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learning

Harnessing Technology Review 2008: The role of technology and its impact on education

Full report

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Executive summary

Key messages

The use of learning platforms, and their integration with management information systems, has increased during the last year. However, this use is still at an early stage of development in schools and most schools' infrastructure does not support mobile and remote access to the network. The development and wider adoption of these technologies is a significant factor in achieving further progress, and represents a sound basis for the development of practice with technology more generally.

Achieving fair access to technology for parents, young people and adult learners is likely to be a continuing challenge. Those school-aged learners who lack computer access at home are likely to belong to groups that are considered 'hard to reach'. In further education (FE), older learners are less likely to have access. As a result, those returning to study or training over the age of 45 are likely to have limited skills in using technology to support their learning.

Online reporting to parents is helping to develop better relationships between schools and parents. Although tools and systems are available to enable this, adoption is relatively low. Communicating with parents is also relatively low among headteachers' priorities, adding to the challenge of making progress in this area.

There are signs that the breadth of ICT practice among teachers and FE practitioners is expanding. More practitioners reported that they used technology to support learners in being creative and working together. However, a high percentage of practitioners reported they rarely or never did this. There was a lack of awareness of the benefits of different practice for learning, a lack of practical pedagogical skills, and possibly a lack of time and incentives to develop practice.

There are also issues for schools and colleges around access to digital learning resources, and to high-quality resources in particular. This suggests that many learners and practitioners are receiving a technology service that is still lacking in reliability and professionalism. This is particularly the case in primary schools, where lack of on-site technical capacity is likely to prove a barrier to school-led progress.

1. Technology-confident, effective providers

Over the last few years providers in all sectors have made steady progress in developing their ability to make strategic and effective use of technology to improve outcomes for learners. Primary schools in particular have made good recent progress in developing this e-maturity and have to a large extent caught up with secondary schools. Some 28 per cent of primary schools are categorised as e-enabled, compared to 25 per cent of secondary schools. In the FE and Skills sector, around 25 per cent of FE colleges are now e-enabled, and work-based learning providers have similar scores.

However, a considerable proportion of providers still do not score well against e-maturity criteria. In the primary sector in particular there is a long tail of less e-mature schools, with 13 per cent of primary schools achieving lower scores, compared to 8 per cent of secondary schools. There is also a stubborn core of late adopters in the FE and Skills sectors, with around 19 per cent of colleges and 25 per cent of work-based learning providers in this category. In FE colleges, progress may also have arrived at a plateau (Becta, 2008b). This is of particular concern for two reasons. Firstly, the e-maturity of a provider influences learners' capability to use technology effectively and safely. Secondly, it reflects the capacity of providers to deliver flexible and extended learning opportunities.

Online reporting to parents by schools is at an early stage. However, around 80 per cent of both primary and secondary schools are now using their websites to provide resources for parents – almost double the figures reported in 2007. This indicates a degree of readiness for greater use of online tools. In spite of this, using their website for direct communication to parents remained at very low levels, with only 4 per cent of primary and 3 per cent of secondary schools doing so (Smith *et al.*, 2008).

There has been considerable progress in teachers' use of technology-based tools to support effective learning and teaching. Technology was widely used for whole-class work in both schools and FE. Research and information gathering were the most common learner-focused uses of technology. However, around two thirds of primary teachers and half of secondary teachers also made some use of technology to support learners in being creative and solving problems. The use of technology to support learners working with others was at a lower level, with around one third of teachers doing this. Only a small number of FE practitioners reported that technology is widely used by learners to support information analysis (18%), to solve problems (9%) or to work with others (8%) (LSN, 2008). However, these uses are increasing.

There appears to be a sizeable minority of practitioners in schools and colleges who do not fully engage with ICT and digital resources. It is likely that there is a polarisation in this respect, with a large minority of FE practitioners routinely using specialised digital resources in lesson planning (around one third) and a similar proportion rarely or never using these resources. Analysis suggests that part-time staff are more likely to be in the latter category.

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2. Engaged and empowered learners

For school-aged learners, not having access to the internet at home is strongly related to social class. While 97 per cent of children from social class AB have internet access at home, only 69 per cent of children from social class E have this. Other relatively disadvantaged groups include those whose main language is not English (77 per cent have access) and children in lone parent households (Peters *et al.*, 2007).There is also likely to be some overlap between these groups.

In addition, young people's computer and internet access is often shared, so there may be limited individual use by children with several siblings (Crook and Harrison, 2008). In further education, levels of home access tend to decrease with age, with those aged 45 and older being most disadvantaged (GfK NOP, 2007b). The other socioeconomic influences on access found among school-aged learners are also likely to apply to FE learners.

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3. Confident system leadership and innovation

Headteachers' highest priority for using technology over the next three years is most likely to be for recording learner progress. Some 68 per cent of primary heads and 74 per cent of secondary heads report that this is their main priority. Promoting independent learning was the second most frequently reported priority, for 57 per cent of primary and 71 per cent of secondary heads (Smith *et al.*, 2008).

Using technology to improve communication with parents or to provide family support are relatively low priorities for headteachers. A possible reason for this is that, regardless of the role of technology, parental engagement and extended schools tend to be unpopular initiatives with heads (EdComs, 2008). However, personalised learning is an area that both primary and secondary heads report they are working on, and this is a key priority for 49 per cent of primary and 66 per cent of secondary heads over the next few years.

There are encouraging signs that teachers in schools are increasingly sharing ICT-based teaching resources with each other. Some 41 per cent of both secondary and primary teachers report that they used resources developed by other teachers in their school at least once every 2–3 weeks. Levels of sharing within schools still far outweigh those between schools. (Smith *et al.*, 2008)

This picture of practice sharing and innovation is also reflected in FE colleges. Some 33 per cent of colleges promote resource sharing and collaboration within the college to a large extent. However, only 3 per cent do this for collaboration with other providers (LSN, 2008).

4. Enabling infrastructure and processes

There has been good progress in implementing a more integrated technology infrastructure for education and skills. For example, school learning platforms are used more frequently by teachers to access pupil information, with 22 per cent of primary teachers and 44 per cent of secondary teachers doing this 'sometimes' (Smith *et al.*, 2008). This compares with 8 per cent of primary and 15 per cent of secondary schools reporting this capability in the previous year.

At a local level some progress has been made in integrating data systems relating to children and young people. The proportion of local authorities operating a single management information system (MIS) for schools increased from 28 per cent in 2007 to 40 per cent in 2008. There has also been a decrease in the proportion of authorities using more than one MIS – falling from 62 per cent to 51 per cent in the same period. However, 9 per cent of local authorities did not have their MIS integrated with the systems in their schools (Hewton and Mortimer, 2008).

Some 46 per cent of FE colleges have a MIS which is linked to the college's learning platform. Though many colleges did not benefit from the advantages of such a link, progress in this area has been good. In the previous year just 33 per cent of colleges reported that their learning platform was linked with the college MIS (LSN, 2008).

Teachers are using digital resources in their teaching more often and appear reasonably satisfied with their fitness for purpose. Some 85 per cent of primary teachers and 73 per cent of secondary teachers rate curriculum software as quite good or very good (Smith *et al.*, 2008). However, while more curriculum resources have become available in recent years, fewer products are shortlisted by expert practitioners from this increased pool of entrants for the BETT awards. Some 23 per cent were shortlisted in 2008, down from 52 per cent in 2006. This suggests there may be issues both with the quality of resources available and with teachers' expertise in judging the quality of digital content.

Despite progress in relation to many aspects of infrastructure, schools' capability to support mobile and personal access for learners is still limited. For example, only 8 per cent of primary schools and 17 per cent of secondary schools reported that they offer access to mobile and handheld devices. Only 6 per cent of schools have wireless internet access everywhere on the campus. Some 14 per cent of secondary schools allow use of students' own devices in lessons, but only 4 per cent give full permissions for students on their network (Smith *et al.*, 2008).

Consideration of the environmental sustainability of a school or college's technology infrastructure is at a fairly early stage. For example, while schools and colleges often reported planning for the growth and replacement of their stock of technology, few reported planning for the safe disposal of obsolete equipment. In relation to purchasing of technology, 40 per cent of schools plan to use their local authority framework for technology purchases, enabling them to benefit from savings as a result of aggregation (Smith *et al.*, 2008).

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5. Improved personalised learning experiences

Using online learning to extend curriculum choice is fairly common in work-based learning (Overton *et al.*, 2007). However, this practice is not widespread in secondary schools. There are case study examples of the technology being used to support greater curriculum choice within 14–19 learning, and secondary school provision generally (Lewin *et al.*, 2008).

Provision of flexible online and blended learning is at an early stage in schools and colleges. Just 20 per cent of FE colleges, for example, reported that they used technology to enable learners to study at their own pace. However, learners do appear to be using technology independently to support studying where and when they choose, though this is unlikely to be fully flexible learning. Some 66 per cent of FE learners reported this in 2007, but this varied between 80 per cent of 16 to18-year-olds and 53 per cent of those over 45 (GfK NOP, 2007b).

In recently 'turned around' schools, staff reported that technology played a key role in improving pupil achievement by enabling learners to evaluate their own work more easily. Several schools used educational software which supported self-assessment (Hollingworth *et al.*, 2008).

Evidence demonstrating the value of technology for learning continues to grow. Around 80 per cent of teachers agree that technology has an impact on engagement in learning, and around 60 per cent reported that it enables them to better support learners' diverse needs (Smith *et al.*, 2008).

There is increasing evidence that technology plays an important part in supporting school improvement. A recent study found that, of 181 schools removed from Special Measures and Notice to Improve, 82 per cent of headteachers reported technology had played a key role in their school's improvement. However, the level of technology in the schools was not a predictor of improvement. Some strategies for using technology in these schools included the use of information systems for monitoring and analysing learner achievement and progress; systems for managing and monitoring attendance and behaviour (lesson registration, parental alerting); greater use of technology to engage under-achieving pupils, especially creative and applied learning using technology; and supporting learner voice through online polls and forums (Hollingworth *et al.*, 2008).

6. Impact on national priorities

There is an increasing body of evidence on how technology can affect wider education priorities. These include raising achievement, narrowing achievement gaps, engaging disadvantaged and vulnerable learners, and improving capacity, quality and efficiency. In some of these areas evidence comes from examples of practice which are not embedded broadly. In other cases there is more general evidence of impact.

The strongest general impact of technology across education relates to improvements in efficiency, notably the impact on the use of teachers' and practitioners' time. Studies have demonstrated that practitioners generally re-invest time they save into core tasks (PwC, 2004), thus giving rise to benefits in quality. Technology has delivered significant benefits to teachers in the use of their time. For example, overall around half of teachers who use technology for lesson planning report gains in time from this use, with just one in ten reporting losing time. Over 60 per cent of teachers report saving time reporting on pupil progress, with 8 per cent reporting losing time. A considerable proportion of those who say they save time report on average saving more than two hours per week (Smith *et al.*, 2008).

The pattern in FE is broadly the same as in schools. Lesson planning and preparation and record keeping represent the areas in which technology delivers most time savings, with 36 per cent of FE practitioners reporting that use of technology saved them time in lesson planning, and 64 per cent of FE practitioners reporting that the use of online resources saved them time (LSN, 2008).

However, reports from practitioners and providers also offer an indication of the value of technology in supporting the improved attainment of learners. As the previous section demonstrates, those views are generally positive, but tend to be more positive in relation to the learning experience than improvements to outcomes. Nonetheless, 30 per cent of FE colleges, for example, report that technology is a great deal of help in improving learning outcomes.

In work-based learning, e-learning supports the delivery of a wide range of skills, including communications, leadership and management, foreign language training, IT (both for technology professionals and those who use IT in their day-to-day jobs), health and safety and a wide range of company-specific programmes (Overton *et al.*, 2007). However, the extent of use of these e-learning programmes is difficult to gauge. Indications suggest that up to 35 per cent of work-based learning providers can be classified as e-enabled, but around one quarter of providers are unlikely to be realising the benefits of technology-supported learning.

Evidence in relation to other priorities remains limited, suggesting the need for further evaluative studies and impact research. More evidence is needed to understand, for example, the links between parents' engagement in children's learning and the use of technology-based information and communication channels (for example, parent gateways). Similarly, little is currently known about the impact on the well-being of children and young people from increased integration of professional information systems at a local level. These and other areas will provide a focus for future Becta research.

Introduction

Three years on from the publication of *Harnessing Technology* in 2005, the Government asked Becta to revise and further develop this strategy. The refreshed strategy, *Harnessing Technology: Next Generation Learning* (Becta, 2008), sets out the system-wide role for technology over the next six years.

Harnessing Technology: Next Generation Learning supports key priorities of the Department for Children, Schools and Families (DCSF) and Department for Innovation, Universities and Skills (DIUS), with a particular focus on:

• raising achievements and improving skills

• narrowing gaps and supporting the vulnerable

• improving capacity, quality and efficiency.

The strategy outlines five high-level outcomes which contribute to these priorities. This review brings together a range of research evidence and data to offer a picture of where we are now and what the key issues are in achieving these challenging objectives. The review addresses both the children, schools and families and FE and Skills sectors.

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The five high-level outcomes sought by the strategy are:

Technology-confident, effective providers

Education and training providers able to make strategic and effective use of technology to achieve the best outcomes for learners.

Engaged and empowered learners

Learners able to access technology and the skills and support to use it to best effect inside and outside formal learning.

Confident system leadership and innovation

Education leaders enabled to lead technology to support their priorities and deploy innovative solutions to improve the quality of teaching.

Enabling infrastructure and processes

A technology infrastructure that offers learners and practitioners access to high quality, integrated tools and resources at the best possible value for money.

Improved personalised learning experiences

Technology enabling improvements to learning and teaching, and tailoring of learning to suit the needs of learners.

The evidence and research presented here is derived from Becta's national and large-scale surveys and research studies. It also includes other statistics, national-level surveys, evaluation studies and Ofsted reports.

Challenges and issues

Progress again, but parts of the system are hard to reach

Echoing conclusions from previous years, this review presents a mixed picture of the adoption, use and impact of technology in education and skills. There have been many promising areas of progress over the last year, with a significant increase in the use of learning platforms and improved integration with management information systems. However, the use of learning platforms is still at an early stage in schools. These are critical underpinnings for further progress and represent a sound basis for the development of practice with technology more generally.

Other progress is apparent, including continued strong growth of practitioners' use of technology to support learning, and indications that the breadth of use is growing. However, there must still be concern about the pockets of very limited adoption. In particular, there appears to be a stubborn core of FE colleges which are late adopters, a long tail of primary schools with limited provision and use, and polarisation within the FE sector between practitioners making good use and those making little or no use.

Minister of State for Schools and Learners, Jim Knight, offered a response to the recent launch of the second phase of the Harnessing Technology Strategy, stating that 'technology is no longer optional'. It appears it will take considerable effort to ensure the message is reflected in consistent change across the system.

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The continuing challenge of access and learner skills

Ensuring fair access to technology for parents, young people and adult learners is essential but it is likely to represent an ongoing challenge which requires concerted effort and a high level of support at the local level. In relation to school-aged learners, those without access are most likely to come from what are generally considered hard-to-reach groups, such as families who rely long term on benefits, families in social housing, lone parents and those whose first language is not English. In the FE and Skills sector, older learners are less likely to have access, and those returning to study or training over the age of 45 are likely to have limited skills in relation to the use of technology to support learning.

The trends for access to technology are generally encouraging, particularly the adoption of broadband. However, the picture suggests that those without access will fail to benefit from the digital tools and resources that are increasingly used to support learning. They are also likely to lose out in terms of broader social participation and employability. Ensuring access and skills for these groups must be a high priority in realising the aims of the Harnessing Technology Strategy.

The host school or college is a key factor in young people's ability to cite behaviours for staying safe online, and FE learners' capability to use technology both generally and for learning. Thus focusing on building provider e-maturity is an important prerequisite to building learners' capability to benefit from using technology.

Low bases but big opportunity: parents and disadvantaged groups

The Government's target for schools to offer online reporting to parents by 2010 (secondary) and 2012 (primary) can support better relationships between schools and parents. However, schools' capacity in this area is currently at a very low base. Though tools and systems exist that enable this, adoption and embedded use is relatively low, possibly reflecting the change-management challenge faced by schools. In addition, communicating with parents is relatively low down on headteachers' reported priorities, both generally and for technology, over the next three years.

Yet other evidence suggests that parents would value schools' use of online channels for communication of information. There is clearly a big opportunity in this area, but also a need for support and advice to schools, and those who support them, to move schools more swiftly from where they are now to better meet the aspirations of parents.

A similar opportunity exists in relation to disadvantaged and vulnerable learners, particularly young people. There have been highly successful projects with these learners over recent years, demonstrating a significant opportunity for technology-based projects to prevent young people slipping through the net and disengaging entirely from learning. Successful projects offer new models both of learning and of the relationship between the young person and professionals and learning providers, often enabling greater control for young people to shape their learning. Building and sharing this practice is a challenge, but will be important in helping ensure that national priorities are addressed.

Leadership and transfer of innovation

A recurring theme across much of this review is that of leadership. For example, there are differences between the accounts of learners, practitioners and leaders of learning platforms in FE which suggest that there are particular issues in embedding the use of technology across all levels of large organisations – a key leadership challenge. In addition, school leaders' priorities for technology do not fully reflect its role in supporting parental engagement. And some FE college technology strategies still focus primarily on infrastructure development, rather than on improving learning and teaching.

Building leaders' understanding of the role of technology in supporting their priorities, and communicating the business case for technology-based change is a continuing but important challenge.

There are now many good examples of practice with technology which achieve real benefits for children, young people and adult learners. These range from mobile learning practices which improve young learners' achievements in core subjects, to creative uses of technology to engage hard-to-reach learners, and the use of learning platforms to extend the curriculum and support the personalising of learning. The challenge is to shift from recognising valuable isolated projects to building recognised good practice among the majority of adopters. It will continue to be critical to the success of the Harnessing Technology Strategy to recognise excellent innovations and support leadership and professional development networks which facilitate knowledge transfer.

Practitioner skills, tools and professional development

The issue of the slow development of learning and teaching practice using technology is a theme which has been discussed in previous reviews. This year there are signs that the breadth of practice among teachers and FE practitioners is expanding, with more practitioners reporting that they are using technology to support learners in being creative and working together.

However, the percentage of practitioners reporting that they 'rarely or never' do this is still high. There still appears to be a significant deficit in practice which is likely to be based on lack of awareness of the benefits of different practice for learning, lack of practical pedagogical skills, and possibly lack of time and incentives to develop practice.

Addressing these issues is a challenge which is likely to require multiple strategies, including building a coherent approach to continuing professional development, developing a greater sense of the importance of technology-based practice in the professionalism of practitioners, building better understanding of benefits of change, and sharing related good practice among the education profession.

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The need for professionalism in technology services

Though many of the issues in delivering the ambitions of the Harnessing Technology Strategy relate to the development of practice and the management of change in schools, colleges and other providers, there still remain issues in building good technology infrastructures which can support flexible and extended learning.

Limitations in most schools' infrastructure to support mobile and remote access to the network are a major concern. This is far from easy for teachers, and is even less readily available to learners. Additionally, though good progress has been made in integrating technology systems, particularly at a local level, only a minority of operating learning platforms are linked to central management information systems. This is true both of schools and FE colleges.

When considered alongside indications that there are issues for schools and colleges in relation to access to, and quality of, learning resources, this suggests that learners and practitioners are generally receiving a technology service that is lacking in professionalism. This is particularly the case in primary schools, where a lack of on-site technical capacity is likely to prove a barrier to school-led progress.

While it is important to note that there has been much progress in the development of institutional infrastructures over recent years, this is unfortunately likely to be failing to keep up with either external developments or the expectations and behaviours of users. There is a need to rethink how technology services are developed and delivered, in order to ensure schools and colleges, and particularly smaller institutions, can access the capacity they require.

Conclusions

This year's review echoes many of the messages from previous reviews, and many of the challenges identified here remain from previous years. However, the landscape is both changing and experiencing improvement.

The use of technology is not just contributing to general, sometimes unspecific, improvements to teaching and learning. There are developing practices with technology that are delivering identifiable improvement, and transforming services for learners. We are talking much less of 'potential', and more of transfer of successful practice; less about early adoption and development and more about embedding across a majority.

This is encouraging. But we must not forget the major challenges facing the education sector in realising the benefits of technology-based change. The continuing challenge for Becta in leading the strategy is to ensure that the right interventions, advice and support are targeted at those who need them in the right ways and at the right time.

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1. Technology-confident, effective providers

'E-maturity' or 'e-enablement' are measures of the ability of education or training providers to make strategic and effective use of technology to improve outcomes for learners. They recognise the part technology has to play across the whole range of schools' and colleges' activities. To be effective, providers need to use technology to be able to respond flexibly to the changing environment in which they find themselves. Providers need to use technology to widen their reach and appeal; it is by now a natural part of most learners' home lives. It should therefore be a key conduit for communicating with learners and their parents, carers or employers. Providers should also deploy the full range of skills and resources available to teach and support learners.

In order to assess the extent to which learning providers are confident and effective in their use of technology, this section is structured around the following questions:

- Do providers achieve well on e-maturity criteria?

- Are providers able to support home and extended learning?

- To what extent do technology-based tools and resources support effective teaching?

1.1 Do providers achieve well on e-maturity criteria?

In schools

Progress in e-enablement in schools

Butt and Cebulla (2006) developed a measure for schools' e-maturity combining data gathered from the schools' surveys conducted between 2002 and 2005. These measures were based on 12 questions gathered into three groups. The first group of questions looked at the schools' technical infrastructure and resources. The second group looked at the use of technology in coordinating the schools' activities and its use by teachers. The final group looked at engaging learners. Subsequent analysis of 2007 data by the authors of the original study showed the steady improvement in the average scores of both primary and secondary schools. Over the period 2002–2007 primary schools also closed the gap on secondary schools and achieved the same average score.

School e-enablement

	Primary	Secondary
E-enabled	28%	25%
Enthusiastic	39%	43%
Ambivalent	21%	24%
Late adopters	13%	8%
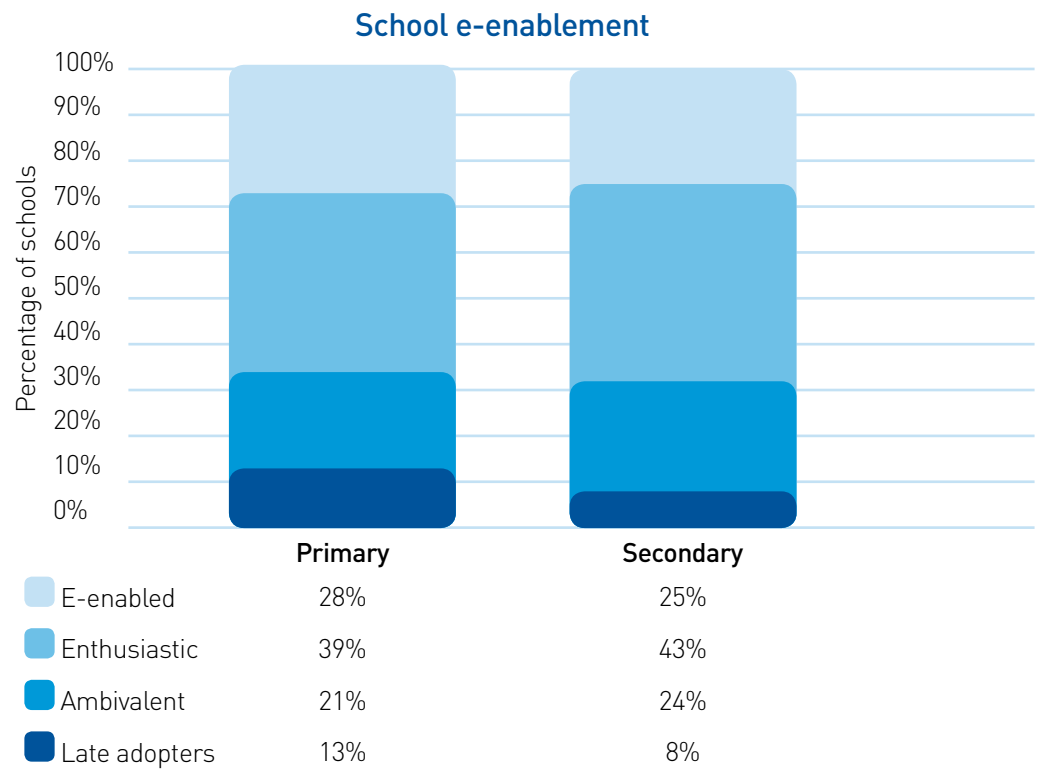
Further analysis of data gathered by Smith *et al.* (2008) shows the degree to which schools have achieved different levels of e-enablement. In 2008 the average level of e-enablement of both primary and secondary schools remained about the same. This analysis showed a slightly higher proportion of e-enabled primary schools (28%) than secondary schools (25%), but there was a larger 'tail' of late-adopter primary schools. Some 13 per cent of primary schools were in this lower category compared to 8 per cent of secondaries.

