptop on a lease scheme and some of the funding for this has been enabled through sponsorship from parents to support the Eggbuckland e-Learning Foundation.

The laptop initiative has mainly affected five classes. Students in these classes have their own laptop with them all the time and are taught most of their lessons in rooms which have wireless communications with the college network. When these students join those from other classes to study art, music and design and technology, their greater technical expertise with ICT is drawn on by teachers and other students. Teachers who teach these classes meet regularly to ensure that teaching styles reflect the new opportunities that can be offered to the students.

The use of ICT by laptop classes has challenged teachers' conventional approaches to teaching and learning. The development of peer tutoring, where students work in groups to plan research, and then teach specific parts of the curriculum has helped both students and teachers to understand the teaching and learning process. One teacher encouraged his students to evaluate, improve and return his own lesson presentations as homework. A similar attitude can be seen in teachers' willingness to embrace the potential of the interactive whiteboards, and display technologies that are increasingly available around the college.

Students from these laptop classes also participate in projects designed to support learning outside college, for instance in local primary schools. Some students have presented aspects of science to pupils in primary schools, and subsequently marked follow-up work emailed to them by the primary pupils. The students were prepared for this in advance by staff and the experience taught them a great deal about the need for planning, preparation, regard for an audience and sensitivity in marking.

An outstanding feature of the college, also part of the broader student leadership agenda, has arisen from widening the availability of ICT resources. The supervision of computer rooms and their environment during break times is managed by

students appointed as 'Access Managers', drawn from Years 8 to 11. They are treated by teaching staff and students as adult ancillary staff. They have devised their own hierarchy of operational grades and an impressive and highly transparent system for promoting their members on merit to higher grades as necessary. Access Managers undertake their own members' induction and training, manage their own appointments or promotions and feel that they are real stakeholders in the college. They expect to be consulted by senior management and the executive committee invites the vice-principal to join its meetings when necessary. Similar schemes include Year 10 students researching and planning the extension of ICT resources for laptop classes.

The college's approach to the management of change was to offer flexibility within a supportive ethos in which staff could choose to join specified projects, such as the use of interactive whiteboards, or working with the students providing ICT training for staff and pupils in primary schools. Being associated with an approved project enabled a teacher or a department to receive additional resources and have timetabled opportunities for meeting others involved in the project. Teachers are encouraged to share their experiences and reflect on progress with colleagues.

The drive from senior management has been the single most influential factor in the college's recent developments. The culture of professional support and challenge has meant that staff can try out new ideas in a supportive climate and share ideas and issues as well as reflect on successes and failures with like-minded professionals.

Lent Rise County Combined School serves an area of some disadvantage in outer London. There are 420 pupils on roll and about a third of these have special educational needs.

The strategic vision for ICT at Lent Rise is to harness its power to motivate teachers and learners, increase access to learning and improve standards. The aim is to use ICT to promote social inclusion and create online learning communities within the school and through extended networks both nationally and internationally. The school seeks to use ICT to empower its pupils to become independent and collaborative learners and to ignite excitement in learning. The development of ICT provision has been part of a broader set of developments that have seen the school make much progress in terms of pupils' achievements and the quality of teaching and learning. Standards in the school are high and the progress the pupils make during their time at the school is significant.

Learning environments are ICT-rich. Interactive whiteboards are used in almost all lessons. Pupils are used to taking part in lessons through manipulating text and images on the whiteboard. Pupils also access ICT resources readily in the ICT suite and cyber café, in their classrooms through the wireless networked laptops and

through videoconferencing resources. Pupils use a range of resources to develop not only their speaking, listening and presentation skills, but also their imaginative thinking and literacy. From the age of four, children in the Early Years Department use the ICT suite with ten PCs, a printer, an interactive whiteboard, a digital camera and Lenni, the Lent Rise robot, who is heavily featured on the Early Years website, encouraging children's imagination linked to ICT. Videoconferencing enhances the taught curriculum by providing access to people, places and information in an interactive form.

Pupils have one lesson per week of timetabled discrete ICT lessons. This means that pupils can use ICT tools such as word processors and presentation software confidently for their own purposes, but high-quality planning also ensures that they have additional opportunities to complement this work in lessons in other subjects. Pupils develop their skills, knowledge and understanding in the use of ICT to: solve problems, find information, develop their ideas through text, graphics and video, work through a range of media, write procedures to control external robots or images on the screen, and model real situations.