In the FE and Skills sector

Progress in e-enablement in further education colleges

Spectrum of e-enablement

	2003	2004	2005	2006	2007
E-enabled	6%	8%	11%	25%	25%
Enthusiastic	43%	50%	51%	50%	48%
Ambivalent	26%	23%	19%	13%	7%
Late adopters	25%	19%	19%	12%	19%
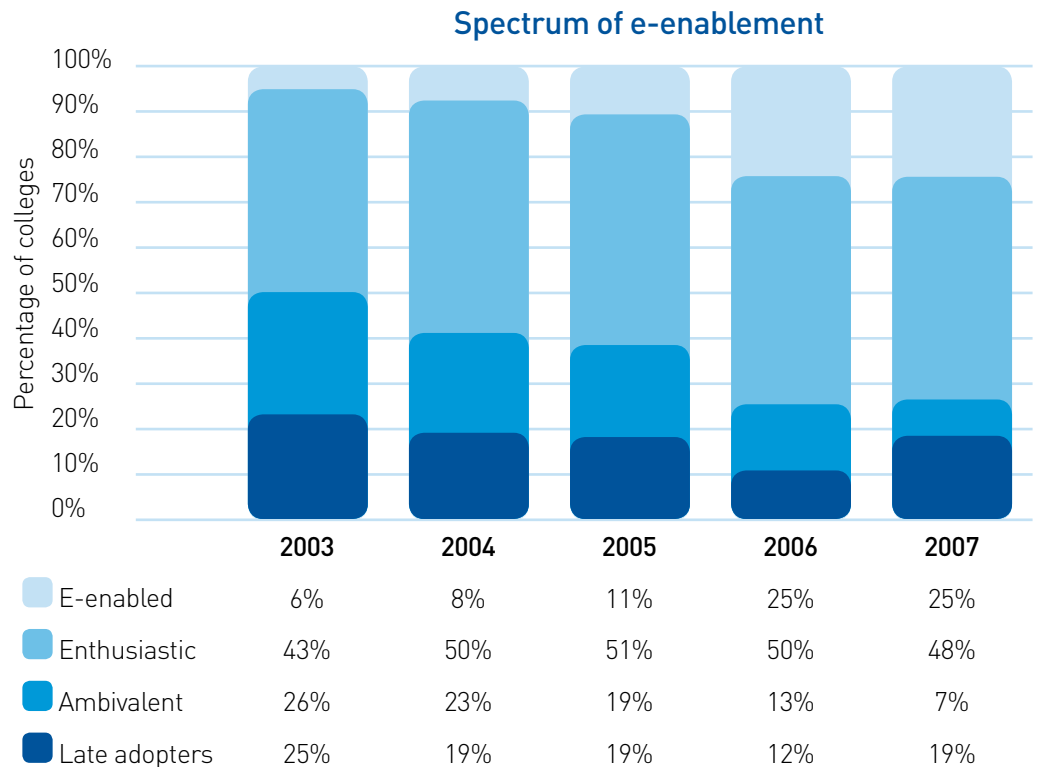
The proportion of colleges categorised as e-enabled grew steadily from 2003, but settled between 2006 and 2007. Some 25 per cent of colleges were e-enabled by this time and around half were enthusiastic. With ambivalent and late-adopter colleges, the situation may even have worsened (Becta, 2008).

Breaking the overall e-enablement measures down into smaller component parts shows the changes that have taken place within the headline figures.

Measures of e-learning implementation

	Access	Resources	Workforce	E-learning	Management
2003	15.8	10.4	10.7	9.7	11.3
2004	15	11.3	11.4	10.5	11.3
2005	14.2	11.5	11.8	11.1	11.3
2006	15	11.7	11.8	11.5	12.9
2007	13.3	14.3	10	11.9	14.6
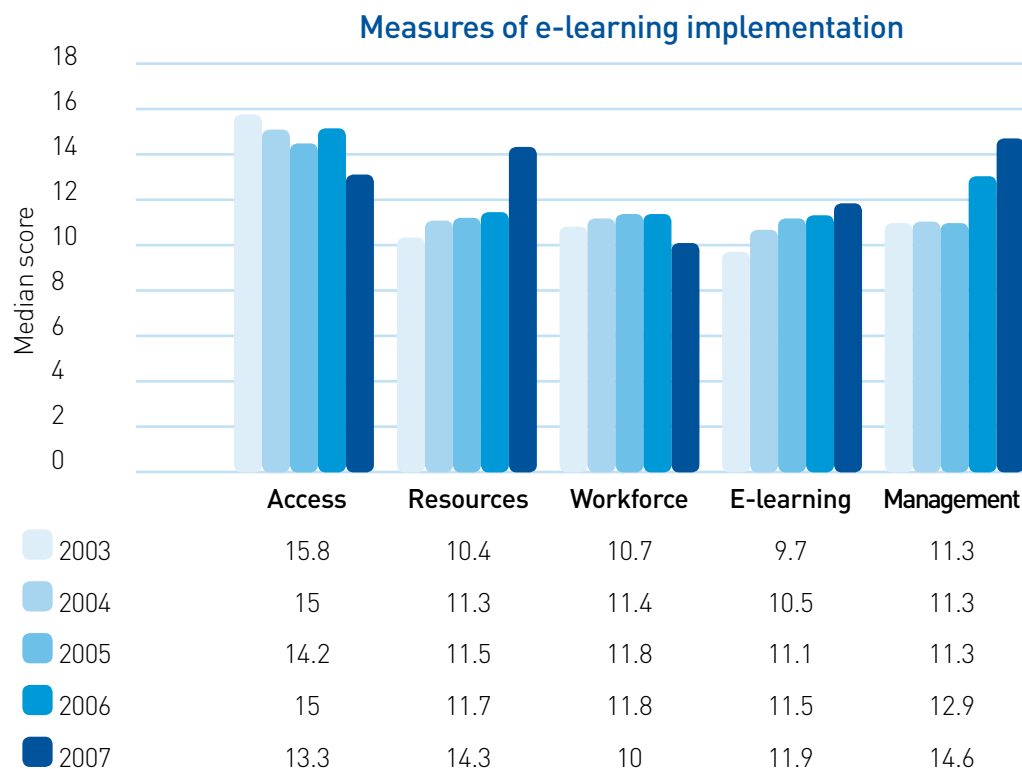
The access measure gives a figure for students' experience in getting to use technology at the college. In 2003, access was by far the highest scoring area. A typical college scored over 15 at this time. However, since then the trend has been downwards – more recently, scores of 13 or 14 have become more typical. There may be several reasons for this. Increased use of ICT or greater student numbers may have taken a toll on the college infrastructure's ability to meet the demand from students and teaching staff. In addition, larger numbers of students bringing their own devices may have created additional demands on the system.

The Resources measure gives an estimate of the extent to which a college can access, produce and deliver e-learning content. The typical score here increased from around 10 in 2003 to around 14 in 2007. It shows that colleges have increasingly focused on e-learning materials and especially the use of virtual learning environments (VLEs). Although central funding directly targeted at e-learning resources had dried up in 2005–06, colleges seem to have got over the plateau that may have been caused by this.

The Workforce measure describes the skills of the teaching staff and their ability to access ICT for their work. This score has proved to be most recalcitrant to change. The score for a typical college crept slowly upwards over the years from below 11 to nearly 12, but may have fallen back again. While staff access can be addressed in the relatively short term, developing skills across an organisation as big as a college will take time.

The E-learning measure shows the extent to which ILT is deployed for teaching and learning purposes. It combines measures of teacher use with learner support and also looks at the use of ILT at both 'ends' of the student journey, in induction and assessment. There has been steady progress over the years, a typical score (out of 20) growing from less than 10 in 2003 to almost 12. This measure shows that small groups and individual enthusiasts can make things happen in late-adopter colleges, but there are limits to their impact.

The Management measure shows the extent to which ICT is used for management information and the extent to which e-learning activities are planned for at college level. Typical scores here stayed at just over 11 between 2003 and 2005, but have taken off since then. The score of a typical college was over 14 in 2007. The recent increases seem to have been especially marked in late-adopter colleges, indicating a greater will to engage with ICT at this end of the spectrum.

If we look at individual colleges, the picture is quite volatile. It has not been unusual for colleges to drop down a category and climb back up a year or two later, or to improve and then fall back. This may be linked to the fast-changing nature of technology and the cost of keeping up with it (Becta, 2008).

E-maturity of work-based learning providers

Work-based learning providers delivered learning across a wide range of occupational areas. The greatest number delivered business administration, IT, management and professional learning (60%) (MacKinnon, 2008). This was the main area of delivery for just under one fifth (18%) of all providers. A slightly smaller number (51%) delivered learning in retail, customer service and transportation, although this was the main area of delivery for just 4 per cent of providers.

Level of e-maturity in WBL providers
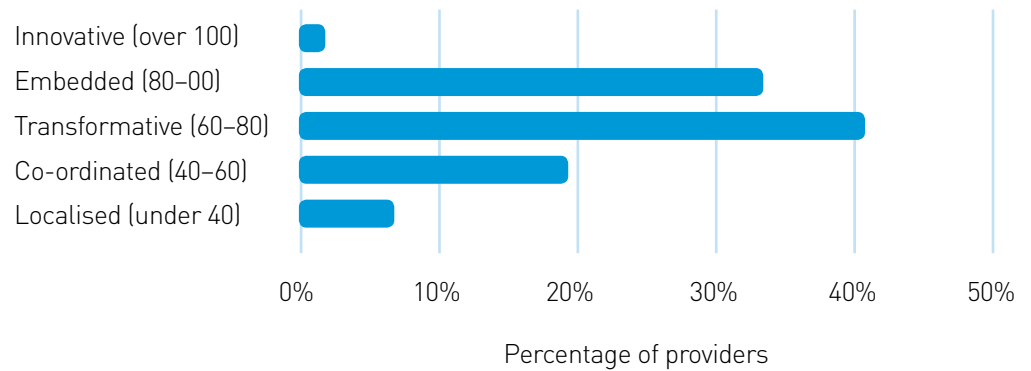
	Localised (under 40)	Co-ordinated (40-60)	Transformative (60-80)	Embedded (80-100)	Innovative (over 100)
	6%	19%	41%	33%	2%

In the categorisation of e-maturity used in this sector, just three work-based learning providers (2%) had a score of over 100 out of 120 and were classed as innovative (the highest category). One third of providers had a score between 80 and 100 and were categorised as embedded. Just 6 per cent of providers had a localised approach to the use of ICT and e-learning (the lowest e-maturity category).

This was the first time a measure of e-maturity had been developed and tested with work-based learning providers. It was therefore not possible to say how far the work-based learning sector had moved towards e-maturity over time. However, a 2005 survey of work-based learning providers found that 7 per cent of providers thought they had been using ICT and e-learning 'for some time and it is well embedded' and one fifth (20%) were 'currently embedding e-learning activities'. This suggests that ICT and e-learning may have become more embedded in work-based learning providers' activities over recent years.

### Comparing colleges and work-based learning providers

The different models of e-maturity applied in each sector make direct comparison difficult. We should also remember that some 23 per cent of work-based learning providers in the study were FE colleges. The 'late adopter' colleges in the FE study had scores that were around half or less than the maximum possible. So these may be compared to those work-based learning providers with scores of 60 or less, those classified as 'co-ordinated' or 'localised'. Some 19 per cent of FE colleges and 25 per cent of work-based learning providers could be said to be in a similar 'late adopter' category.

The higher scoring categories for these providers are harder to compare. However, going back to the original data for FE colleges, some 36 per cent of colleges scored over 67 out of 100, which would rank them alongside 'embedded' and 'innovative' work-based learning providers (some 35 per cent of providers). Only two colleges achieved scores that would place them in the 'innovative' category compared to three work-based learning providers.

These findings suggest that around one third of FE colleges and work-based learning providers were reasonably 'e-mature'. While a small number of both types of provider were at the 'cutting edge', a larger number of work-based learning providers were 'late adopters'.

E-maturity of personal and community development providers

A study of 32 mainly local authority personal and community development services (either delivered directly or contracted out) found a range of levels of e-maturity (SERO, 2008). Only three providers (9%) were found to have ICT and e-learning largely embedded and a further six were at the early stages of developing ICT and e-learning. The rest were divided fairly equally between those where ICT was largely established across a range of practices and those where the use of technology was still developing.

Level of e-maturity in PCDL providers

	Embedded	Established	Developing	Early stages
Number of providers	3	13	12	6
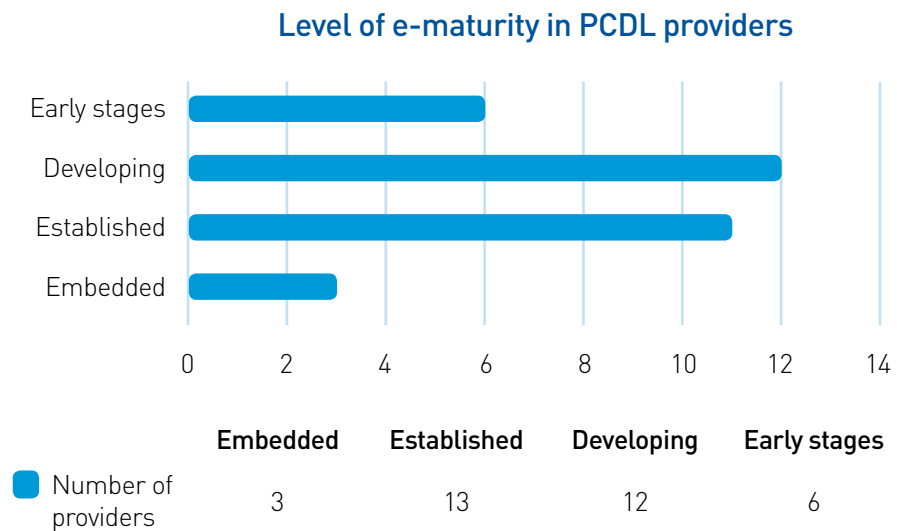
Most of these providers were strongest in using ICT for management and administration of learning. Early stages and Developing providers tended to be weaker in terms of resources and support.

1.2 Are providers able to support home and extended learning?

In schools

Online access and reporting

Some 51 per cent of parents feel very involved in their child's school life. This was an increase from 29 per cent in 2001 and 38 per cent in 2004 (Peters *et al.*, 2007). Women, parents with young children, parents who left full-time education later, those from Black or Black British backgrounds, and parents of a child with a Statement of SEN were all more likely than average to feel very involved. Lone parents and non-resident parents were both less likely than average to feel very involved. Around two thirds (66%) of parents said that they would like to be more involved in their child's school life. Some 28 per cent of these parents felt that informal discussions with school staff were the most useful way of finding out about children's progress in school.
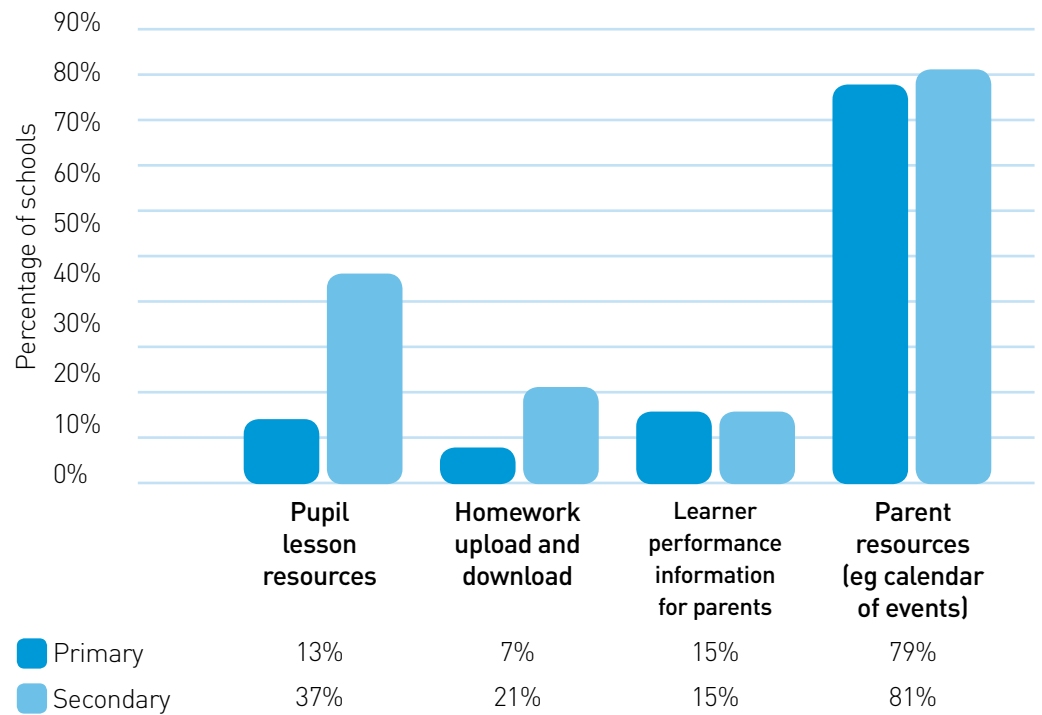
The two methods of communication that parents thought schools should use more were notes brought home by children (21%), and email (16%). Parents whose main language is not English were most likely to want more communication in writing (36%), while email was not surprisingly mentioned more frequently by those with internet access – and as result, by those in higher social grades. However, email was mentioned more frequently by male parents (20%) and non-resident parents (25%), as well as by those in full-time work (21%) – all groups who are currently less involved in their child's school life. Email could therefore be an effective way of targeting parents who are currently less involved.

Some 80 per cent of parents thought it would be useful if their child's school was able to provide a secure website with up-to-date information on how well their child was progressing. Parents working full-time were slightly more likely than those not working full-time to find this idea appealing (83 per cent compared with 79 per cent).

In another study (Populus, 2008), 81 per cent of parents reported they would like more feedback on their child's progress, and 68 per cent stated they would like their child's school to use technologies such as text messaging and emails to communicate with them more frequently.

Most schools had their own website, which was most often used to provide school news and parent resources such as a calendar of events or school policy documents (Smith et al., 2008). Around 80 per cent of primary and secondary schools said they were using their school website for providing resources to parents. This had almost doubled for both primary and secondary schools since 2007, which clearly represented an important step towards bridging the gap between home and school. The percentage was slightly lower in special schools but was still well over half.

School websites used for access and reporting

	Pupil lesson resources	Homework upload and download	Learner performance information for parents	Parent resources (eg calendar of events)
Primary	13%	7%	15%	79%
Secondary	37%	21%	15%	81%

Very few schools, however, used their website to communicate directly with individual parents; only 4 per cent of primary schools, 3 per cent of secondary schools and none of the special schools said they were using their school website to do this. Findings in 2007 were similar and there had also been little movement towards other types of use, such as providing access to management information systems, learner performance information and homework upload/download.

Use of ICT for homework

The number of teachers who often set homework requiring a computer has decreased in primary schools (from 13% to 8%) and in secondary schools (from 11% to 7%) (Smith *et al.*, 2008). This is a disappointing trend, but may be improved when teachers believe that universal home access has been achieved.

The use of Web 2.0 technologies and social software (such as blogs, instant messaging, wikis and online discussion groups) to support learning is still extremely uncommon. However, there has been a slight increase since 2007 in teachers saying that they use these technologies.

A sizeable minority of teachers (especially in primary schools) are completely unfamiliar with these types of software and, even in secondary schools, a quarter of teachers said that they had never heard of wikis. This contrasts with the high use of these types of software among young people for informal purposes.

School facilities available for community use

Community access to ICT facilities remains low, with almost two thirds of primary schools and 82 per cent of special schools saying that they offer no access at all (Smith *et al.*, 2008). Just under half of secondary schools offer facilities for adult learning or evening classes. Community access to ICT facilities during the school day remains very limited. This may change as the move towards extended schools (by 2010) accelerates, but it is an area that has some way to go.

Schools offering facilities for community use

	Drop-in internet during day	Other ICT during day	Drop-in internet outside day	Other ICT outside day	Adult classes	No community use
Primary	11%	14%	9%	9%	17%	64%
Secondary	10%	14%	11%	30%	47%	38%
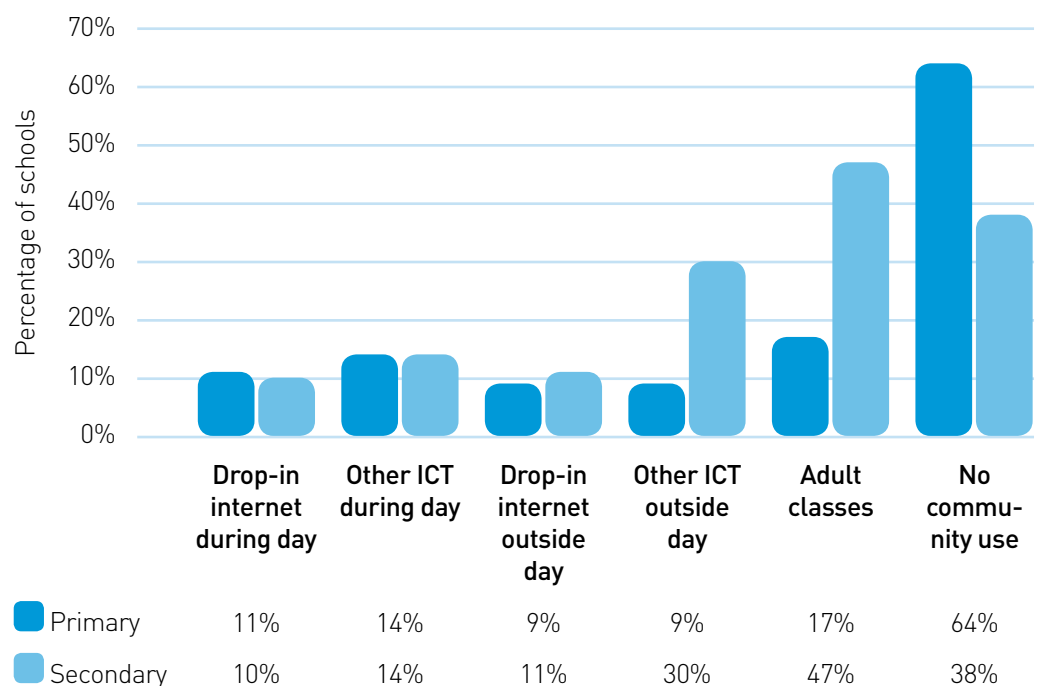
In the FE and Skills sector

Remote access to college programmes

Some 41 per cent of colleges use ICT in all or most programmes to give learners remote access (LSN, 2008). This figure has increased considerably since 2006 when 26 per cent of colleges did this. The number of colleges offering learndirect courses to remote learners continued to decline (30 per cent, down from 48 per cent in 2006 and 72 per cent in 2003). Around half of colleges (48%) continue to offer remote learning programmes that are not related to learndirect. This percentage has remained fairly steady since 2003.

Computers available outside teaching hours

	None	100 or less	Between 101 and 250	Between 251 and 500	Between 501 and 1000	1001 or more
▉ Percentage of providers	4%	51%	25%	14%	6%	0%
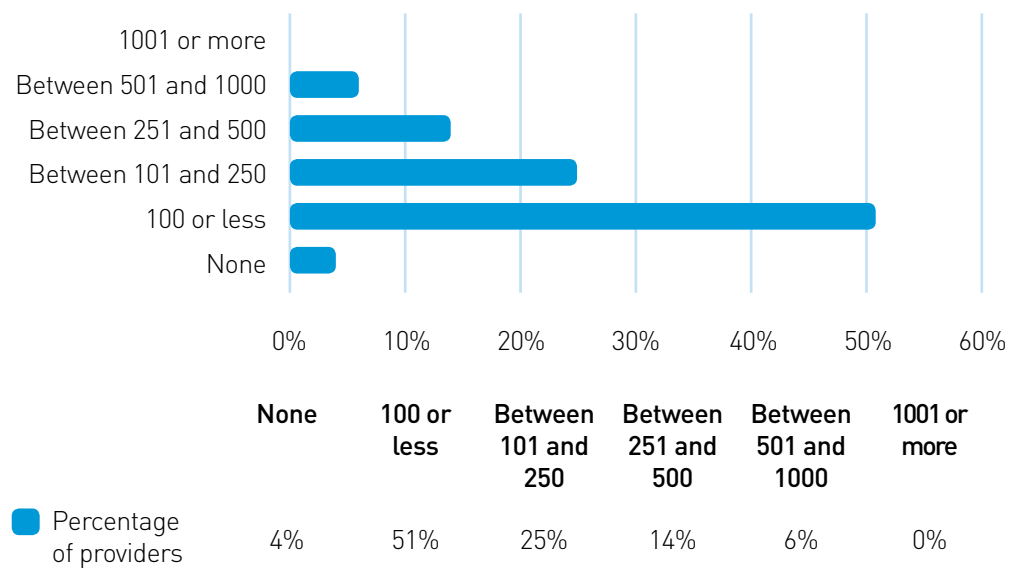
While almost all colleges (96%) offered some degree of access to college computers outside normal teaching hours, this involves only a small proportion of machines. Around half (52%) of colleges offered access to fewer than 100 computers.

1.3 To what extent do technology-based tools and resources support effective teaching?

In schools

Teachers' use of technology

The majority of teachers are confident and enthusiastic about using ICT. Over three-quarters of ICT coordinators (77%) reported that teachers in their school are either very or quite confident with ICT (Smith *et al.*, 2008). Similarly, all or nearly all teachers were considered enthusiastic about ICT in 20 per cent of schools, and most were considered enthusiastic in 51 per cent of schools.
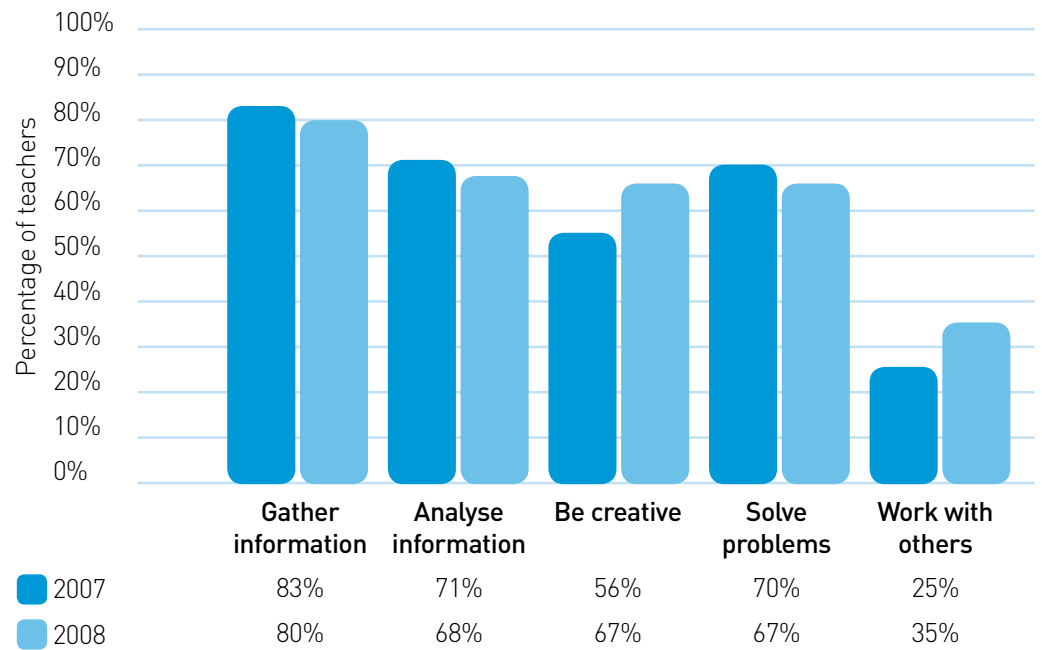
Secondary school teachers have increased their use of computer packages, subject-specific software and internet resources. For example, while only a third of secondary teachers said that they used internet resources in at least half of their lessons in 2007, almost half of them (46%) reported doing so in 2008. Nonetheless, the gap between primary and secondary schools remains, with primary teachers continuing to use technology more often in their lessons. This may reflect a more widespread availability of software for primary schools than for secondary schools. Learning platforms are still used very infrequently, if at all. Around two thirds of teachers said that they rarely used these in lessons. Even where learning platforms are in place, some teachers are unaware of their existence or what they could be used for.

Teachers predominantly use ICT for whole-class activities, confirming their preferred use of ICT for display and presentational purposes. There has, however, been some development in the use of ICT for other activities in secondary schools. Almost a third of secondary school teachers (32%) said that they used ICT with pupils working on their own in half or more of their lessons (this is up from 22 per cent in 2007, while the comparable figure in primary schools is unchanged, at 31 per cent).

Primary teachers making some use of ICT with learners

	Gather information	Analyse information	Be creative	Solve problems	Work with others
2007	83%	71%	56%	70%	25%
2008	80%	68%	67%	67%	35%

Secondary teachers making some use of ICT with learners

	Gather information	Analyse information	Be creative	Solve problems	Work with others
2007	69%	45%	32%	31%	16%
2008	80%	67%	50%	49%	27%
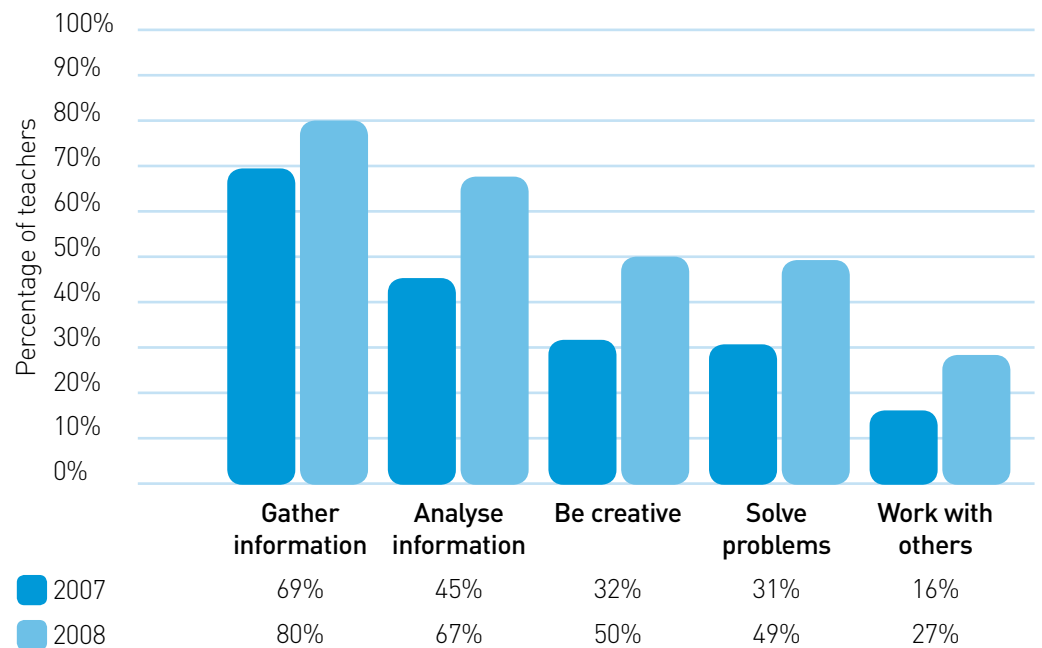
The purpose for which ICT is used in lessons has also undergone some change since 2007. In both primary and secondary schools, teachers are using ICT more frequently to help pupils to be creative and to work with others. However, although the use of ICT to enable learners to gather and analyse information and to solve problems has increased in secondary schools, it has not increased in primary schools. This has significantly narrowed the gap between primary and secondary school teachers, but also indicates that up to a quarter of teachers are reluctant to engage with technology.

When asked what prevented them from using ICT in lessons, teachers implied that they were less comfortable with ICT. Around a quarter said that they didn't know where to find or how to use ICT resources, or that they did not feel confident using ICT in lessons at least some of the time. Secondary teachers' answers were more about organisational issues – a high proportion (41%) said that they found ICT difficult to access in their school and 29 per cent of them said that they did not always think ICT was an effective use of their time.

There is a statistical association between reported teacher enthusiasm in using ICT to deliver the curriculum and the level of technical support in schools. Schools with either a dedicated, school-based ICT technician or an ICT supplier who has responsibility for day-to-day maintenance and support, reported higher levels of teacher enthusiasm for ICT. On the other hand, schools that share an ICT technician with another school, borrow an ICT technician from another school or have a local authority support service, reported lower levels of teacher enthusiasm. The presence of technical support in a school would appear to help foster teacher enthusiasm for the use of ICT.

Teachers' perception of their effectiveness

Over three quarters of teachers (77%) said that they are either 'quite' or 'very effective' in using ICT to support learning and teaching in the classroom (Smith *et al*., 2008). However, fewer secondary teachers feel 'quite effective' and rather more feel 'not very effective' compared with primary and special school teachers.

Compared to 2007, the proportion of teachers saying they felt 'very' or 'quite effective' in using ICT has risen. For example, in 2007, 12 per cent of secondary school teachers said that they felt 'very effective', compared with 16 per cent of secondary teachers in 2008.

Teachers' perceived effectiveness is linked with the frequency with which they use ICT resources. For example, teachers who said that they felt 'very effective' are less likely to say that they never use learning platforms (63%) compared to teachers who said that they were not as effective.

In the FE and Skills sector

Practitioners' use of technology

A clear majority of colleges (60%) report making widespread use of ICT as a traditional classroom tool (LSN, 2008). This includes the use of interactive whiteboards and other display screen technologies. Around half (51%) also use ICT with traditional learning resources as part of blended learning in all or most of their programmes. Both of these uses have increased considerably since 2006. Teaching staff using ICT to create individualised programmes for learners remains at a low level – only 14 per cent of colleges reported this in all or most of their programmes. However, this does represent a considerable increase on previous years.

Use of ICT in all or most college programmes

	As a traditional classroom tool	As part of blended learning	To create individualised programmes
2006	34%	31%	4%
2007	60%	51%	14%
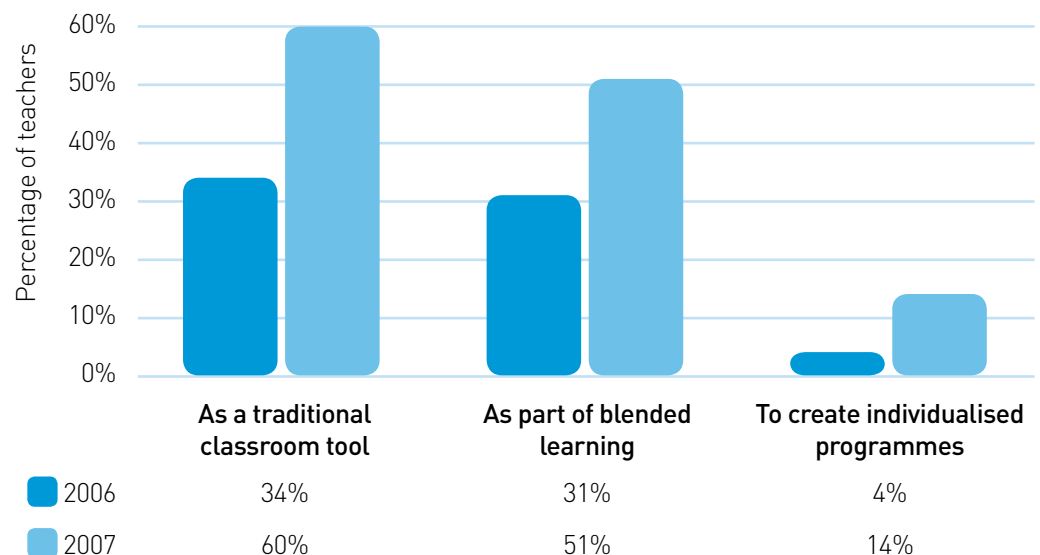
Practitioners' views of their learners' uses of ICT focused on ICT as an information resource, rather than as a wider learning resource. Some 61 per cent of practitioners estimated that over 60 per cent of their students used ICT to research subjects. However, far fewer estimated such large numbers of their students using ICT to exercise wider skills. Less than 10 per cent reported this level of use by learners to solve problems (9%) or to work collaboratively (8%).

Practitioners estimating more than 60 per cent of learners use ICT...

	to research subjects	to analyse information	to work collaboratively	to solve problems
Percentage of practitioners	61%	18%	8%	9%
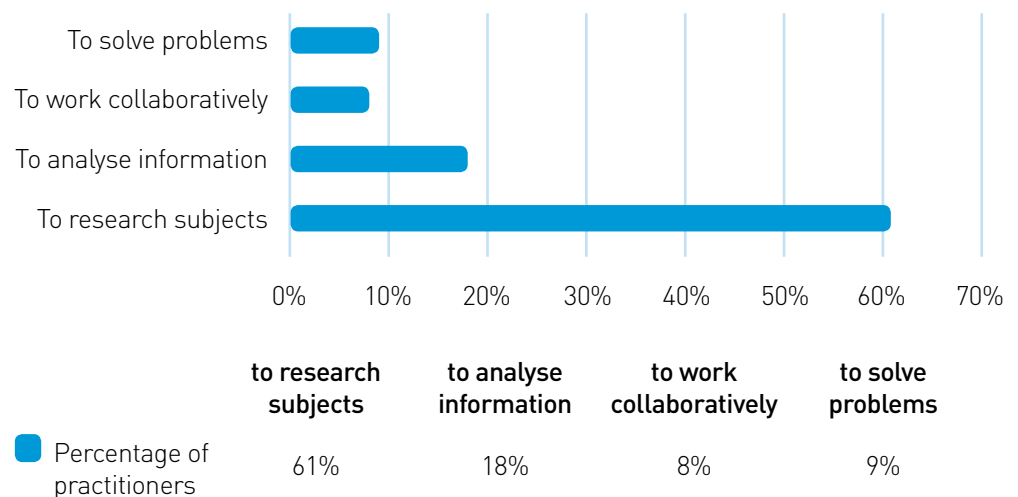
The curriculum areas identified as the highest users of technology were ICT and computing, business and hairdressing and beauty. These were followed by media, sciences and sports. The lowest users of ICT were reported as being art and design, performing arts, health and social care, and again hairdressing and beauty. These areas were also reported as high and low users the previous year, indicating little change in curriculum use of ICT over that time.

The culture and attitude of the department were as likely to be given as reasons for high and low use of ICT and e-learning as curriculum content. These cultural reasons generally focused on staff skills, enthusiasm for ICT, pro-active individuals driving change and the willingness of staff to embrace change. Again, these reasons were cited the previous year.

Staff capability in using ICT

Staff skills are generally reported to be higher in terms of personal use of ICT than in using ICT with learners (LSN, 2008). This is not surprising given that personal ICT skills are a prerequisite for using technology in the classroom. Also use of e-learning in the classroom is still spreading in the FE sector, meaning that some staff are still catching up with their colleagues.

Practitioners' rating of own skills

	ICT skills	e-learning skills
Advanced	38%	26%
Intermediate	51%	47%
Basic	10%	24%
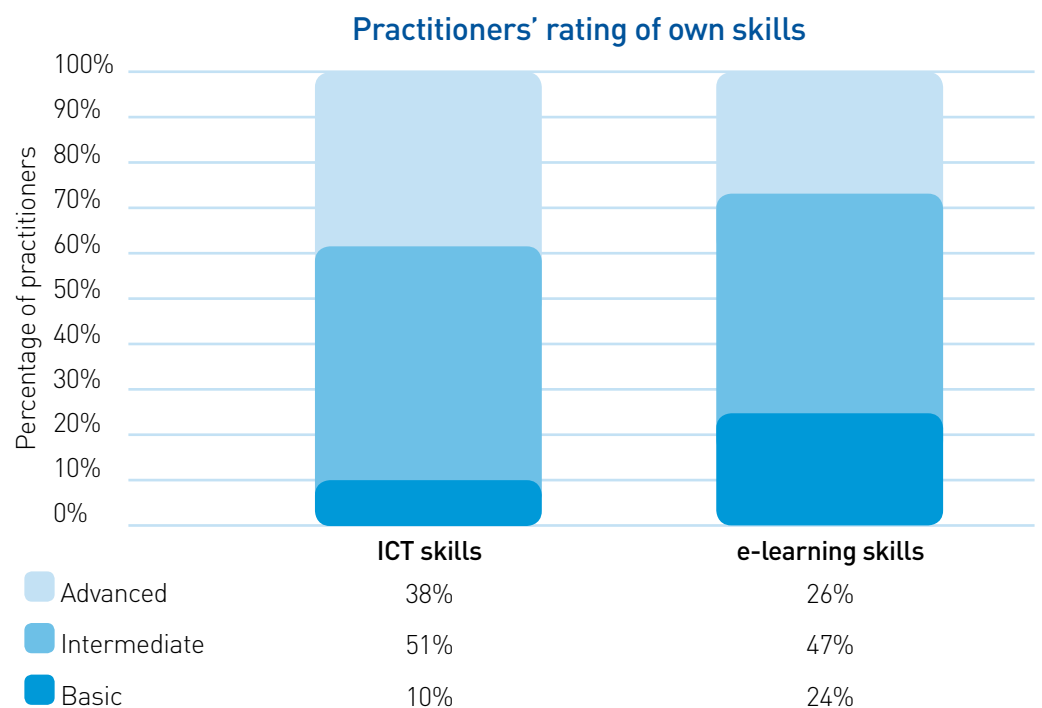
FE practitioners have a more optimistic view of their skills than their colleges. On average, colleges regarded around three quarters of their staff (74%) as intermediate or advanced in personal use of ICT. Some 89 per cent of staff put themselves in this category. Similarly, colleges regarded 61 per cent of staff as intermediate or advanced in their use of ICT with learners, as opposed to 73 per cent of the staff themselves. This may, however, indicate that less competent staff were less likely to respond to the survey.

While around one third of practitioners (36%) used specialised websites for teachers in planning at least half of their lessons, a similar number (32%) rarely or never did this. More optimistically, one half (50%) of practitioners used more general websites, while 21 per cent rarely or never did this. As in schools, these findings suggest a significant minority of practitioners who are reluctant to make use of digital resources.

Some 15 per cent of all work-based learning practitioners considered themselves beginners in terms of the general use of ICT while over one fifth considered themselves advanced (MacKinnon, 2008). There was, however, considerable variation between providers. For one in ten providers, over half of their practitioners were beginners. Practitioners working in health, education and public service occupational areas were most likely to rate themselves as beginners (27%) and least likely to rate themselves as expert (10%).

Over one quarter of work-based learning practitioners (28%) considered themselves beginners in terms of the use of ICT with learners either in the classroom or remotely. Only 11 per cent considered themselves advanced. As a result, less than half of providers believed their tutors were exploiting technology consistently or effectively. Work-based learning practitioners in FE colleges appeared to be more advanced in their use of technology with learners.

The most commonly identified development needs for work-based learning practitioners were developing electronic learning materials (72 per cent of providers); teaching and facilitating online (66%); and knowing how best to use ICT resources (63%).

Some 80 per cent of personal and community development practitioners rated their general ICT skills as good or very good (SERO, 2008). Some 60 per cent also rated their skills positively with regard to using ICT with learners, knowledge of specialist software and using ICT for managing learning. However, there was some concern that the sample of practitioners was biased towards enthusiasts for ICT. These practitioners were also concerned that the take-up of e-learning had not extended much beyond the enthusiastic users. Even among this group, less than half (44%) created their own e-learning materials.

2. Engaged and empowered learners

In order that no learners are excluded from learning opportunities, access to technology and the information and resources it delivers needs to be universal. Learners also need to have the skills and support necessary to get the best from technology, including opportunities to learn outside formal education settings. Technology can offer the possibility of re-engagement with formal education but for this to happen, learners need the confidence to use technology for learning and be reassured that the technology environment is safe and secure.

In order to assess the extent to which learners are engaged and empowered users of technology, this section is structured around the following questions:

- To what extent is learner entitlement met and does it support vulnerable groups?

- Does technology add value to family and informal learning?

- Are learners confident and safe users of technology to support their learning?

2.1 To what extent is learner entitlement met and does it support vulnerable groups?

In schools

Learners' access to technology beyond the school

Some 92 per cent of parents of school-aged children reported in 2007 that they had computer and internet access at home (Peters *et al.*, 2007). This figure does, however, mask some differences between groups. Access to the internet at home is strongly related to social class. While 97 per cent of children from social class AB have internet access at home, for children from social class E the figure drops to 69 per cent. Other relatively disadvantaged groups include those whose main language is not English, 77 per cent of whom have access, and children in lone-parent households.

Only a minority of young people had their own laptop or desktop computer, and in most households, the computer was a family resource (Crook and Harrison, 2008). This constrained both the length of time young people could spend using this technology and the number of opportunities when they might be able to use it.

In a study of five primary schools, 90 per cent of children said they had access to a computer that they could use outside school (Cranmer *et al.*, 2008). However, the nature of this access varied. Some 86 per cent of these children had access to a computer in the home, while 7 per cent relied solely on computer access in other sites. These differences varied according to the child's school and year group. Pupils in Years 3 and 4 were more likely to rely on ICT in a community site (such as a library, community centre or youth club) than those in Years 5 and 6. Pupils in the two inner-city London schools were more likely to rely on ICT access in a community site than those in the three suburban and small town schools.

Around 10 per cent of schools have a home access scheme in place (Smith *et al.*, 2008). The majority of headteachers (58%) reported that the proportion of pupils with home access would increase slightly in the next 12 months, although around a quarter indicated that it would stay about the same. Secondary school leaders were slightly more optimistic about an expansion in home access, and special school leaders were slightly more pessimistic.

Schools with a home access scheme were more likely to report that teachers set homework requiring ICT use. Respondents in primary and secondary schools also reported that having a home access scheme meant more electronic submission of homework and more use of ICT in lessons.

In recently 'turned around' schools, 47 per cent of primary schools and 42 per cent of secondary schools claim that technology is most often used to extend learning beyond the classroom (Hollingworth *et al.*, 2008). Some 97 per cent of secondary and 70 per cent of primary schools also indicated that there is some form of extended access for pupils. Lending and purchasing equipment and software was most common for pupils with special educational needs. Five of the 43 secondary schools surveyed loaned ICT equipment and software to disadvantaged pupils. However, schools were more likely to name gifted and talented groups as the targets of extended access. Extended access was regarded as important in improving pupils' engagement by 81 per cent of secondary and 70 per cent of primary schools.

Learners' use of technology

Primary school children were asked to indicate the nature and level of their use of the internet both in and out of school (Cranmer *et al*., 2008). School-based use varied considerably by pupils' age and school attended. For example, use of the internet for school-related learning increased with year group. On the other hand, games playing and video watching decreased from Year 3 through to Year 6. However, at home boys were more likely than girls to report playing games and watching videos online while at home. Girls were more likely to use computer-mediated communication applications, as well as social networking sites. Use of games at home declined with age, while use of social networking sites increased as pupils got older.