Pupils are encouraged to take responsibility for developments in the school. There is a school council which meets monthly and which is given a sum of money to spend on developing the school environment. This approach is important in developing an ethos in which pupils recognise that they have a share in the development of the school and in their own learning.

The school is committed to professional development and each member of staff is given half a day per term to research materials on the web with a specific subject focus. The fruits of these labours are then shared with all other staff in the same year group. Staff ICT training takes place frequently so that staff can keep up to date with software and hardware developments. All teaching staff have a laptop on which they can prepare their lessons as well as access an interactive whiteboard. Time in staff meetings is devoted to ICT developments. As part of this, teachers demonstrate in their own classrooms the ways in which they have used ICT in their teaching. This sharing and collaborative approach is significant and has been a key means of establishing a consistent approach across the staff.

The headteacher is the mainspring of ICT developments in the school, which have accelerated rapidly in recent years. She has pursued links with commercial organisations so that the school has gained full benefit in developing its resources, such as network and videoconferencing facilities. The ICT management team ensures that the co-ordination is shared between staff and does not fall to one teacher; it also means that ICT is firmly rooted in the role of the senior management team.

The school has recognised the need for and subsequently the benefits of having two part-time technicians, one via the LEA and one from a major commercial supplier. This ensures that staff are able to concentrate on teaching rather than technical matters.

The school uses its websites to present its work to a wider audience and ICT is also reflected strongly in the high-quality display throughout the school. Parents are encouraged to work with their children after school in the cyber café.

A number of factors make Lent Rise unusual: the clarity of vision, determination and tenacity of the headteacher, combined with the sheer hard work and commitment of her staff. This has ensured that the common obstacles of lack of resources and staff competence have been systematically broken down with notable success. Staff respond well to the head's challenge and are effectively supported. They are willing to take risks and to try out new ideas and see this as a hallmark of their professionalism.

Robin Hood Primary School in Birmingham has 400 pupils on roll and these are drawn from a wide range of backgrounds.

Although the pupil–computer ratio is only just above national average, there is a good range of additional resources, including digital video and still cameras and videoconferencing. The school has the services of an ICT technician for three days per week and he has a good understanding of the school's aims for ICT.

Curricular provision for ICT is outstanding and pupils reach very high standards of ICT capability in both key stages while ICT is well integrated into the Foundation stage. The application of ICT across subjects is very well developed. The school has developed a visual literacy curriculum and work in this area is particularly impressive.

Pupils use ICT for animation and digital video production from Key Stage 1. They are taught from the Foundation Stage to be visually discriminating. Reception pupils are encouraged to read and interpret film. They watch films, concentrating on expressions and gestures to explain what is happening and understand subtle changes in the mood of the animation and explore the use of music and read the film according to its pitch, volume and tempo. They make animated sequences with a webcam, using model figures, based on their own stories and using their own backdrops. Older pupils learn to read visual information from still and moving images and apply this in their own film making which reaches sophisticated levels, addressing, for example, stereotypical images and the use of music to create mood.

There is an emphasis on pupils' presenting their own work and they use a small 'cinema' for this purpose where they can use an interactive whiteboard to demonstrate their work. Pupils are encouraged to think critically about their use of software; they share advantages and disadvantages of ICT use during plenaries. For example, a Year 6 pupil working on an animation sequence on an underwater theme produced an eloquent, smoothly animated sequence involving a group of fish swimming across the screen and based on observations of groups of small fish

swimming as one while snorkelling on holiday. She demonstrated how the software could help to suggest the darting movement of the shoals of fish she had observed.

ICT work in the school is distinctive for its application across a wide range of subjects and contexts and for teachers' very high expectations of what the pupils can achieve. Pupils quickly develop very high levels of independence, perseverance and confidence in their work with ICT, for example working with little adult supervision in ICT areas. They provide high level of peer support for each other and collaborate very effectively.

Staff display high levels of confidence in the way they apply ICT to teaching and learning. Their interaction with pupils is quiet, informative, supporting and encouraging. They make very good use of questioning to extend learning. All have a laptop for lesson preparation and familiarisation with software. All new staff are mentored so that the school's distinctive and well-developed approach to ICT is shared. New staff are not expected to have a high level of ICT experience, but they are expected to work hard at developing their use of ICT with pupils and to be prepared to learn from the pupils.