In the FE and Skills sector

Learners' access to technology outside the college

FE college learners had good access to computers at home (GfK NOP, 2007b). A large majority of learners (84%) had a computer at home that they used for their college course. This was particularly high among those aged less than 25. Notably, learners who did not have access to a computer at home did not use college computers to compensate. These learners were more likely to say they never made use of computers at college (32 per cent compared with 21 per cent with access to a home computer). Overall, those with a computer at home were much more computer literate and likely to be using computers both at home and college for a range of tasks. The vast majority of learners with a computer at home said that they had access to the internet (94%) and broadband was the most widespread mode of accessing the internet.

Support for learners

ICT is used for a range of induction activities in at least some programmes in a large majority of FE colleges (LSN, 2008). These include initial assessment (93%); induction to ICT resources (85%); induction to learning resources (83%); induction to subject (80%); general induction to college (79%). Using ICT to provide pre-registration advice is slightly less common, used in at least some programmes in 69 per cent of colleges.

Email is used for communication between learner and tutor in at least some programmes in 86 per cent of colleges. Other forms of online communication are less common. Online discussion is used in 48 per cent of colleges while learners' own websites, blogs or wikis are used in 34 per cent.

Practitioners using ICT to...

	make materials available to learners	communicate with learners
🟦 Percentage of practitioners	58%	41%
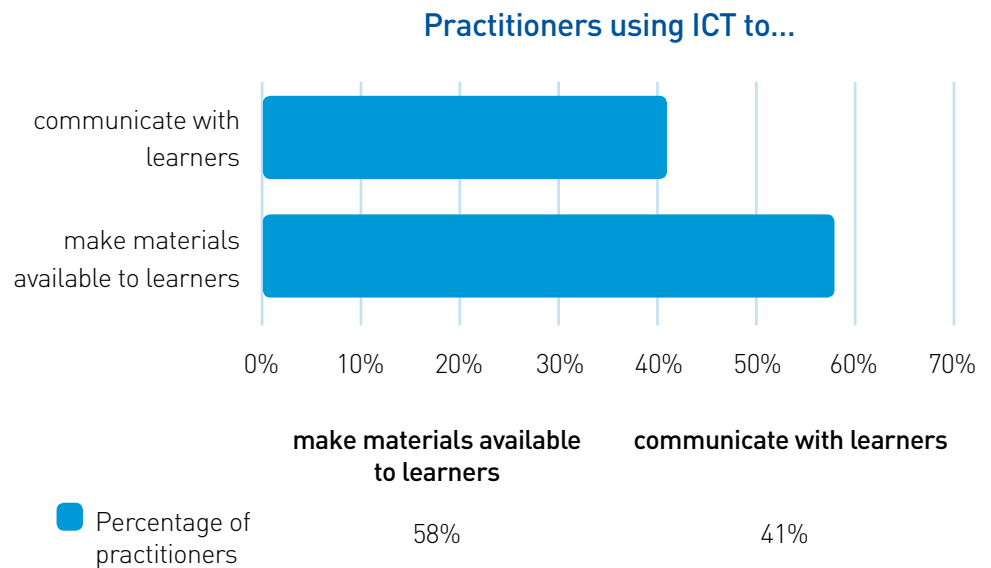
Among learners who used college computers, technical support was most usually sought from a member of the college IT support staff or a course tutor (GfK NOP, 2007b). Those who were least confident in their computing ability were more likely to ask a course tutor for help, while those who felt more confident would approach a member of the IT support staff. Nine out of ten of those that would seek support on technical problems felt that it was either very or quite easy to get help. Just 7 per cent found it difficult.
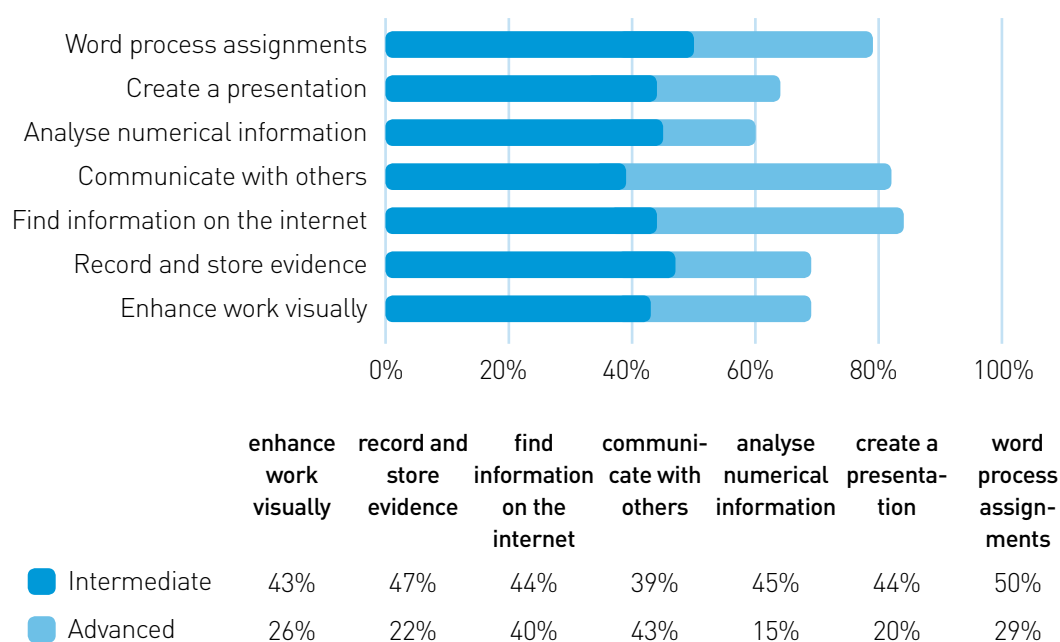
Practitioners in personal and community learning are relatively unaware of support services within their organisations (SERO, 2008). More than 20 per cent either did not know or did not respond to questions regarding resource centre support and technical support for learners. This would reduce the chance of learners being able to get these types of support.

Learners' capability in using technology

Learners in further education were most likely to rate themselves as an expert in email and internet skills (GfK NOP, 2007b). At least four in ten considered they were an expert in communicating with other people (43%) and in finding information on the internet (40%). Over a quarter felt they were an expert in word processing (29%) or adding visual information or decoration to their work (26%).

Levels of expertise were lowest for analysing numerical information using computers. Some 38 per cent rated themselves as beginners in this respect. One third of learners (33%) stated that they were beginners at using a computer to create a computer-based presentation.

Learners' assessment of own skills in using ICT to...

|	enhance work visually	record and store evidence	find information on the internet	communi- cate with others	analyse numerical information	create a presenta- tion	word process assign- ments
Intermediate	43%	47%	44%	39%	45%	44%	50%
Advanced	26%	22%	40%	43%	15%	20%	29%

A small proportion of learners answered 'don't know' when asked to rate themselves for each of these tasks. These learners either did not know what was involved or had never carried out a particular task before. Learners were most likely to be unsure whether they had recorded and stored evidence of their achievements (4 per cent answered 'don't know) compared with 1–2 per cent for the other tasks.

Younger learners and those with a computer at home were more likely to be computer literate and to be using computers for a range of tasks both at home and in college. Some 48 per cent of learners with a computer at home used ICT to present written work or data 'all the time' compared with 27 per cent of those without a home computer. They were also more likely to create and deliver presentations (27 per cent said 'all the time' compared with 16 per cent); submit assignments to tutors (22 per cent said 'all the time' compared with 16 per cent); and contact their tutor with queries (13 per cent said 'all the time' compared with 8 per cent).

As might be expected, those who considered themselves to be very confident using computers were much more likely to be using ICT for a range of purposes. This declined gradually for those describing themselves as fairly confident, okay for basic tasks, and not confident at all.

Practitioners estimating more than 60% of learners' ICT skills are...

	advanced	intermediate	basic
Percentage of practitioners	12%	25%	28%
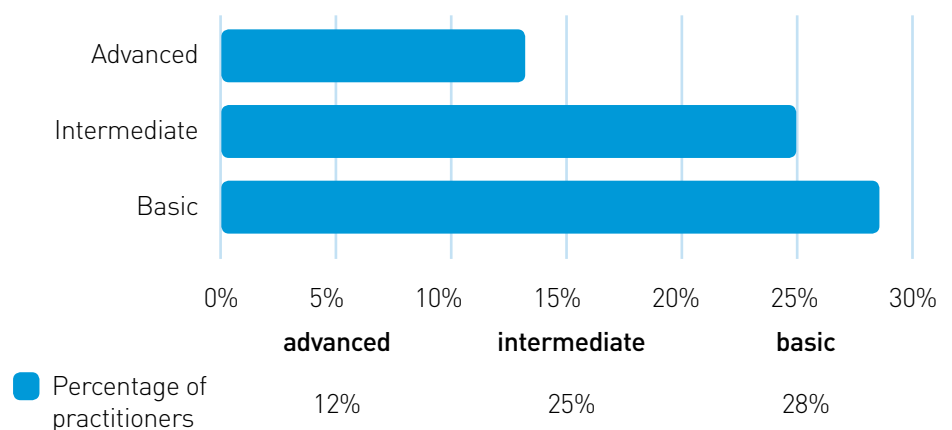
Further education practitioners, on the other hand, thought that their learners had lower skills (LSN, 2008). The majority (53%) estimated that more than 60 per cent had at best, intermediate skills in ICT. Only 12 per cent estimated that more than 60 per cent of their learners have advanced ICT skills. This note of caution is also echoed in studies of students using technology to support their learning. These identified some relatively unsophisticated use of technology among young people, characterised as the 'google generation' (JISC, 2008).

2.2 Does technology add value to family and informal learning?

In schools

Schools offering informal access to ICT facilities

Schools offering informal access to ICT facilities...

	before school	during breaks	after school
Primary	6%	21%	10%
Secondary	51%	77%	73%
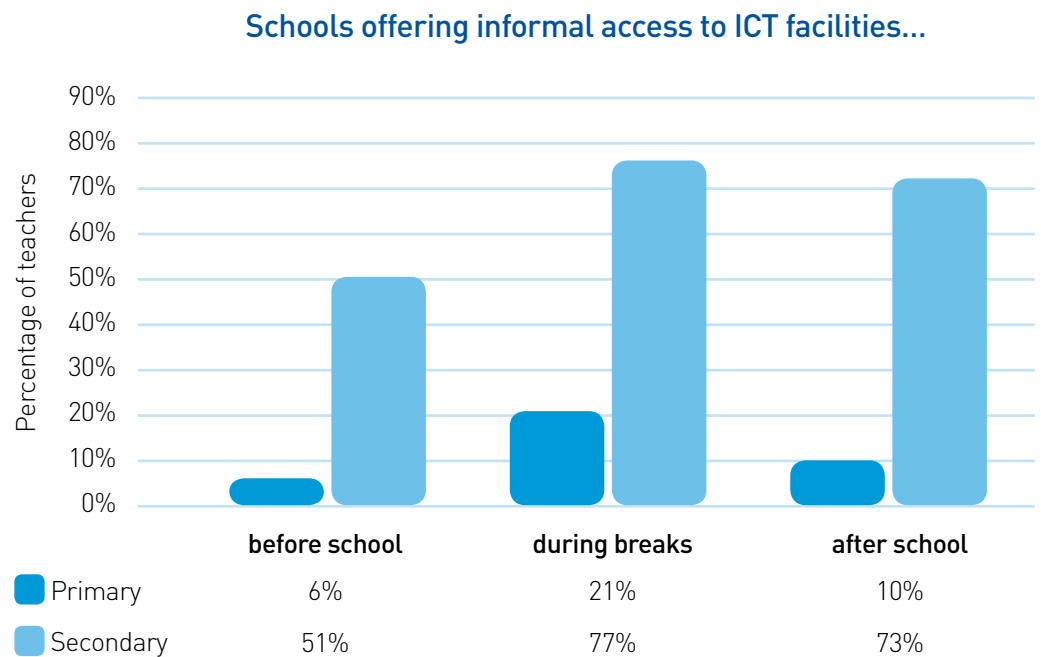
Secondary schools are far more likely than primaries to allow learners any informal access to their ICT facilities (Smith *et al*., 2008). In both types of school this is most often reported to be at break times. However, even here, only 21 per cent of primary schools offer this, as opposed to 77 per cent of secondary schools.

Some 50 per cent of primary school pupils reported using a computer on their own in school during lessons and 67 per cent using a computer in a group in school during lessons (Cranmer *et al*., 2008). Some 34 per cent reported using a computer in school during break or lunchtimes and 46 per cent using a computer in school before or after school. Pupils in Year 6 (57%) were most likely to report using a computer on their own during lessons. On the other hand, group use of computers was more likely to be reported by Year 3 pupils (81%).

The value of technology for learning in and out of school

Pupils using computer applications 'a lot'

	Play games	Make pictures	Use digital camera	Write things	Use spread-sheets	Make presenta-tions
Home	80%	44%	28%	37%	10%	15%
School	41%	34%	14%	68%	26%	25%
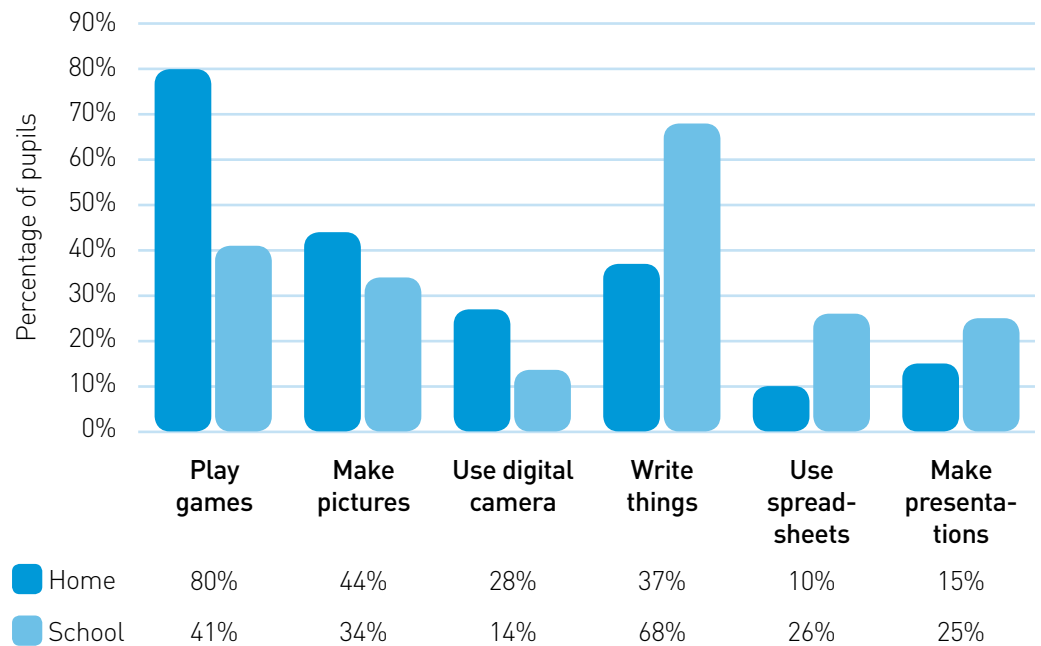
Primary school pupils were asked about their use of non-internet computer applications both in and out of school (Cranmer et al., 2008). Nine main types of computer application were reported as being used, with levels of usage varying between school and home. Use of computer games, digital cameras, and making pictures were all more prevalent in the home rather than school context. On the other hand, use of computers for writing, presentations and spreadsheets were more likely to be school-based.

Pupils' use of these applications at school varied considerably by age and school attended. School-based use of computer games, CD programs, making pictures and email were more likely to be reported by boys than girls. The use of databases and spreadsheets increased from Years 3 through to 6. However, making pictures, using CD programs, digital cameras, scanners and playing computer games all declined in use as pupils got older.

Pupils were subdued in interviews when discussing school ICT use, but talked with passion about their out-of-school activities. School ICT uses included using the computer for writing and drawing, searching for information, maths and science educational games, and databases. Favoured home uses of ICT were freely chosen for fun, rather than learning.

Pupils were also asked about learning associated with using ICT both at school and at home. Pupils were most likely to indicate that they felt they were learning in both settings in a number of ways. These included finding out new things, learning to make and create things, and doing other things that they could not do before. Pupils were less likely to indicate that they felt they were learning from school or home ICT use in terms of maths, revising for tests or learning to read.

School internet use was dominated by schoolwork-related activity such as information and picture retrieval. Home internet was dominated by online games, watching video clips and, to a lesser extent, chatting and using social networking sites. Other than for the internet, use of computers in school entailed mainly writing up work, making presentations and, for older children, spreadsheet and database work. At home children were using computers for games and email. Creative and collaborative uses of technology were not prevalent either inside or outside school, with passive consumption rather than active production the dominant mode of engagement.

For many children technology was most engaging and most desirable when used for 'games', and the least exciting and most objectionable uses of ICT were for 'work'. There was little evidence of a blurring of home and school uses of ICT, and little evidence of a blurring of play and learning. Aside from this general disdain for school-related activities, the majority of children indicated that they felt ICT use could lead to gains in learning – especially in terms of finding things out and what could be classed as self-directed learning. Interestingly, these perceived learning gains were felt equally in terms of in-school and outside-school use.

In interviews, 35 out of 39 parents of children in the early years foundation stage reported frequently using computers with their children. Some 38 of these parents considered that technology contributed to young children's learning and development. Several parents thought that ICT provided a different way to learn and was seen as central to life today. Skills such as hand–eye coordination and controlling a mouse were also mentioned. Overall, these parents felt that that ICT contributed to children's learning in a variety of ways (Aubrey and Dahl, 2008).

In the FE and Skills sector

Non-college computer use at home

Use of the internet to support both formal and informal learning is common among adults. Some 76 per cent of young people and adults aged 14+ with access to the internet, used it for investigating topics of personal interest, 52 per cent for finding out about further study and 22 per cent for formal distance learning (OxIS, 2007).

FE college learners with a computer at home use it for a variety of leisure purposes (GfK NOP, 2007b). Some 88 per cent surf the internet and 81 per cent communicate with others via email or instant messaging. Around half regularly shop online, create things or download music, video or podcasts.

Leisure activities regularly carried out at home
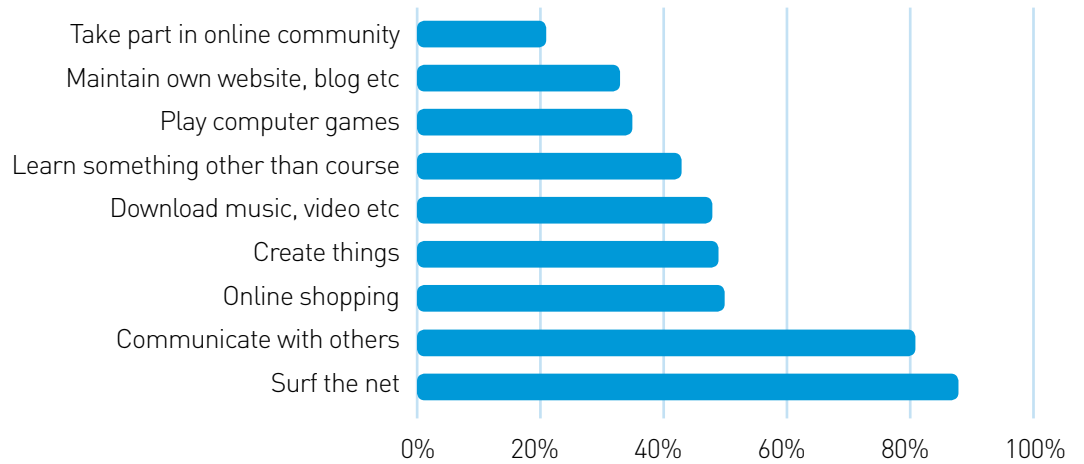
■ Percentage of learners with home computer	**Surf the net**	**Communicate with others**	**Online shopping**	**Create things**
	88%	81%	50%	49%
Download music, video etc	**Learn something other than course**	**Play computer games**	**Maintain own website, blog etc**	**Take part in online community**
48%	43%	35%	33%	21%

A higher proportion of men than women took part in computer-related leisure activities, with the exception of online shopping, which was reported by around half of both male and female learners. Younger learners were more likely to regularly take part in all computer-related leisure activities, with the exception of online shopping and learning about something other than their college course. A greater number of full-time learners also took part in the majority of computer leisure activities, with one exception being 'online shopping' in which part-time learners were more involved.

2.3 Are learners confident and safe users of technology to support their learning?

In schools

Planning to develop pupils' capability

Ofsted noted that more schools now not only provide discrete ICT lessons but also develop pupils' capability through other subjects. They note that 'where this was well planned, pupils made very good progress, but more often their experience was erratic and opportunities for them to build on their knowledge and skills were insufficient' (Ofsted, 2008).

Secure storage of work

Over 90 per cent of secondary schools offer a secure area for pupils to store their work. In most cases this is hosted by the school itself, a similar proportion to 2007 (Smith *et al.*, 2008). Some 49 per cent of primary schools offer all pupils a secure area for their digital work. Another 40 per cent offer this to some pupils, a considerable increase from 11 per cent in 2007. This also tends to be hosted by the school, although the local authority is the host in just over a tenth of cases.

Half of special schools say that all pupils had a personal secure area and just over a third report that some pupils have access to such an area for storing their digital work. Special schools have, however, the highest proportion of ICT coordinators who said none of their pupils had a personal secure area for storing their work (11%) compared with 2 per cent of secondary schools and 6 per cent of primary schools.

E-safety

Nearly three-quarters of primary pupils in five schools indicated that they had thought about how to stay safe when using the internet (Cranmer *et al.*, 2008). A majority of these claimed also to be aware of ways that they could keep themselves safe. However, when asked to provide specific examples of such e-safety practices, only one third of pupils were able to cite a valid answer. Interviews with children also suggested that some younger children had an abstract awareness of safety issues but that this was frequently confused in practice. Older children had a more developed understanding of what risks might be when using the internet, although most responses were concerned with 'mundane risks' such as losing work or becoming bored with particular games or activities.

'Pupils' awareness of e-safety'

	Thought about e-safety	Claimed to be aware of ways to remain e-safe	Able to cite ways to remain e-safe
Percentage of pupils	72%	69%	34%
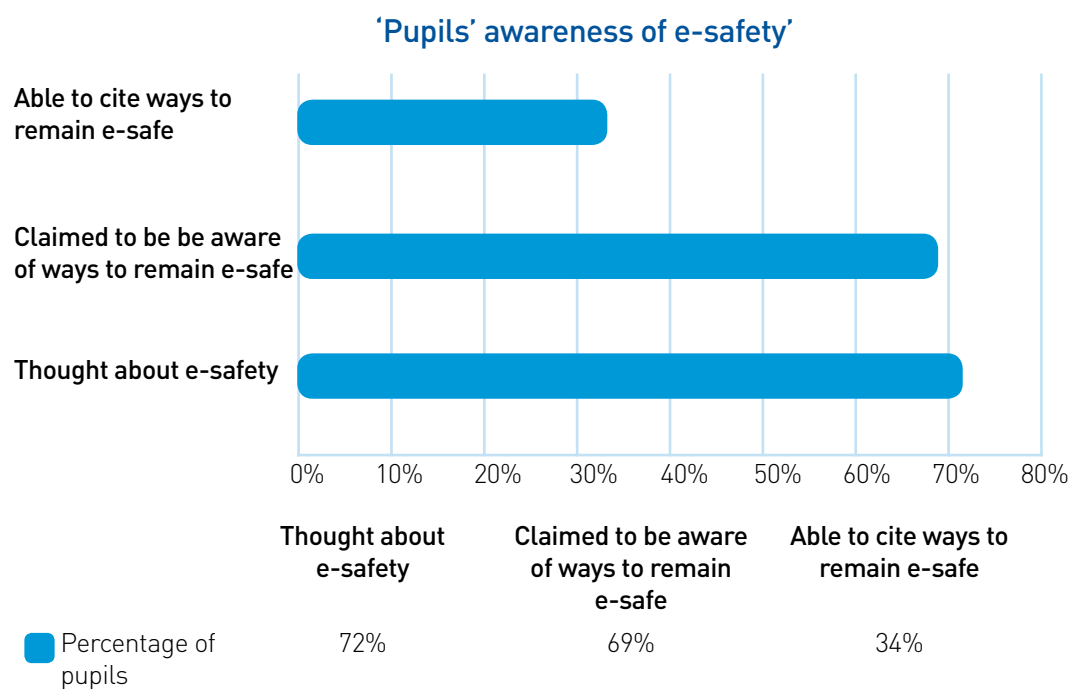
These children appeared muddled about the potential outcomes of not following safety advice. Even so, many had taken messages on board, such as not giving out personal information and not talking to strangers. In addition, children were reportedly wary of clicking on pop-ups which they typically saw as causing viruses which could damage the computer. In one school pupils were able to recall in detail advice they had been given in discrete sessions about internet safety provided by one of their teachers.

Other risks raised in discussion included eye strain from using the computer too much, copycat behaviour stemming from viewing video clips showing examples of 'happy slapping' for instance, having phones stolen, and falling victim to viruses. Some children's responses reflected wider social concerns, showing anxiety about seeing sites which were too old for them, specifically 'rude' or violent websites that might upset them or generate nightmares.

In the FE and Skills sector
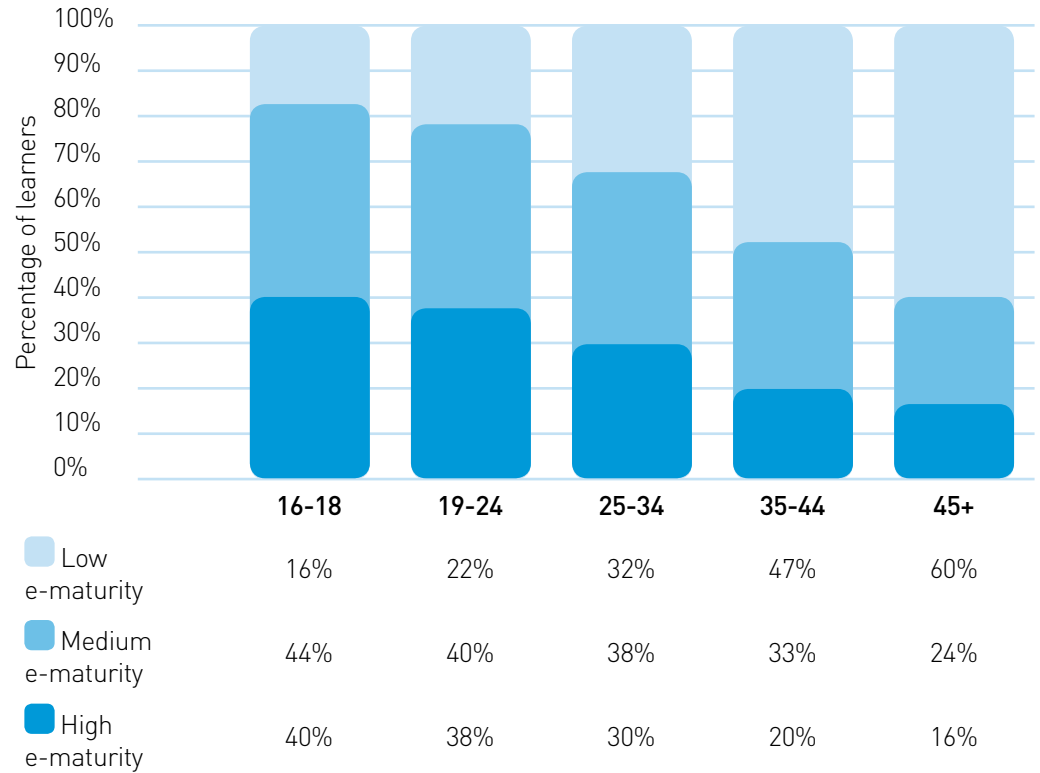
Learners' confidence in using ICT

The majority of FE learners were confident users of ICT (GfK NOP, 2007b). Around one third (35%) said they were very confident in using computers for a wide range of tasks, and 40 per cent described themselves as quite confident. Age was an important factor, with older learners less confident than their younger counterparts. Some 20 per cent of learners over 45 and 24 per cent of 35 to 44-year-olds felt very confident in their use of computers compared with 49 per cent of 16 to18-year-olds and 44 per cent of 19 to 24-year-olds.

There was also some variation by subject of study. Those studying business and professional subjects, engineering and technology, sciences and maths, performing arts and media and those studying humanities were the most confident in their use of computers. Those studying hairdressing and beauty, health and social care, languages and communication and, surprisingly, ICT were among the least confident users. Full-time learners also showed more confidence in their computer use than part-time learners.

Learners' e-maturity

Learner 'e-maturity' seeks to gauge the skills and abilities that learners need in order to be effective within technology-rich learning environments. The measure of learner e-maturity used in this study combined questions relating to learner expertise in relation to a range of specific ICT-based tasks and learner perceptions of their confidence in using technology. Learners were then categorised as 'high', 'medium' or 'low' in terms of their e-maturity (GfK NOP, 2007a).

Learner e-maturity by age

Percentage of learners

	16-18	19-24	25-34	35-44	45+
Low e-maturity	16%	22%	32%	47%	60%
Medium e-maturity	44%	40%	38%	33%	24%
High e-maturity	40%	38%	30%	20%	16%

Learner e-maturity by college e-enablement

Percentage of learners by college type

	E-enabled	Enthusiastic	Ambivalent	Late adopter
Low e-maturity	29%	30%	37%	39%
Medium e-maturity	38%	37%	36%	35%
High e-maturity	33%	33%	27%	25%
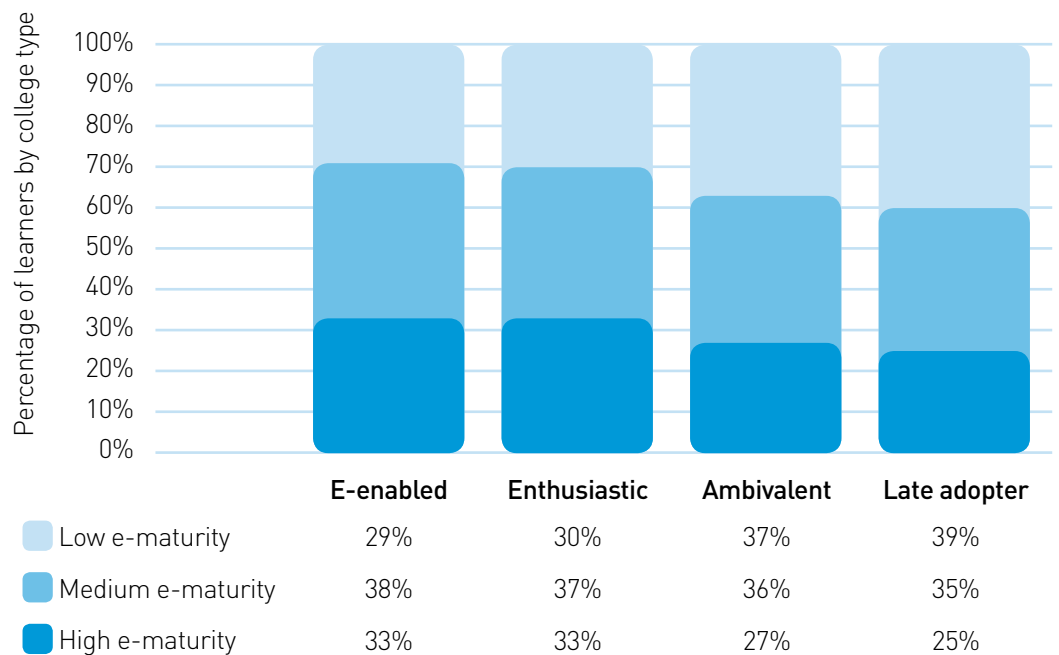
Younger learners, aged 16 to 24 were far more likely to be defined as having high or medium e-maturity compared with those aged over 35. This could be related to mode of study as younger learners were more likely to be on full-time courses which tend to use computers more as part of their course. However, it should also be noted that younger male respondents are generally more likely to rate themselves as more confident or expert compared with older respondents and female respondents.

Learners studying at colleges classified as e-enabled or 'enthusiastic' were more likely to fall into the high or medium e-maturity categories. This suggests that college investment to improve computer access and the usage of ICT does have an impact on learners' ICT confidence and expertise.

Computer use was positively associated with higher earnings, especially for men and younger workers (Dolton *et al.*, 2007). While this may be a proxy for a person's job type, there is clearly an implication for future earnings of FE students. Students who attended more e-mature institutions would on the face of it be in a better position in the job market.

College acceptable use policies

FE colleges had policies for both staff and learners which governed their use of technology, particularly their use of the internet and email (LSN, 2008). During online enrolment at one college, learners could not progress with enrolment until they had read and agreed with the policy. In interview, several emphasised the strictness of their application of these policies.

Tight restrictions were often placed on website access, often excluding all sites and requiring staff to request access to particular sites for their own or learners' use, a matter of concern for some practitioners. Social networking sites were generally more acceptable and caused less of a problem. Some providers also welcomed these technologies as part of the next generation of learning platforms.

Basic training was provided to learners as part of their induction in many colleges. These covered both the health and safety aspects of e-safety as well as the 'do's and don'ts' relating to acceptable usage. The general consensus was to change users' attitudes so that they adopt a sensible and self-regulating approach.

Non-college providers of personal and community learning tend not to have a full and detailed policy on e-safety (SERO, 2008). Many of these providers are part of local authorities that tend to have policies based on their corporate concerns. The use of local authority networks for learning purposes is then often constrained by these corporate firewalls.

3. Confident system leadership and innovation

Peter Northouse (2000) defined leadership as 'a process whereby an individual influences a group so as to achieve a common goal'. It therefore involves balancing priorities, forming alliances and instigating action. Technology can help deliver many of the priorities of education leaders, if it is seen as offering a credible solution. Nationally, standards for leadership and inspection that take technology into account can ensure that school and college leaders know how to deploy technology to best effect. If schools and colleges can share or jointly develop technology and practice, this will better utilise the people and resources already in the system. These new and innovative practices can also help raise the quality of teaching.

In order to assess the extent to which education leaders engage with technology and innovation, the following questions will be used to structure the evidence in this section:

• Do education leaders use technology to support their priorities?

• What wider support do learning providers receive?

• Is innovation encouraged across the system and good practice shared and adopted?

3.1 Do education leaders use technology to support their priorities?

In schools

Headteachers' priorities

Headteachers have to deal with a wide range of competing priorities. Few of these priorities are directly technology-oriented, though many would require technology as part of their solution. Headteacher and senior management workload was a serious concern for both primary and secondary heads (Edcoms, 2008). Bureaucracy and lack of time were particular concerns for primary heads, while teacher recruitment and the new 14–19 diplomas were concerns for secondary heads.

Both primary and secondary heads were working on self-evaluation and 'light-touch' Ofsted inspections. Personalised learning also appeared on the agendas of both sets of heads. Primary heads were also currently working on extended schools and the primary strategy. Secondary heads are working on specialist status and the Every Child Matters requirement to work with other agencies.

The least popular initiatives among headteachers were the development of Trust schools and Academies, but also greater parental involvement and extended schools.
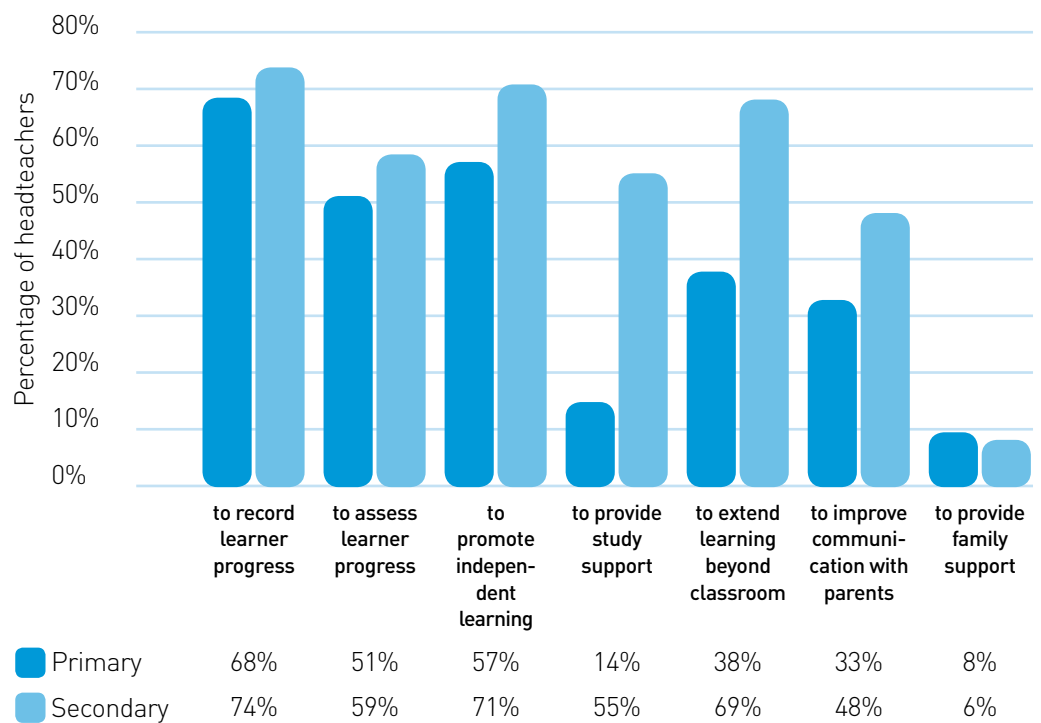
Headteachers' priorities for technology use

When prioritising the deployment of technology in their schools, headteachers tend to focus on using ICT in management and administration and then on using it in teaching and learning (Smith *et al*., 2008).

Over two thirds of primary heads (68%) report that using technology to record learner progress is a priority for them over the next few years; this is a slight increase on the 2007 percentage of 55 per cent. Using technology to inform the learning and teaching process (58%) and to promote independent learning (57%) are also high priorities for over half of primary schools. Improving communication with parents remains a high priority for around one third of primary schools between 2007 and 2008, and the percentage of primary schools reporting that extending learning beyond the classroom is a high priority for them in the next three years has decreased from 43 per cent in 2007 to 38 per cent in 2008.

Unlike primary schools, secondary schools also give high priority to the areas of communication and collaboration and study support. Just under half of secondary heads (48%) said that they are giving high priority to using technology to communicate with parents (a slight increase from 45 per cent in 2007) and over half (55%) said that using technology to provide study support for learners is a high priority. There has also been a slight decrease in the percentage of secondary heads who reported that using technology to support personalising learning is a high priority for them. This decreased from 73 per cent in 2007 to 63 per cent in 2008.

Heads reporting 'high' priority for technology use...

	to record learner progress	to assess learner progress	to promote independent learning	to provide study support	to extend learning beyond classroom	to improve communication with parents	to provide family support
Primary	68%	51%	57%	14%	38%	33%	8%
Secondary	74%	59%	71%	55%	69%	48%	6%

More schools are prioritising recording learner progress over assessing learner progress, indicating that technology is seen more as a data collection tool and less as an aid to analysis. Also, many schools prioritise promoting independent learning over providing study support, and many also prioritise extending learning beyond the classroom over improved communication with parents or providing family support. This may reflect headteachers' concern with overall strategies rather than their implementation, though perhaps may reflect a view of ICT as a one-way 'promotional' technology rather than a two-way 'collaborative' one.

In around half of schools (slightly more in primary schools and slightly less in secondary schools), the whole-school policy governs decisions about how digital learning resources are used by teachers and department heads. In secondary schools in particular, it is unusual for decisions about the use of these resources to be left to the individual teacher.

Ofsted has expressed concern about the gap between the best and worst schools in terms of ICT leadership and management. 'The quality of the leadership and management of ICT in the schools visited was better than in the past, but the gap between the best and the worst provision was wide. Few schools had outstanding provision' (Ofsted, 2008).

In the FE and Skills sector

Planning for ICT use

More than four fifths of all colleges (82%) have a dedicated ICT and e-learning strategy (LSN, 2008). Some 97 per cent address some aspect of ICT in college strategies. This implies a relatively high level of commitment to use of ICT within the senior management in FE providers. However, some strategies focus on use of ICT and e-learning in a fairly general way and are less likely to cover more specific usage such as self-assessment reviews.

Colleges with a strategy that addresses using ICT...

	to manage learner records	to deliver learning	in self assessment reviews	to assess demand and capacity
As part of a wider strategy	51%	23%	43%	39%
In a dedicated ICT strategy	44%	72%	30%	45%
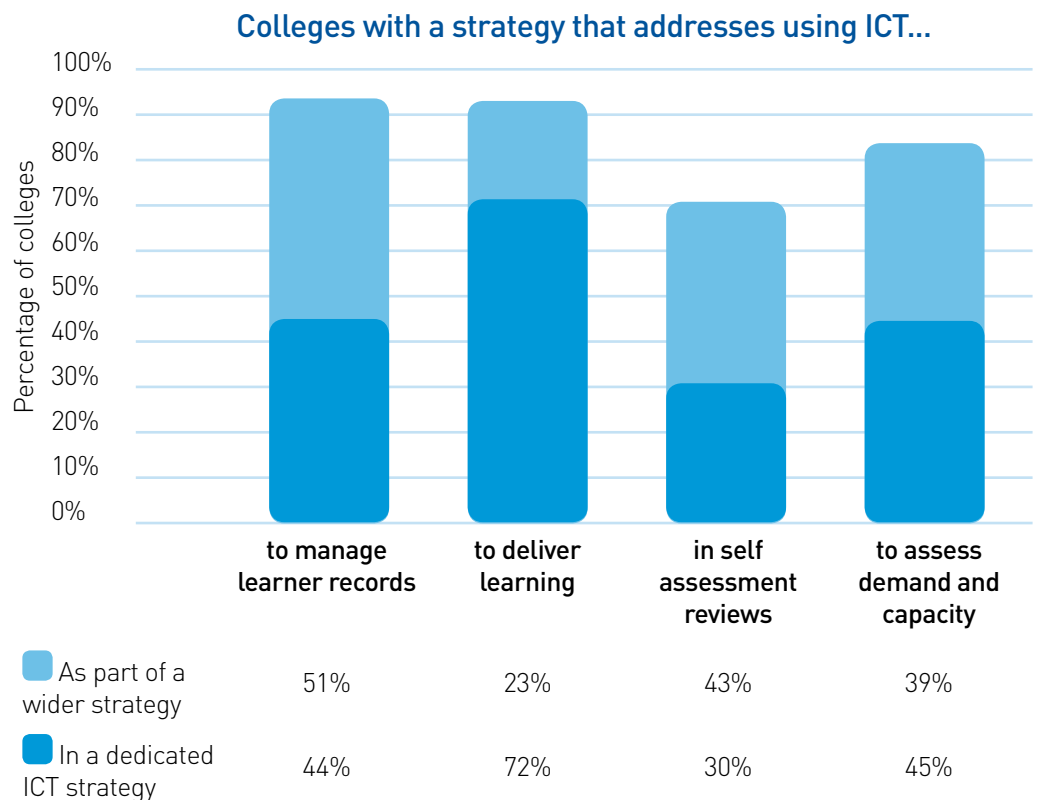
Setting targets for the use of ICT and e-learning varies across providers: just over a third (35%) have formal targets across all programmes; a further 34 per cent across 'some programmes', and the remaining 31 per cent do not have targets.

Just over half of work-based learning providers (51%) have a written strategy covering a full range of ICT uses. Just 8 per cent of providers do not have any written strategies for ICT (MacKinnon, 2008). Providers are most likely to have strategies covering technical support for staff and learners (86%) and safe and secure learning environments (85%). They are least likely to cover staff training to support and deliver e-learning (68%), sustainable use of technology (72%) or e-learning resources (72%).
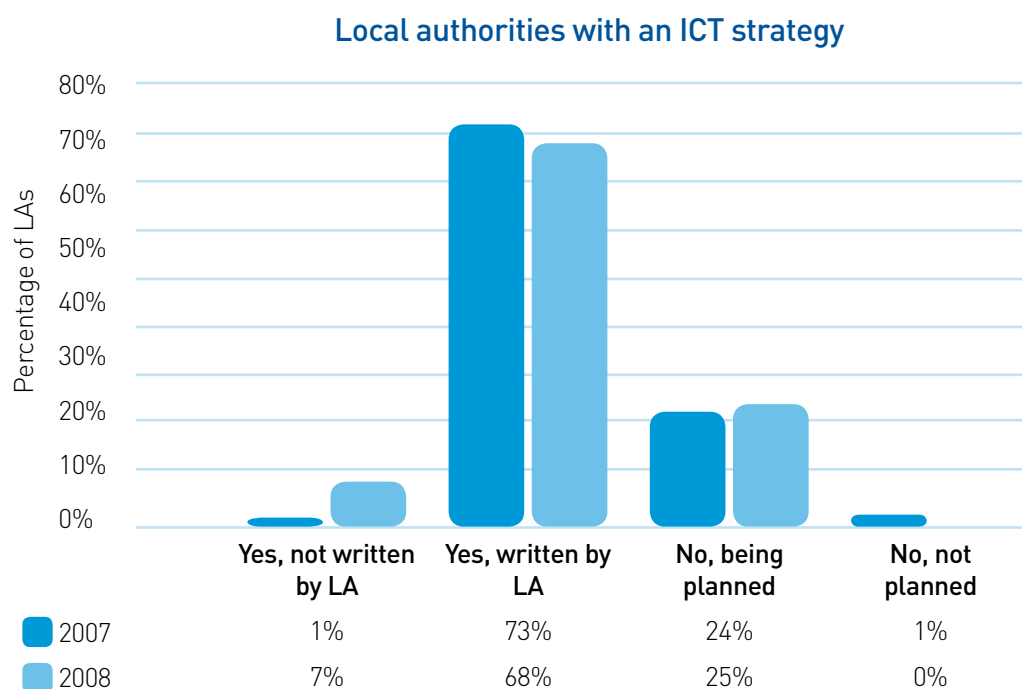
Contributors to strategy development

Senior college staff and curriculum leaders generally contribute to the development of dedicated ICT and e-learning strategies (LSN, 2008). Consultation with other teaching staff and learning support staff is less widespread. Consultation with learners is even less common, which may be a concern given the current policy priorities surrounding personalisation and meeting learners' needs. In addition, 80 per cent of respondents thought less than half the staff at their college were aware of the ICT and e-learning strategy.

Qualitative interviews suggest that strategies in more e-mature colleges are 'led from the top', and address the college's business strategy as well as quality improvement. Technology is perceived as a major support mechanism for organisational change. This is expressed as a desire to become more efficient in data management and its use to monitor, review and plan provision. These more e-mature providers see technology as a way to improve efficiency, reduce costs and to encourage innovation and flexibility in delivering teaching and learning.

3.2 What wider support do learning providers receive?

In schools

Local authorities with an ICT strategy

Local authorities with an ICT strategy

	Yes, not written by LA	Yes, written by LA	No, being planned	No, not planned
2007	1%	73%	24%	1%
2008	7%	68%	25%	0%

Three quarters of local authorities (75%) report having an ICT strategy in place (Hewton and Mortimer, 2008). Generally, these figures were similar in 2007. However, those that said the strategy was not written by the local authority increased from 1 per cent in 2007 to 7 per cent in 2008. Also, the remaining quarter of local authorities without a strategy remains unchanged, despite this proportion also saying that they 'planned' one the previous year.