Good examples of work in art include Year 1 work on a Muslim festival and Year 3 work on the rainforest where ICT is used well as a visual resource to stimulate the pupils' own art work based on Rousseau. Year 6 pupils develop a spreadsheet model to cost and manage an imaginary business where they sell cardboard boxes for Christmas presents made from 'nets'. Some take this to high levels of ICT capability, for example incorporating customer ordering into a well-designed web page.

Year 5 pupils are involved in all stages of film making, from discussing initial ideas and planning out scenes using a storyboard, through the filming process (in which group members have clearly defined roles) and onto editing, including the addition of music and special visual effects. They then show this to other pupils and teachers in the cinema and talk about what they were trying to achieve.

The main contributory factors to this school's success over a number of years have been: the strength of leadership of the headteacher and deputy, shown particularly in their vision and tenacity; a collaborative climate in which staff share ideas, experiences and materials; and a critical approach to using ICT by all staff that ensures that pupils' learning experiences are consistent with the school's philosophy and aims.

Dene Magna School is a rural 11–18 comprehensive in Gloucestershire with 750 students; the school has Technology College status. The school has a strong commitment to the cross-curricular use of ICT and this is much more widespread than is usually found.

The school is well resourced for ICT and the strategic deployment of resources has been well thought out to match the school's intentions. As well as the networked

computers, there are two sets of wireless laptops linked to a separate network. 80% of classrooms have interactive whiteboards, some of these being via conversion kits. The school has a 10Mb broadband connection and this is used across departments. There is effective technician support from three staff. The service they provide is very responsive and a significant contributory factor in the school's success. There are two main computer rooms, one of which is large and flexible, and resources around departments are plentiful and often housed in good accommodation, for example in the new performing arts block, where music has an adjacent studio and room with 10 computers; and in D&T which houses some of its computers in an area that is easily accessible from the adjacent specialist rooms.

The in-house ICT support provided for both teaching and non-teaching staff is very effective and has been a key factor in moving the school forward. All staff are provided with a laptop and most departments make frequent use of ICT. The use of interactive whiteboards has had a particularly positive impact on exposition and demonstration as well as on students' motivation and concentration.

The school training plan identifies ICT as a major issue alongside the 'reflective practitioner' strand. Forward planning and pro-activity are seen as important and induction of new staff includes ICT support within departments where necessary (including TAs). ICT is also reflected in NQT action plans – through observing and using ICT and identifying and meeting training needs.

There is an emphasis on self-review and peer observation, with 1,000 of these having taken place in the past two years. Staff, including TAs, work in groups of three for this purpose, with the observer always seen as the learner; observations have a clear and specific focus. There is a teaching and learning coach who runs a coaching programme. A further fifteen members of staff have been trained as coaches and the aim is for all to be trained in specific areas where they feel they have strengths to offer, for example in questioning or formative assessment. Dissemination takes place through 'toolbox' forums held twice per term. In addition the ICT co-ordinator has made specific inputs on school INSET days. Coaching, combined with peer observations is a very effective force in developing the use of ICT as an integral part of students' work in subjects.

Evaluation is taken seriously – with every member of staff involved in the peer training programme interviewed or asked to complete a questionnaire. There are also focused evaluations when significant training has taken place – for example on interactive whiteboards.

Students have wide experiences of using ICT across most subjects and applications. They are motivated and engaged in their learning by the use of ICT and behave well in lessons. Their involvement in school evaluation and developments, including staff appointments, brings them a strong sense of identity and ownership. Staff development has been planned to give English staff confidence to teach those ICT objectives, and strands of ICT capability which have been delegated to the

department. ICT is used to aid whole-class presentation by students. In particular, work on shared texts, with the highlighting of stylistic effects, as advocated by the Key Stage 3 English strategy, is enhanced in this way.

Students' achievements in mathematics are very good. The quality of teaching is strong and teachers have high expectations of students. Students' motivation and attitudes to learning are very positive, resulting in students' high levels of self-belief. There is very good access to ICT resources in mathematics and this enhances students' learning and attainment. The department is particularly effective in meeting its responsibility to develop all students' ICT capability in relation to ICT modelling skills. The use of well-prepared multimedia presentations, containing the lesson objectives, main teaching points and problems for students to solve, enables the lessons to progress with very good pace and challenge. In some lessons, the interactive whiteboard and associated remote voting devices were used very effectively to check the group's understanding, enabling the teacher to correct misconceptions before they became problematic.

Annex B – LEA case studies

Bolton LEA

The effectiveness of the ICT support team depends on the high level of expertise in the team and their approach to working with children and teachers. There is a critical mass of expert ICT advisory officers offering direct support and consultancy to all key stages. The support team was initially established using Standards Fund Grant 1, however, since then it has been substantially augmented to enhance its provision to schools and the wider community through other income-generating activities, including a commercial agreement with Bolton EAZ. Additional staffing was secured in preparation for the delivery of NOF-funded training, whereby the team became the local accredited provider. The team makes clear contributions to the council's aims to raise standards in schools, contributing positively and directly to the LEA's Education Development Plan.

In 2002 the team introduced the 'emark' programme focused on 'ensuring excellence in ICT'. This provides a baseline against which schools can evaluate themselves across a number of fronts enabling more active engagement in driving forward their progress in ICT. A particular strength of the emark is its positive contribution to ICT development planning. ICT advisers actively use the emark with schools to identify their current position and to inform the steps they need to take to move forward. Related activities include LEA-wide approaches to assessment and developing the use of ICT in teaching and learning.

Areas of excellence in the provision are:

- the overall design and ethos of the support provided
- the very high-quality in-service training sessions provided
- the cordial, trusting professional links of the ICT Team with primary schools
- the impact of its courses and materials on writing and monitoring school ICT Development Plans
- the imaginative development of learning communities for the study of literature through email.

Some training is inspirational, for example where teachers have to work with children as part of courses. The ICT Team and the ICT Unit jointly ran courses for headteachers and ICT co-ordinators on ICT school development planning. This unified approach to planning was welcomed by headteachers, largely due to the clarity and coherence of the message being communicated.

Technical support was provided by the Schools ICT Unit. This was well rated by schools; it was seen as distinct from the professional support provided by the ICT Team, but as complementary to it. Strong features identified by the schools included:

- meeting schools' educational requirements in terms of specifications of NGfL infrastructure
- support for administrative applications
- competitive approach to procurement and maintenance costs when faced with keen competition from other suppliers
- effective technician support from centre-based staff.

The ICT Team has made impressive attempts to work with the community in ICT through initiating ICT awareness and skills courses for parents and others. The industry linked Key stage 4 courses for gifted and talented pupils, delivered after school hours, were very appealing and well delivered.

Surrey LEA

The ICT strategy was well conceived, providing a clear vision. There was an effective partnership with schools and good consultation to reach a consensus. This has been important, for example, in gaining the agreement of schools to retain Grant 31a Standards Funding to run centrally managed Laptops for Teachers and Hands on Support programmes on their behalf. The place of ICT in the Education Development Plan was well thought-out and clear.

The LEA's support service has been fully traded since 1993, with subscription buy-back services for administration and technical support. A pay-as-you-go scheme operated for curriculum support, except where funded from Education Development Plan priorities or government initiatives. The LEA had successfully brought together different aspects of ICT support under the overall management of a self-funding agency, leading to greater coherence. Special and primary schools were particularly grateful for the coherence between support for curriculum and administration.

There were strong, credible and knowledgeable support teams for primary and Key Stage 3. Visits to schools by advisers and consultants were well targeted. Lesson observations were helpfully shared with the staff, providing clear evaluations and points for action. This had been particularly significant in helping schools to move forward from positions of weakness highlighted in Ofsted reports.

Support for assessment in primary schools resulted in much greater awareness of the need for consistency of judgement and the importance of moderation and

shared understanding. Schools were highly appreciative of the support offered and were taking this forward well.

A broad range of training courses was offered covering all phases, including both centre-based courses and those delivered in schools, tailored to their specific needs. Newer technologies were addressed through courses on website design, and on using interactive whiteboards, GIS and digital video.