In contrast to the mixed picture at school level, local authorities' strategies for technology in schools are more strongly influenced by national priorities and initiatives. All local authorities report that the strategy incorporates the Every School Connected initiative (broadband). Nearly all report that the strategy incorporates learning platforms (97%) and an online learning space for every child (96%), while 90 per cent report that it incorporates internet safety. A majority (71%) also indicate that the strategy incorporates Building Schools for the Future and access to the National Education Network priorities. Fewer authorities incorporate the Computers for Pupils (50 per cent now, and 64 per cent in 2007) and E-assessment schemes (now 43 per cent, and 58 per cent in 2007).

Similarly, curriculum areas prioritised for technology support by local authorities broadly reflect national priorities. These are mathematics (87%), English (86%), ICT (77%), and science (62%). In the secondary sector particularly, maths and English represent key areas for improvement in relation to National Challenge schools.

About a quarter of local authorities (26%) report that all or most schools in their area have been actively involved in developing the strategy. The majority of local authorities (93%) report that schools in their area have been involved in the process of strategy formulation to some extent.

Eighty-nine per cent of local authorities indicate that their strategy for the use of ICT in schools is reviewed on a systematic basis. Just under a third of local authorities (32%) said that their strategy is reviewed on at least an annual basis. Similar proportions report that it is scheduled to be reviewed once every one to two years (30%) or two to five years (27%). The proportion of authorities who review their strategy at least annually has decreased from 47 per cent in 2007 to 32 per cent in 2008.

Supporting change in schools

Almost all local authorities (99%) provide schools with advice about their ICT infrastructure (Hewton and Mortimer, 2008). While it is most common for this information to be supplied on request (61%), 38 per cent provide it to all schools systematically. These figures are very similar to those for 2007.
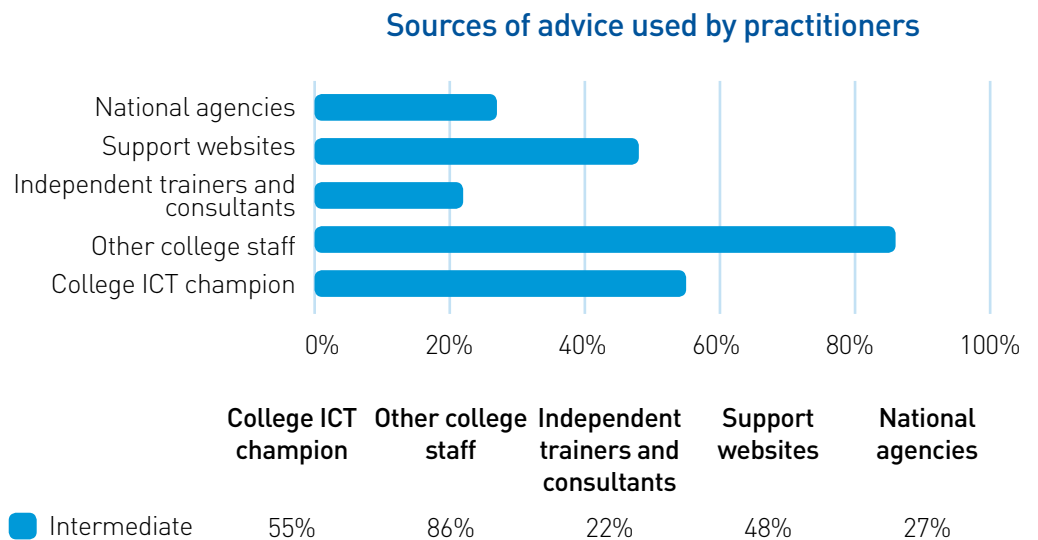
Just under one third (30%) of local authorities currently provide an area-wide e-portfolio system for all learners to record their progress, an increase from 21 per cent in 2007. A further 12 per cent did this for some learners. The remaining local authorities plan to introduce a system.

Nearly all (99%) local authorities reported that they provide advice or recommendations to subject teachers on digital resources for use in the curriculum. In the majority of cases (62%) such advice is provided for some subject areas only; however, in 37 per cent of cases this advice is provided for all subject areas. These figures are almost identical to those for 2007.

Some 96 per cent of local authorities enable teachers to share digital learning resources in some way. Of these, just over half (52%) share resources via a website, around a third (36%) via a repository and access and 10 per cent via CD-Roms.

In the FE and Skills sector

Sources of advice for practitioners

Sources of advice used by practitioners

	College ICT champion	Other college staff	Independent trainers and consultants	Support websites	National agencies
Intermediate	55%	86%	22%	48%	27%

College practitioners are most likely to seek advice on ICT and e-learning from other members of college staff and some 86 per cent of practitioners do this (LSN, 2008). Around half consult their college's ILT champion (55%) or a website (48%). Rather less than one third (27%) said they would seek advice from a national agency and even fewer from independent training or consulting organisations.

These findings are backed up by interview evidence that indicates a wide range of knowledge about the support available from external agencies. Some practitioners have sought advice from a range of agencies but this is a small proportion. Others are involved in various user and practitioner networks.
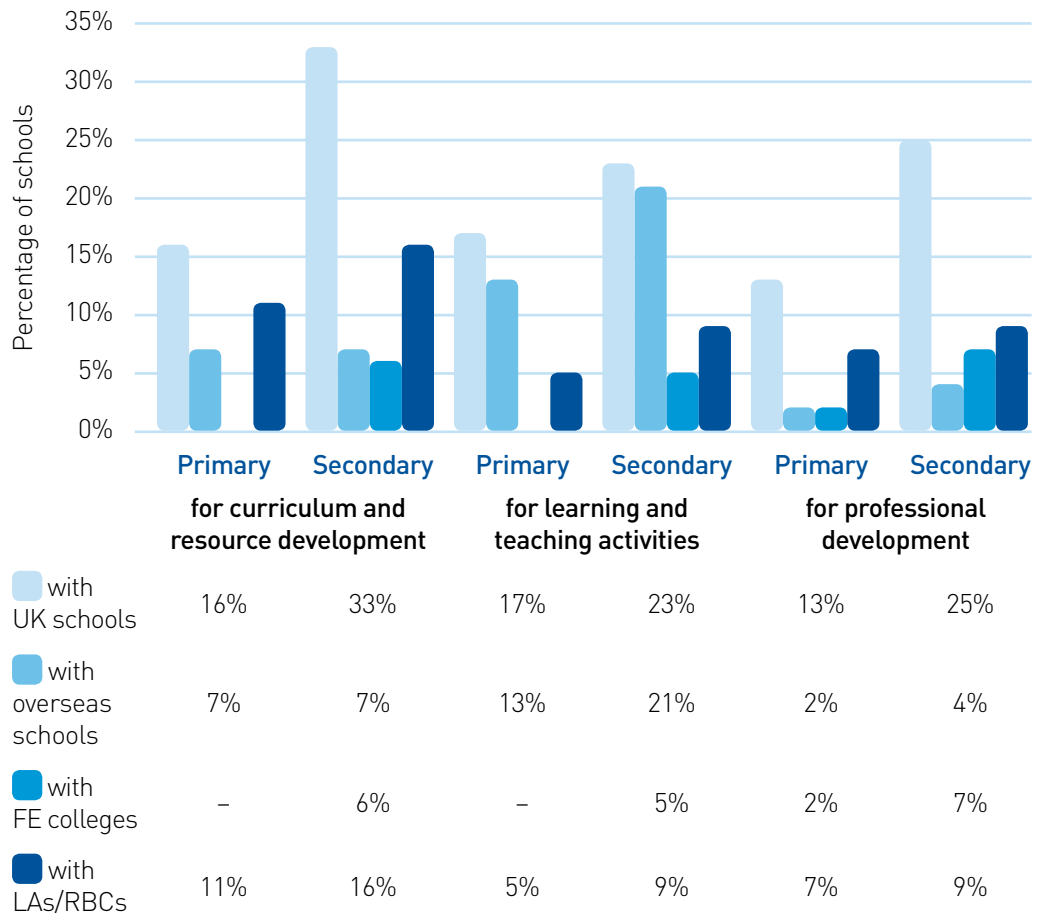
3.3 Is innovation encouraged across the system and good practice shared and adopted?

In schools

Schools' collaboration with technology

Under half (47%) of primary schools, 37 per cent of special schools and 23 per cent of secondary schools report that they are not engaged in any ICT collaborative networks (Smith *et al.*, 2008). Using technology over the next few years to establish links with educational institutions at a distance is a low priority for around a third of all schools. Of the 78 primary schools that reported currently taking part in partnership working in terms of ICT, the highest number (33 out of 78) are collaborating on purchasing a learning platform. This is similar for secondary schools (47 out of 106) and to a slightly lesser extent for special schools (38 out of 112).

Schools using technology for collaboration

|	for curriculum and resource development		for learning and teaching activities		for professional development	
	Primary	Secondary	Primary	Secondary	Primary	Secondary
with UK schools	16%	33%	17%	23%	13%	25%
with overseas schools	7%	7%	13%	21%	2%	4%
with FE colleges	–	6%	–	5%	2%	7%
with LAs/RBCs	11%	16%	5%	9%	7%	9%

Almost a quarter of secondary school teachers share resources they have created with teaching staff in other schools. More respondents in primary and special schools than in secondary schools do not share the digital resources they have created. The proportion of teachers that share learning resources with other teachers within their own school and with other schools has increased from 2007 levels.

Collaborating on a learning platform is at a fairly low level, with only 3 per cent of secondary schools and 1 per cent of primary schools having purchased their learning platform as part of a consortium. However, 31 per cent of secondary headteachers and 21 per cent of primary heads said they were part of a consortium intending to do this.

In the FE and Skills sector

Collaboration and sharing

ICT and e-learning is used to promote collaboration and sharing of teaching and learning resources within colleges, although less so between providers (LSN, 2008). Some 91 per cent of providers thought ICT and e-learning was used to promote collaboration between practitioners in their college to at least some extent. However, only 3 per cent of providers use ICT to promote collaboration with other providers to a large extent. Some 42 per cent 'rarely or never' do this.

Use of ICT to promote collaboration and sharing resources...

	between college practitioners	with other providers
to some extent	55%	54%
to a large extent	36%	3%
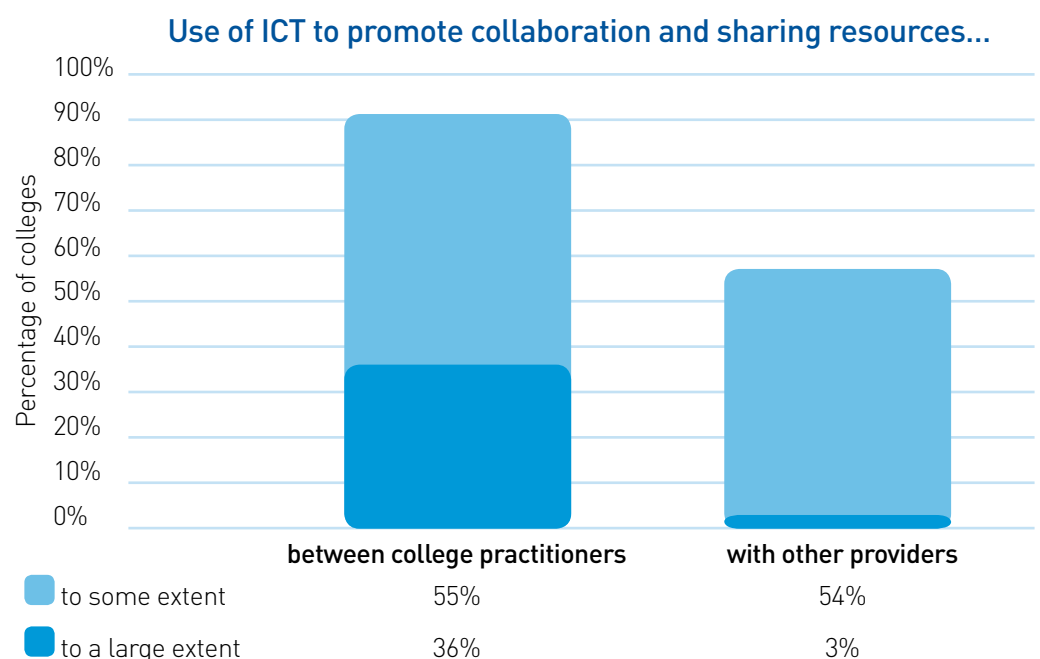
This view of collaboration was confirmed in interviews with FE providers. Most colleges are quite open and enthusiastic about internal collaboration. Peer group support is felt to help with take-up and embedding of ICT and e-learning into the curriculum. However, external collaboration depends in part on organisational culture.

Practitioners are more likely to share information and practices directly to improve the work they do. The JISC RSC networks are seen to support collaboration quite effectively in practitioner-based areas. User groups are another area where sharing takes place.

Working in partnerships with other providers, for example on 14–19 provision, highlights some compatibility issues around learning platforms and databases. Respondents felt that this could waste the often limited time and resources allocated to joint projects.

This picture of practice sharing and shared innovation is also reflected in FE colleges. In this sector, 33 per cent of colleges promote resource sharing and collaboration within the college to a large extent. However, only 3 per cent do this for collaboration with other providers. This suggests a genuine need to foster innovation and good practice networks such as the Technology Exemplar Network [http://excellence.qia.org.uk/page.aspx?o=158557].

Partnership working in work-based learning

Some 39 per cent of work-based learning providers develop computer-based learning resources in partnership with other providers (MacKinnon, 2008). This includes other work-based learning providers (24%), FE colleges (16%), industry bodies (14%) or employers (8%). Some 83 per cent of providers use ICT to share information or data with partners. Three fifths of providers use ICT to share data with other work-based learning providers.

4. Enabling infrastructure and processes

To get the best from technology-based systems, learning providers need to ensure that their management information can effectively support learning. A learning platform should give learners access to a range of high-quality resources tailored to meet their needs, and all this should be provided at the best possible value for money. Providers should take advantage of the buying power offered by national frameworks and the collaborative provision of services. The technology infrastructure should be both affordable in the long term and have minimal impact on the wider environment.

In order to assess the implementation of technology-based systems, this section considers the following questions:

• To what extent are learner services integrated?

• Are high-quality, tailored resources available to all learners?

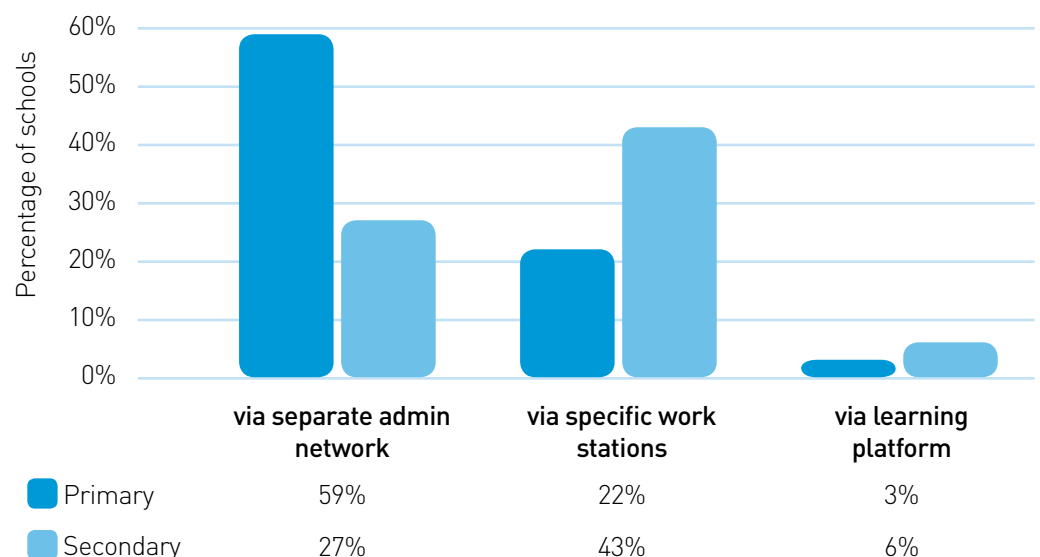• Is the technology infrastructure for learning efficient and sustainable?

4.1 To what extent are learner services integrated?

In schools
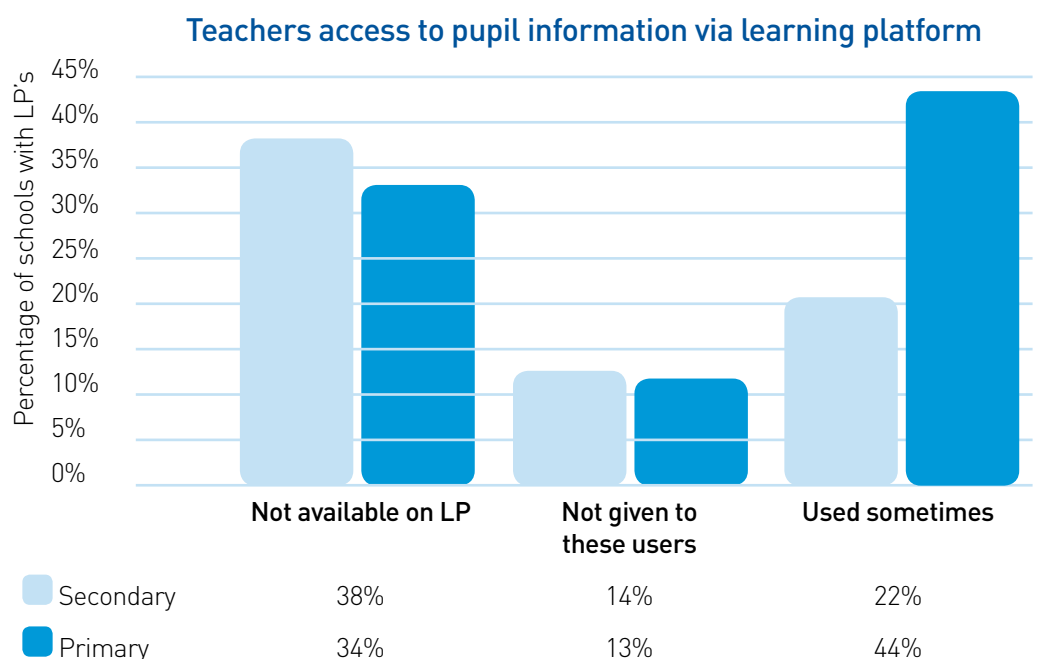
Access to management information systems

Almost all secondary schools use a MIS, as do around 80 per cent of primary and special schools (Smith *et al.*, 2008). Most schools also restrict access to their MIS. In secondary schools access tends to be restricted to specific workstations (43%). In over half of primary and special schools, access is restricted to a separate administration network.

Staff access to schools' management information systems...

	via separate admin network	via specific work stations	via learning platform
Primary	59%	22%	3%
Secondary	27%	43%	6%

Percentage of schools

Few schools report that their MIS can be accessed via a learning platform. Even within schools with a learning platform, access to pupil progress and performance information is restricted. Despite these restrictions, teachers find learning platforms most useful as stores for learning and teaching resources and, secondly, as sources of information about pupil progress.

Some 91 per cent of local authorities reported that their MIS is integrated with the systems in their schools. Forty per cent have a single system that everyone uses and just over half (51%) reported that several compatible systems are used. In 2007, 28 per cent of authorities reported that a single MIS that everyone used had been introduced across all of its schools. This has increased to 40 per cent in 2008. As a result, there was also a decrease in the proportion of authorities that used multiple compatible MIS, from 62 per cent in 2007 to 51 per cent in 2008. The remaining 9 per cent of local authorities did not have MIS integrated with the systems of their schools (Hewton and Mortimer, 2008).

Teachers access to pupil information via learning platform

	Not available on LP	Not given to these users	Used sometimes
Secondary	38%	14%	22%
Primary	34%	13%	44%

Other information systems

More secondary schools use electronic systems for recording learner attendance, attainment and behaviour, than either primary or special schools. Almost all secondary schools (95%) have an electronic system for recording learner attainment. These systems are also in place in a large majority of both primary schools (87%) and special schools (75%) (Smith *et al.*, 2008).
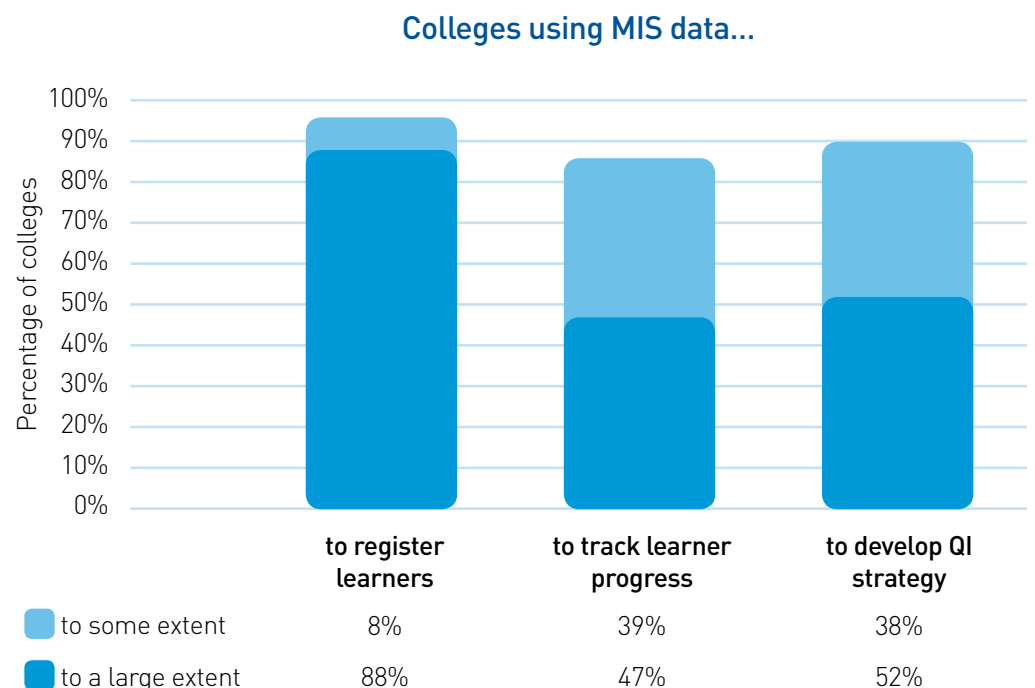
Over 80 per cent of secondary and primary schools have electronic systems for recording learner attendance. Just over 60 per cent of special schools have such a system. Nearly three-quarters of secondary schools and over half of primary schools also say it has made the identification of repeat non-attendance more effective.

Over three quarters of secondary schools have an electronic system for recording behaviour issues. This compares to under a quarter of primary schools and just over a third of special schools. This may be partly due to the expectation that involvement in behaviour partnerships should be compulsory for secondary schools from 2008.

In the FE and Skills sector

Links between MIS and learning platforms

MIS data is routinely used to register learners in colleges but used less often for other tasks (LSN, 2008). Just under half of colleges (46%) have an MIS linked to a VLE. In colleges without this link, the college's ability to deliver tailored information and services to learners is reduced. Only one specialist college has its MIS linked to a VLE.

Colleges using MIS data...

	to register learners	to track learner progress	to develop QI strategy
to some extent	8%	39%	38%
to a large extent	88%	47%	52%

Networking within colleges

In all colleges, all major sites are connected to the college network (LSN, 2008). Of the 65 colleges surveyed that had minor sites, 49 said all sites were connected to the college network. In the 16 remaining colleges there was a concern that staff and learners primarily based on these minor sites have restricted access to college networks and resources.

Interviews with personal and community development providers indicate that 'last-mile' connectivity remains a problem. The use of smaller venues like church and community halls, make connectivity difficult, even for local authority providers (SERO, 2008).

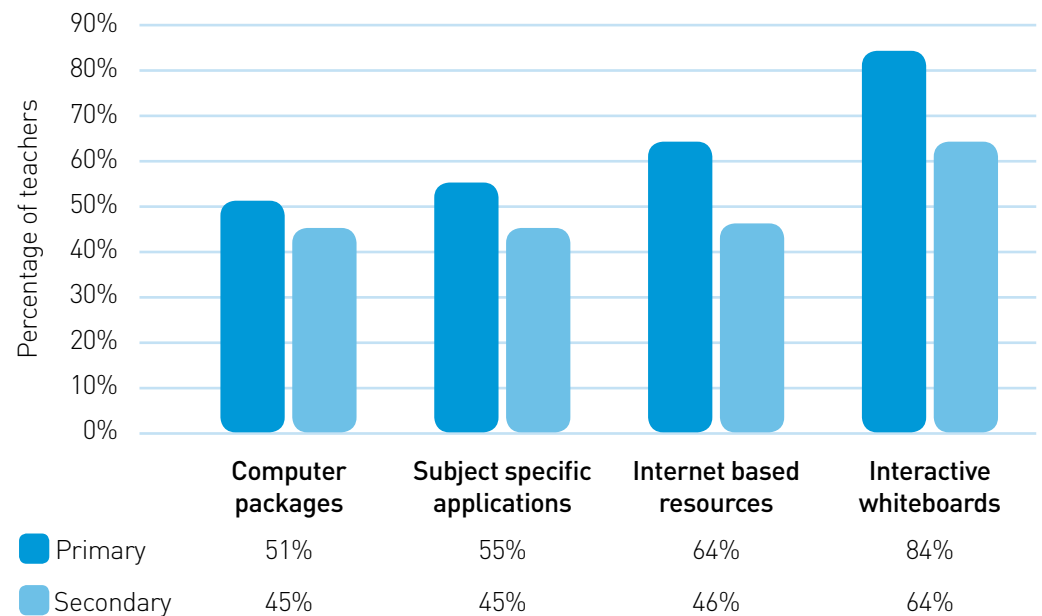## 4.2 Are high-quality, tailored resources available to all learners?

In schools

Availability and use of curriculum resources

Secondary schools are less likely to feel they have enough ICT equipment to deliver the curriculum compared to primary and special schools (Smith *et al.*, 2008). More than half of secondary school ICT coordinators said they did not have enough desktop computers. This was also the case with interactive whiteboards, but less so with laptops.

Around a quarter of ICT coordinators across all sectors said that they did not have enough specialist subject equipment to deliver the curriculum adequately. Some 45 per cent of ICT coordinators in primary schools said that this equipment was not available at all in their schools.

Teachers using digital resources in at least half of lessons

	Computer packages	Subject specific applications	Internet based resources	Interactive whiteboards
Primary	51%	55%	64%	84%
Secondary	45%	45%	46%	64%

Secondary school teachers are also less likely to use the range of ICT resources compared with primary schools, bearing out the perceptions of the ICT coordinators. However, teachers' use of these resources has grown steadily over the last few years in all school sectors. For example, the percentage of all teachers regularly using interactive whiteboards in lessons has increased from 42 per cent in 2006 to 73 per cent in 2008.
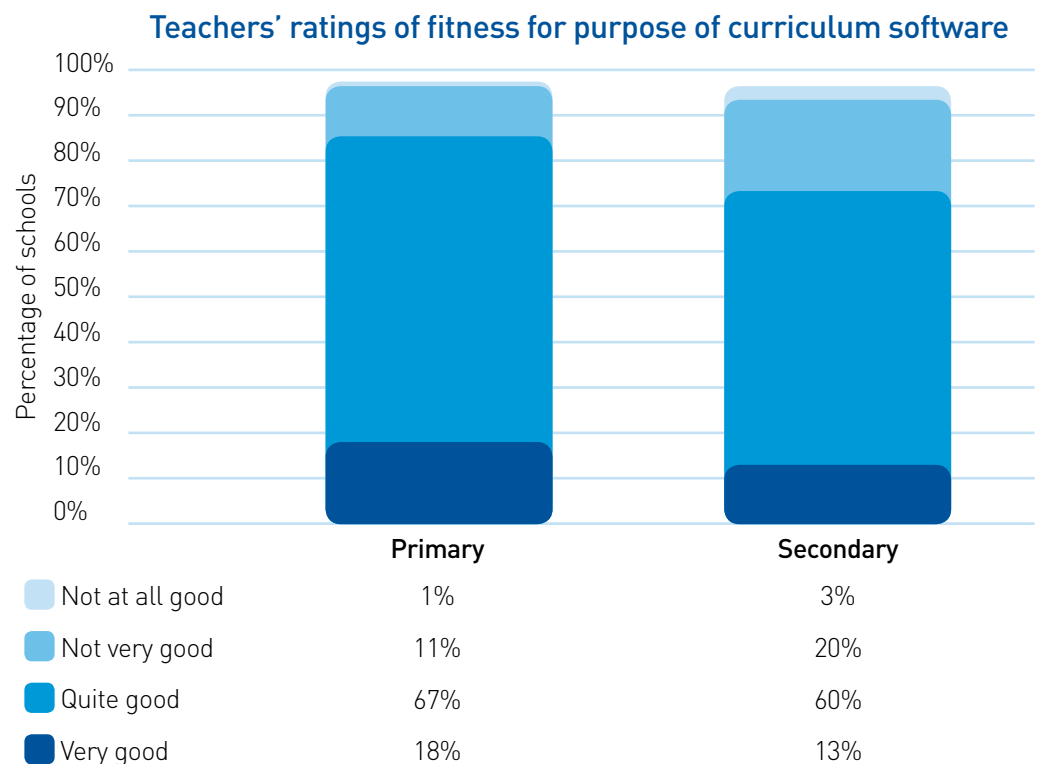
Teachers creating resources

About a quarter of teachers upload and store digital learning resources at least once a week on the school's network (Smith *et al.*, 2008). This has increased from 2007 along with teachers who do this at least once a month. Lesson planning is now almost always at least partly based on digital sources. Teachers generally said that they planned their lessons mostly with paper-based resources but with some digital resources.

Teachers mainly use their own digital resources. Almost half of secondary school teachers, and a third of primary and special school teachers, use self-created resources to plan all or more than half their lessons. They use digital resources created by colleagues much less frequently. Primary school teachers adapt learning resources from other people more frequently than other teachers.

Nearly all teachers create their own resources at least sometimes. Almost two thirds of secondary school teachers said that they did so often. The reasons teachers gave for doing this included tailoring to specific teaching and learning needs and that existing resources were insufficient for their needs. Teachers also enjoyed making their own resources, indicating a positive and confident approach to technology-based lesson planning.

English teachers are most likely, and mathematics teachers least likely, to create their own digital resources. Also, teachers with up to 10 years' experience were more likely to say that they often created their own digital resources than those with longer time in service.

Quality of available resources

Teachers' ratings of fitness for purpose of curriculum software

|	Primary	Secondary
Not at all good	1%	3%
Not very good	11%	20%
Quite good	67%	60%
Very good	18%	13%

Teachers are also reasonably satisfied with the software available for school curriculum use. Primary teachers, in particular, reported that this software is easy to find and that fitness for purpose is either 'very good' or 'quite good' (Smith *et al.*, 2008).

 Almost all teachers said that curriculum-related software is 'quite good' or 'very good'. However, a smaller proportion of teachers than in 2007 said that fitness for purpose was 'very good' and a slightly higher proportion said it was 'not very good'. Mathematics and history teachers were most likely to rate curriculum-related software highly.

There is little evidence relating to learners' view of the quality of curriculum resources. However, figures from the annual BETT Awards gives an interesting counterpoint to the largely optimistic views of teachers. Over the last three years the number of digital resources entered for these awards has increased by over one third while the number of entries shortlisted (against the same criteria) has decreased.

Number of BETT Awards entries shortlisted

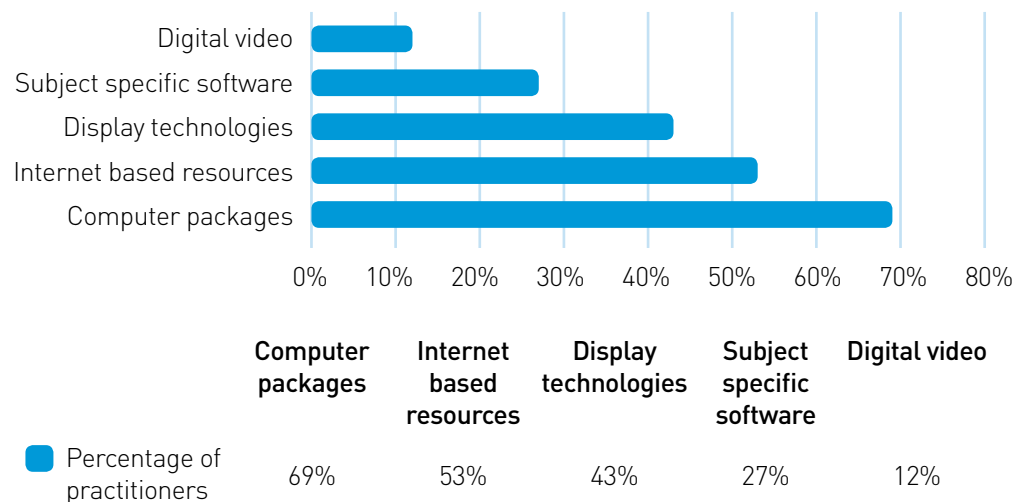|	BETT Awards 2006	BETT Awards 2007	BETT Awards 2008
■ Total entries	137	175	190
■ Shortlisted	47	40	36
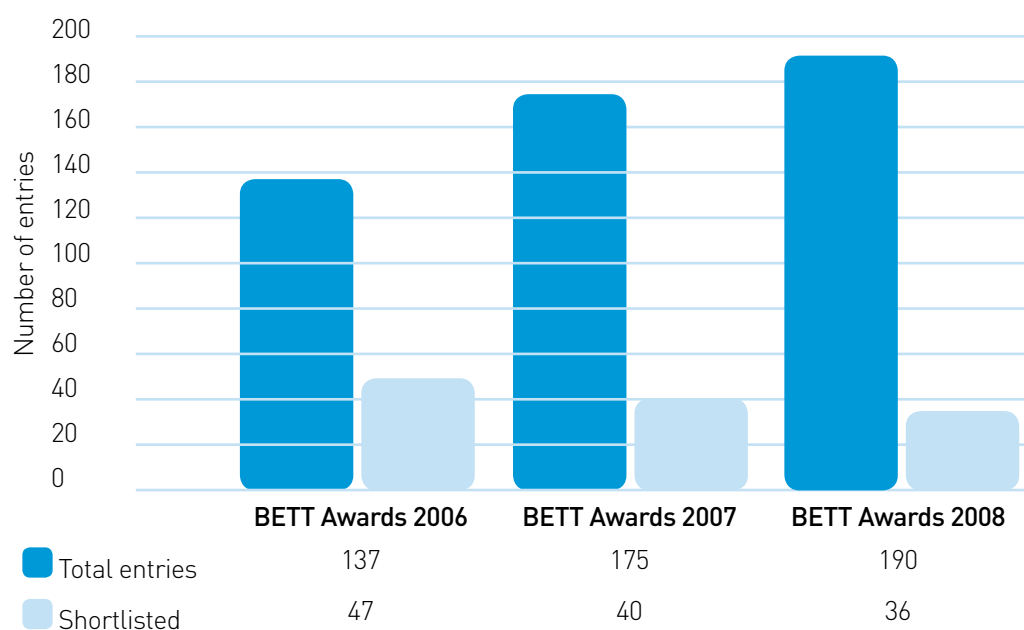
Digital resources remain a novelty in many classrooms, so teachers may not yet have the expertise to drive demand for higher quality resources for education.

In the FE and Skills sector

Practitioners' use of digital resources

Some 69 per cent of further education practitioners use computer packages with learners in all or most programmes (LSN, 2008). This is a higher level of usage than reported in schools. However, college practitioners reported much lower use of display technologies such as interactive whiteboards or subject-specific software than school teachers.
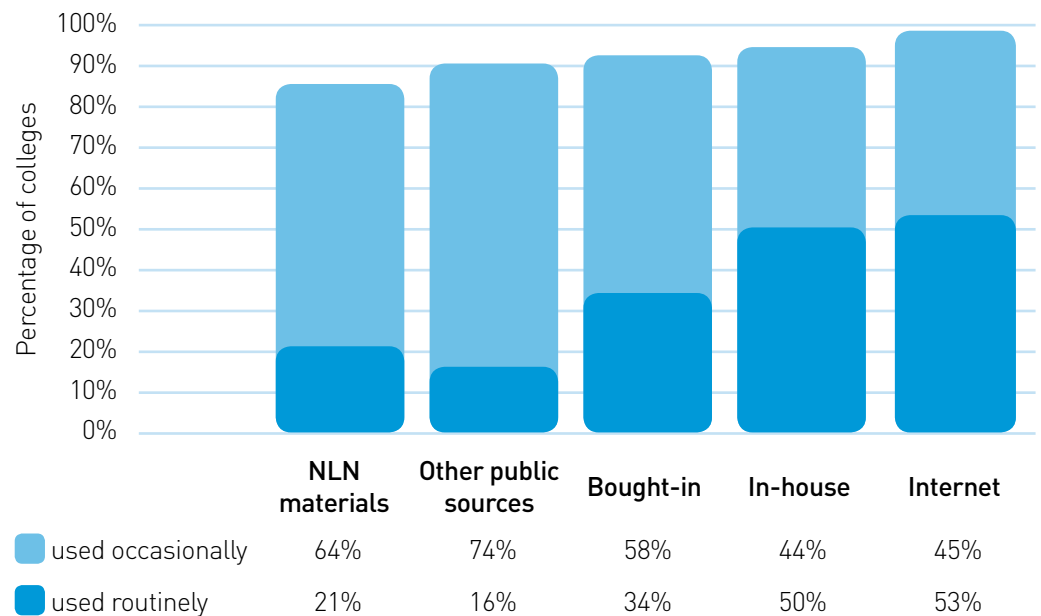
Practitioner use of resources in all or most programmes

	Computer packages	Internet based resources	Display technologies	Subject specific software	Digital video
● Percentage of practitioners	69%	53%	43%	27%	12%

There is widespread use of some electronic resources in preparing or planning for lessons. Two thirds of practitioners (66%) said they regularly use digital resources (web content and software packages, for example) when planning lessons, compared with 72 per cent for paper-based resources.

Some 62 per cent of practitioners also said they sometimes create e-learning resources themselves. This is also reflected at college level, where in-house developed resources are used in 94 per cent of colleges, and 'routinely used' in 50 per cent. This level of use is almost the same as for resources downloaded from the internet.

Use of electronic learning materials

	NLN materials	Other public sources	Bought-in	In-house	Internet
used occasionally	64%	74%	58%	44%	45%
used routinely	21%	16%	34%	50%	53%

The use of electronic materials is at the discretion of individual teachers in around two thirds of colleges (64%). This could lead to inconsistent use of ICT and electronic materials, being dependent on the skills and enthusiasm of individual staff. Greater coordination could promote wider – and more consistent – use, as well as signalling a commitment to ICT from senior management. However, in several of these colleges practitioners are also encouraged and given support to use electronic materials. In the remaining third of colleges, where there is some degree of planning, 14 per cent of colleges plan for the use of electronic materials at course level. Some 9 per cent of colleges plan at departmental level and the remaining 14 per cent at college level.
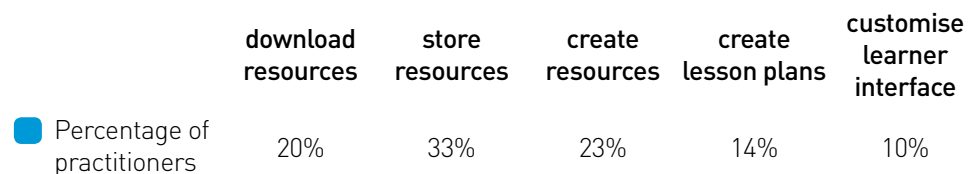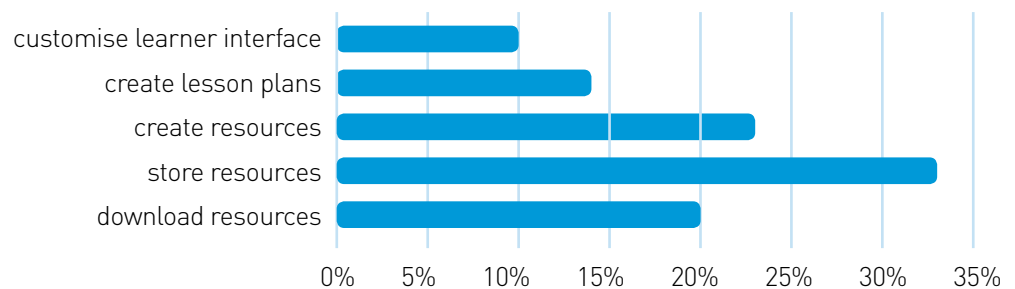
Work-based learning providers obtain computer-based learning materials from a wide range of sources (MacKinnon, 2008). Nearly three quarters of providers that use computer-based learning resources (72%) bought them commercially, although a large proportion (59%) use resources that are freely available online.

Increasing numbers of providers develop resources in-house. Around two thirds (66%) of providers did this in 2007 compared to just over half (53%) in 2006. Only 12 per cent believed that neither future income nor savings would cover the cost of their development. However, over half of providers did not know whether they would cover costs or not.

Use of a VLE to tailor resources

Further education practitioners are most likely to use a virtual learning environment (VLE) to upload and store digital resources (LSN, 2008). Some 33 per cent do this regularly. Around one fifth of practitioners regularly use their VLE to create (23%) or download (20%) digital resources. Smaller numbers use it to create lesson plans (14%) or to customise the learner interface (10%).

Practitioners regularly use a VLE to...

	download resources	store resources	create resources	create lesson plans	customise learner interface
Percentage of practitioners	20%	33%	23%	14%	10%

FE practitioners were most likely to say that they did not use their VLE for facilitating online discussions (41%) or for online assessment (34%), even though the VLE had these features. Part-time staff were less likely to use the college VLE for any of the tasks.

4.3 Is the technology infrastructure for learning efficient and sustainable?
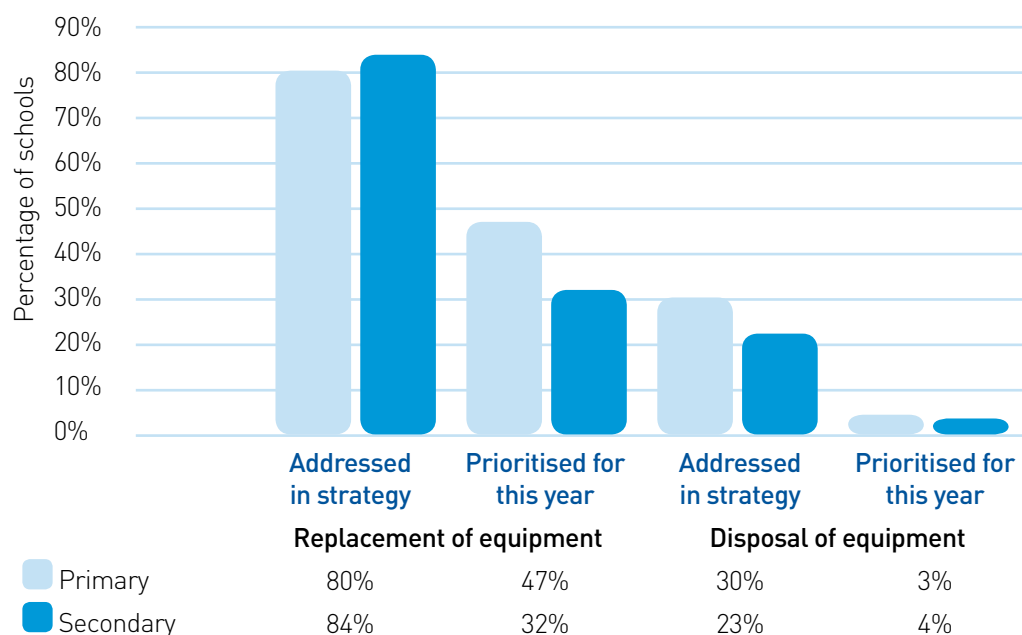
In schools

Sustainability in school strategies

The number of computers in schools increased by 65 per cent over the last five years, to a current estimated level of 1.8 million. However, the average number of computers available for pupils in schools has changed very little since 2007 (Smith et al., 2008). The average (mean) pupil-to-computer ratio in 2008 was 6.25 pupils to every computer in primary schools compared to 6.6:1 in 2007. The average for secondary schools was 3.6 pupils to every computer, the same as 2007.

Around 80 per cent of schools in each sector gave replacing equipment as one of the elements of their current ICT strategy (Smith *et al.*, 2008). However, far fewer schools saw this as a current priority, perhaps indicating that most school equipment had not reached the end of its useful life. The safe disposal of obsolete equipment appeared in the strategies of less than 30 per cent of schools, and was a current priority for very few indeed. This important aspect of sustainability has not been planned for in the majority of schools.

Items relating to sustainability in school ICT strategies

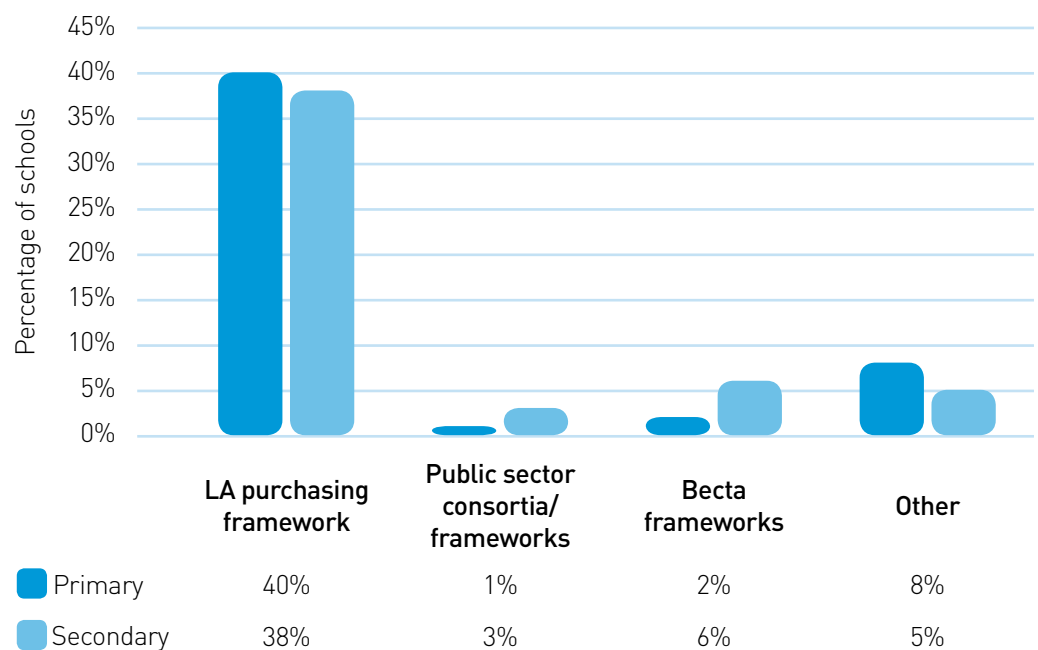|	Replacement of equipment		Disposal of equipment	
	Addressed in strategy	Prioritised for this year	Addressed in strategy	Prioritised for this year
Primary	80%	47%	30%	3%
Secondary	84%	32%	23%	4%

Electricity accounts for around 10 per cent of schools' energy costs and 25 per cent of carbon emissions. ICT is the second largest consumer of electricity for schools after lighting. Though this amounts to a relatively small part of the total energy use, there are some opportunities for savings.

Strategies could include better energy-efficient management of ICT equipment and procurement policies that aim to reduce energy use and embedded energy, along with considering refreshing and recycling digital equipment. Local authorities and ICT consultants/advisers are key influencers of schools' ICT strategies or improvement plans. These are therefore important intermediaries in enabling schools to address sustainability.