There was very effective support for ICT co-ordinators and subject leaders through information, the raising of horizons, exposure to national issues and networking. Headteachers were also well supported and especially appreciated joint courses for governors, headteachers and ICT co-ordinators and courses for link ICT governors. The LEA was supporting the NCSL/Becta Strategic Leadership in ICT courses for senior staff in schools.

Good support was also noted for:

- the National Curriculum in ICT in Key Stages 1–3
- school technicians and classroom assistants – both in advising on local technical support solutions and in training classroom assistants to provide effective ICT support in school
- ICT in administration, where courses are timely and well delivered, especially for special and primary schools
- electronic data transfer.

The flexible approach to procurement had worked well. Schools received sound advice and this had generally led to systems that were effective. This had in turn boosted the confidence of schools in their own procurement. Staff found the ICT resources more reliable and this improved their confidence to embed ICT use in their teaching.

Bracknell Forest LEA

LEA officers were trusted by their schools. This was based on the knowledge that they were available to staff, sometimes at quite short notice, that they were supportive and responsive to their needs, and above all, that they were usually successful in resolving problems. Headteachers respected LEA decisions and co-operated in working groups; in particular, a cross-phase ICT Advisory Group had substantial headteacher membership.

There was an impressive and robust ICT strategy which had the support of schools. This linked well with the EDP2, and had activity lines which clarified what needed to be done and for whom. The strategy reflected real beliefs, enthusiasms

and leadership from top management. A most valuable section of the strategy was the 'The Approach' which set out the unique features of the developments in this borough.

Schools were fully consulted, and the strategy moved people forward together. There had, for example, been a clear and comprehensible rationale for the selection for schools for networks, ISDN and broadband. Local trials were undertaken prior to recommending resources such as laptops assessment software.

The LEA was clearly committed to, and good at, building a community of practitioners. Officers continually sought approaches that would work for a small LEA. Effective support and training included:

- links between ICT and literacy and numeracy
- reinforcing the networking of ICT co-ordinators, and the creation of new three-day course for them to address the moderation of assessment in ICT
- training in ICT for classroom assistants.

Overwhelmingly, the emphasis in the LEA is pupils' ability to use ICT well in their studies, and for teachers to be confident users in teaching. NOF-funded training in primary schools was undertaken mostly by the schools themselves. Where they needed it, schools could obtain help from a small team of school-based teacher advisers, an appropriate solution for a small LEA. The training officer (curriculum) followed up completion of training by the main provider by perusing teachers' portfolios.

A regular programme of meetings for ICT co-ordinators was well established and highly valued. In addition, a three-day course on managing ICT provision was offered, including a pupil assessment element. Co-ordinators felt that the development of ICT in the LEA was a two-way process; they had their say and were regularly informed of developments. This, together with the unified approach to resources, helped considerably in the management of change in their institution.

Other strengths included:

- appropriate procurement – with a clear impact on schools
- ICT support for schools sufficient to underpin implementation – which schools could choose to further enhance
- flexible ICT support to take into account of any changes in funding arrangements
- clearly identified technical support for schools.

Annex C – Glossary

Bandwidth provides a measure of the volume of data that can be transmitted through a cable in a given time and is measured in Megabits (Mb) per second. A full page of English text is about 16,000 bits, while full-motion, full-screen video would require about 10 Mb in one second, depending on how it is transmitted.

Broadband refers to higher rates – in the terms of this report – 2 Mb per second upwards.

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

E-mail: electronic mail; the sending and receiving of messages using the internet. Users who subscribe 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.

Interactive whiteboard: A whiteboard onto which computer images are projected and which responds to touch with hand or special ‘pen’ in a way that is similar to using a mouse with an ordinary computer screen.

Internet: The worldwide ‘network of networks’ connected by telephone communication systems. The internet enables the transfer of information such as text, pictures, databases, websites and email, and provides other services such as news and information.

Intranet: A restricted network that uses the style and search facilities of the internet on information held locally within an organisation’s own network. An intranet usually has a facility to connect to the wider internet.

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).

Portal: A website that acts as a point of entry for users visiting the web. These often include links to other sites on a specific theme and a search engine and may also offer email and other services.

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

Virtual Learning Environment (VLE): A VLE is an ‘electronic space’ on the web where learners and tutors participate in ‘online’ interactions of various kinds, including online learning. VLEs can bring together student assessment and promote access to relevant learning resources.