Purchasing equipment and services

On average primary schools commit the highest percentage of their school budget on ICT (8 per cent on equipment, software, connectivity and ICT support) (Smith *et al.*, 2008). Secondary schools commit an average of 6 per cent and special schools an average of 5 per cent. ICT equipment tends to have the highest average spend compared to the other three elements. This reflects the priority given to the replacement of ICT equipment in schools' strategies.

Schools' planning for aggregated purchasing

	LA purchasing framework	Public sector consortia/ frameworks	Becta frameworks	Other
Primary	40%	1%	2%	8%
Secondary	38%	3%	6%	5%

Around 40 per cent of both primary and secondary schools plan to use their local authority (LA) purchasing framework and this is by far the dominant route for schools wishing to use aggregated purchasing. In general, primary schools are more likely to seek advice on hardware purchase from their LA (50%) than secondary schools (22%). Both sectors are then more likely to go to a private supplier to source the equipment than use the LA. For internet services, around two thirds of primary schools and over half of secondary schools both sought advice and subsequently sourced these from their LA.

In the FE and Skills sector

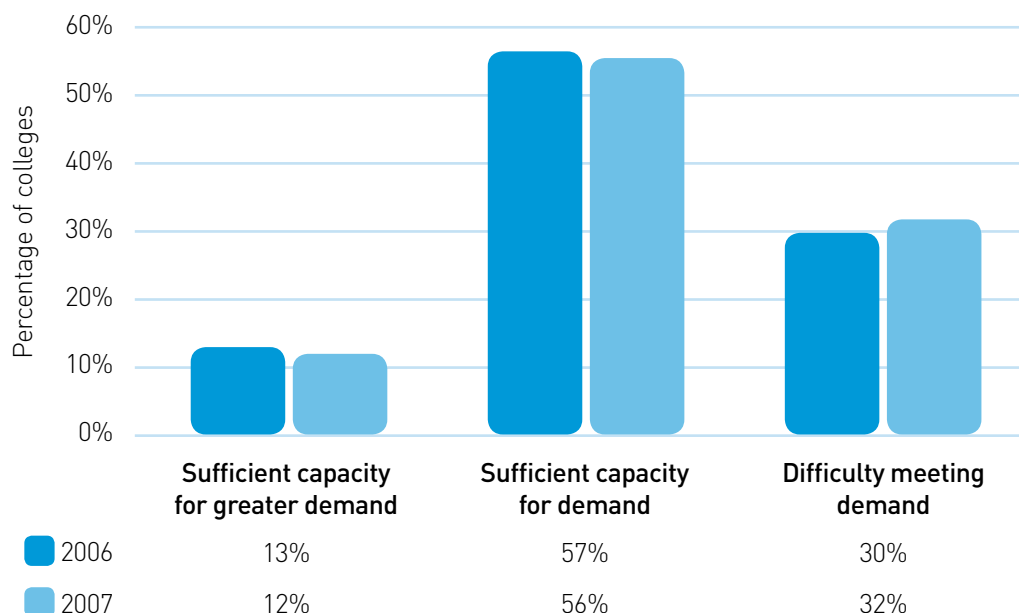### Ability of colleges' infrastructure to meet demand

The mean number of FTE students per networked computer in colleges is 4.5 and the median, which is not distorted by extremes, is 3.8 (LSN, 2008). There are still a few providers with relatively high numbers of FTE students per computer. Moreover, the ratio for FTE students per computer available outside teaching hours is much higher, with a mean of 28.7.

Over three quarters of colleges (78%) have a rolling replacement plan for computers that they regularly review in light of demand (LSN, 2008). Most of the remainder (19%) only review capacity in response to particular problems, and the last 3 per cent do not review capacity.

Both providers and practitioners reported variation in the adequacy of college networks and bandwidth. Although few respondents reported major problems, some indicated that network resources can be stretched at certain times or in certain situations.

Some providers reported that capacity did not always meet learner demand for computers (30%) or internet access (32%). Some 64 per cent of colleges also reported that their network was fast and reliable. However, a sizeable minority (32%) reported that their network slowed down at very busy times and 4 per cent thought the slowness or unreliability of their network was a frequent problem.
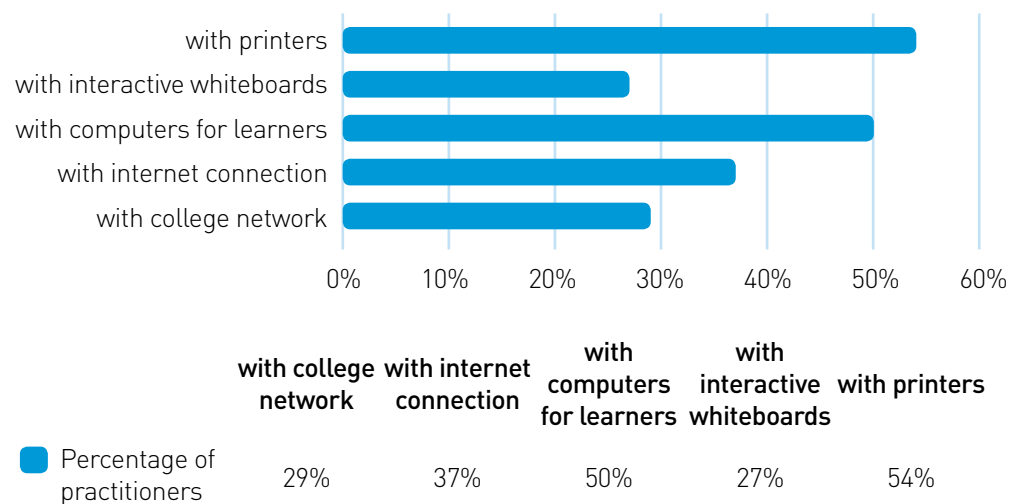
Meeting student demand for computers

	Sufficient capacity for greater demand	Sufficient capacity for demand	Difficulty meeting demand
2006	13%	57%	30%
2007	12%	56%	32%

Around three quarters of FE learners (77%) use computers at college (GfK NOP, 2007b). Learners aged over 35, women, less confident users and those who did not have access to a computer at home, were most likely not to use a computer at college. Some 70 per cent of learners said that access to computers at college was good. Four in ten said it was always possible to get onto a computer while three in ten said it was usually possible to do so.

Some 82 per cent of those learners who used college computers used them to access the internet. Internet connection at college was judged to be good by the majority of users. Some 40 per cent said it was always fast and a similar proportion said that the connection was usually fast, but that it sometimes slowed down. Very large proportions of learners aged 16–18 (96%), Asian learners (89%) and those with a computer at home (85%) accessed the internet at college. This latter figure suggests that learners accessing the internet at college were not doing so because they could not access it elsewhere.

Practitioners experiencing technical problems at least monthly...

	with college network	with internet connection	with computers for learners	with interactive whiteboards	with printers
Percentage of practitioners	29%	37%	50%	27%	54%

Some 10 per cent of FE practitioners said they experienced technical problems with their college network at least once a week. This compares with 64 per cent who experienced problems at least once a term; the remaining 26 per cent said they never experienced problems. Practitioners were also more likely to report technical problems with the internet connection than with computers, with 12 per cent saying they had this problem at least once a week.

Work-based learning is mainly focused on learning in the workplace. Despite this, nearly all providers (93%) have computers on their own premises for work-based learners' use (MacKinnon, 2008). There were a number of reasons for this. One reason was to give access to learners who work in places where computers are not common or where they are not allowed access, such as Apprentices working in care homes. Other reasons were to allow tutors to include ICT-based resources within their tutorials, to support learners' IT skill acquisition and for computer-based testing. These computers are not necessarily dedicated to work-based learners, since for example learning centres in FE colleges may have computers that are also accessible to other students.

Work-based learning providers have a range of other ICT equipment. Around two thirds have data projectors (68%) and digital cameras (60%) while over half (56%) now have electronic whiteboards. The latter represents an increase since 2006 when only one third (36%) reported having interactive whiteboards. The use of mobile devices for learning has also increased to over a quarter (27%).

5. Improved personalised learning experiences

To achieve the best outcomes, teaching and learning should be tailored to the needs of each learner, and technology can help bring this about. It can give learners the choice to learn at a pace and time to suit their needs. It can enhance teaching approaches and extend the choice of study modes available to learners. Electronic assessment can offer learners timely feedback on their work and helpful diagnosis on all aspects of their learning. Technology can also offer a wide range of engaging learning experiences, enabling learners to tackle a wider range of subjects, at greater depth.

In order to assess the extent to which technology has contributed to improving learners' experiences, the following questions will be used to structure the evidence in this section:

- To what extent are learners able to exercise choice among flexible learning options?

- Is tailored and flexible assessment available and able to address learners' needs?

- Does technology offer engaging learning experiences that support deep and higher-order learning?

5.1 To what extent are learners able to exercise choice among flexible learning options?

In schools

Technology's ability to support pupils

Using online learning to extend curriculum choice is not yet widespread in schools. However, there are some case study examples of technology being used to support greater curriculum choice within 14–19 learning, and secondary school provision generally (Lewin *et al*., 2008).

One example is Kingshurst City Technology College, which ran online learning weeks in science, enabling high-ability students to go further with their learning than they might otherwise. The Bridge Academy in Hackney offered 40 young people access to the 'Not School' remote learning service. It also ran its own 'Bridge Academy Online', which supported blended, task-focused learning within the academy. In the further education sector, St Helens College used a learning platform as a focus for hairdressing, music, ITQ and animal management courses. This provided an e-portfolio, access to resources and links, tests and assessment and communication forums.

Teachers were largely positive about the potential contribution of new technologies to learning. However, when pressed to identify specific advantages gained, they were rather more ambivalent and sometimes doubtful.

"ICT particularly helps me support the diverse learning needs of pupils"

	Agree/Strongly agree	Disagree/Strongly disagree
Primary	63%	22%
Secondary	62%	17%
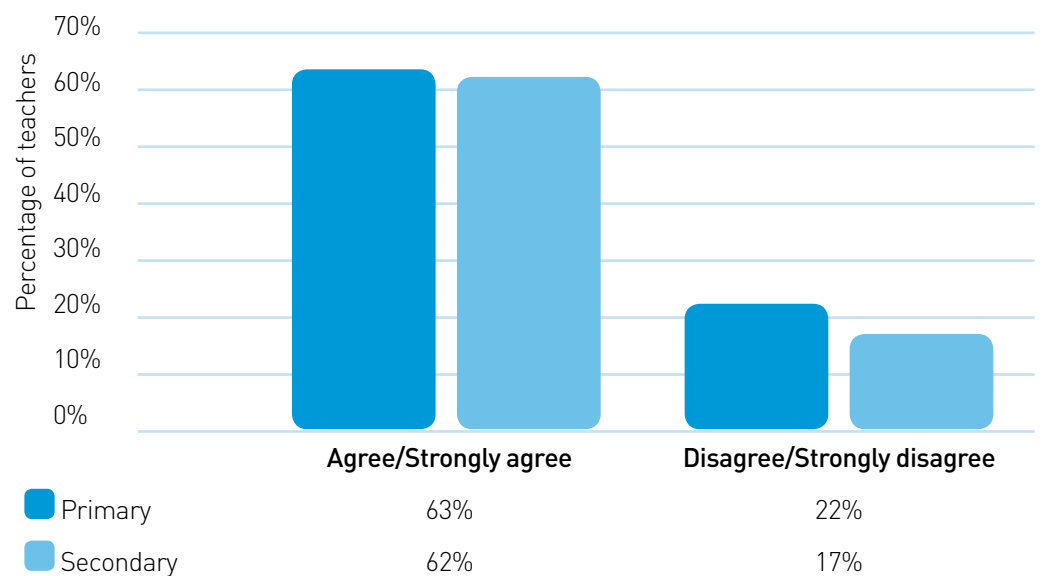
A majority of teachers agreed with various general statements about the contribution that ICT can make to teaching and learning (Smith *et al.*, 2008). Around 60 per cent of teachers agreed that ICT helped support the diverse learning needs of pupils. A similar number agreed that pupils enjoy lessons more if they use ICT than if they do not. However, more primary school teachers agreed with this than secondary or special school teachers.

In recently 'turned around' schools, teachers felt that the effective use of technology in learning and teaching could have an impact on the engagement, motivation, self-esteem and aspirations of 'disadvantaged' or 'underachieving' pupils (Hollingworth *et al.*, 2008). They felt that this in turn could improve behaviour and might have an impact on their achievement. Key strategies for using technology in these schools included the following:

- Technology could be used to make teaching and learning more interactive. Pupils could use interactive whiteboards, the internet, digital cameras, and interactive software. This was particularly seen to engage 'disaffected' boys in these schools.

- Technology could increase the range of learning strategies available to teachers. These strategies could include visual learning, collaborative learning, creative or project-based learning. This was often seen to enable a more equal provision of education to different types of pupils.

- Pupils could use technology to communicate their work and improve their standard of presentation. This can raise the confidence of pupils who do not excel at traditional written work. This was seen to affect the achievements of boys and pupils with special needs in particular.

- Pupils could learn ICT in relation to everyday and working life. Linking ICT to working life was also seen by teachers to widen pupils' horizons and aspirations.

- Technology could extend learning beyond the classroom, and help implement flexible and distance learning.

- Technology could also be used to enable independent learning, and enable learners to set their own pace and targets.

- Technology could help create a positive school culture. Having new technology in schools was seen to improve pupils' learner identities, making them feel good about their school and consequently their learning.

- Technology could also enable the learner voice to be heard. Schools used online polls, or feedback mechanisms on learning platforms, website forums and pupil radio stations.

Children's views of the potential of technology in schools

Interviews with children aged between 7 and 11 suggested that they would like ICT to be used to make learning more 'fun' (Cranmer *et al*., 2008). However, they struggled to come up with practical ideas for bringing fun into learning. Some suggested games that might help with literacy and numeracy skills, for instance, games that facilitated times tables 'fighting' with each other. However, others felt that games were a distraction from 'real work' and would not help with the kinds of learning that take place at school.

The majority of pupils who advocated change in school ICT provision and practices wished to see the relaxation of restrictions on use imposed by the school. This most often involved playing games or viewing websites such as YouTube or Miniclip. There were few portrayals of the more communicative, creative or collaborative ICT uses or practices associated with Web 2.0 applications.

In the FE and Skills sector

Learners' ability to learn at a time and pace of their choosing

Learner-focused uses of ICT increased considerably between 2006 and 2007. Some 40 per cent of colleges used ICT in all or most programmes to enable learners to study at a time convenient to them (LSN, 2008). Only a quarter of colleges (25%) reported this in 2006. However, a much smaller minority of colleges (20%) used ICT to enable learners to study at their own pace.

Use of ICT in all or most college programmes

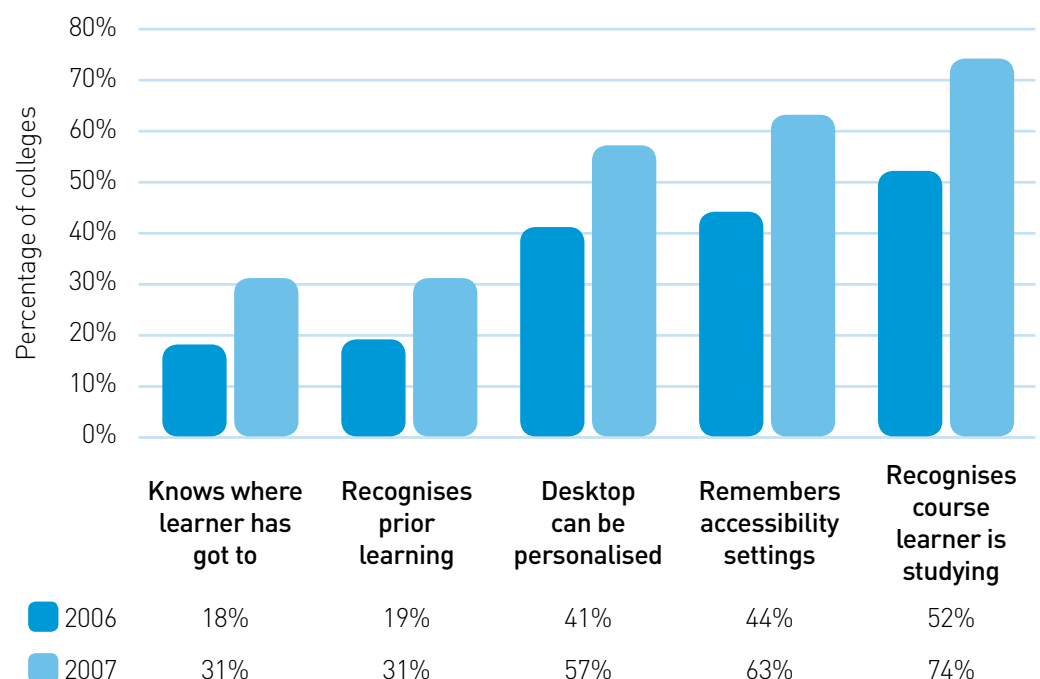|	To enable students to learn at own pace	To enable students to learn at any time
2006	12%	25%
2007	20%	40%
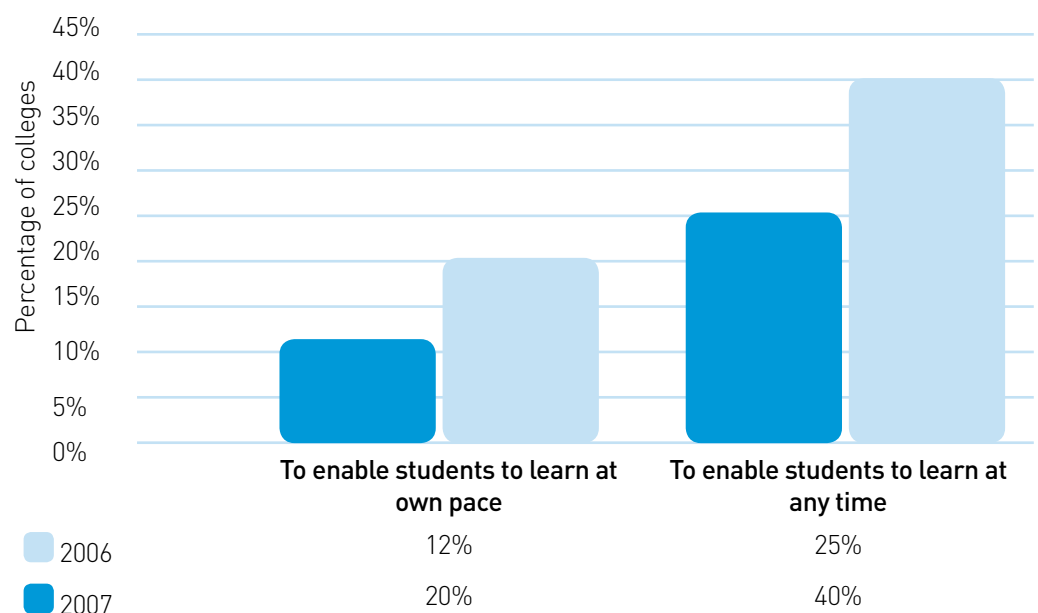
This seems to be reflected in the experience of learners. Some 66 per cent of learners agreed, or strongly agreed, that because computers were used in their course, they have more choice as to where and when they can study (GfK NOP, 2007b). This was more likely to be reported by full-time students (80%) than by part-time students (56%). Younger students were also more likely to feel this was so than older students (80 per cent of 16–18-year-olds as opposed to 53 per cent of those over 45).

In work-based learning, two fifths of providers (40%) provide some of their learners with an online learning space (MacKinnon, 2008). However, nearly three quarters of these providers offer this on just some of their learning programmes. Some 60 per cent of providers either do not provide this or did not respond to the question.

Some 72 per cent of work-based learning providers and 81 per cent of practitioners agreed that ICT improved the range of learning opportunities available to learners. This included the use of online tests, electronic learning materials and e-portfolios. However, the latter two resources were not widely used and providers were still identifying the best way to use them (MacKinnon, 2008). Some 87 per cent of personal and community learning practitioners also believed that ICT and e-learning had allowed learners greater choice in learning opportunities (SERO, 2008).

Learning platforms able to be personalised for each learner

Platform features that encourage personalisation

	Knows where learner has got to	Recognises prior learning	Desktop can be personalised	Remembers accessibility settings	Recognises course learner is studying
2006	18%	19%	41%	44%	52%
2007	31%	31%	57%	63%	74%

The extent to which college learning platforms can be personalised for each learner also increased between 2006 and 2007. These features should give learners greater flexibility in their studies. However, less than one third of colleges used this technology to track the learner's progress through a course, or recognise prior study (LSN, 2008).

Learners' use of learning platforms

Just over a quarter of further education learners (27%) said they were required to use a learning platform as part of their course (GfK NOP, 2007b).

The main use these learners made of their college's learning platform was to access resources about the subject they were studying (86 per cent of those required to use a learning platform). Two thirds (66%) of these learners had used it to read messages from their tutor about the course. Around half had used it to take tests or quizzes (53%), check their progress on the course (49%) or submit assignments to their tutor (48%).

Some 60 per cent of learning platform users who used a computer at home said they had accessed the learning platform at home. Younger learners aged 16 to 18 were less likely to access the platform from home than older learners (55 per cent compared with 65 per cent).
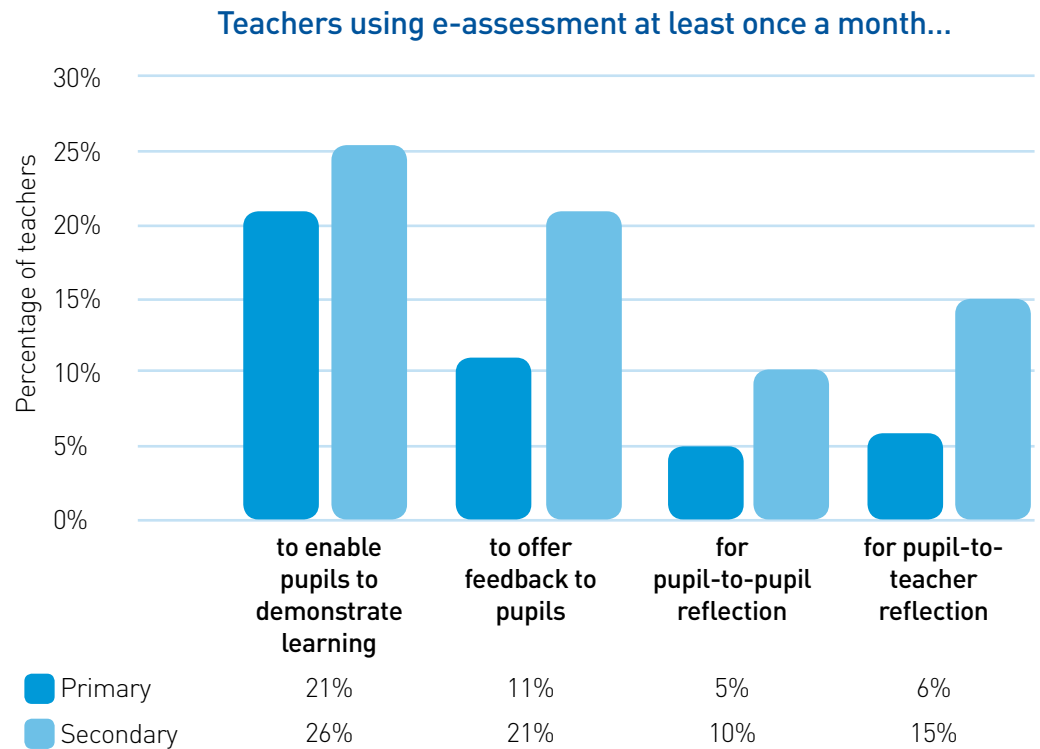
Just under half of learning environment users (46%) thought it was 'very helpful', while a further 44 per cent described it as 'moderately helpful'. Only 8 per cent thought the learning platform was 'not very helpful' and only 1 per cent said it was not helpful at all.

5.2 Is tailored and flexible assessment available and able to address learners' needs?

In schools
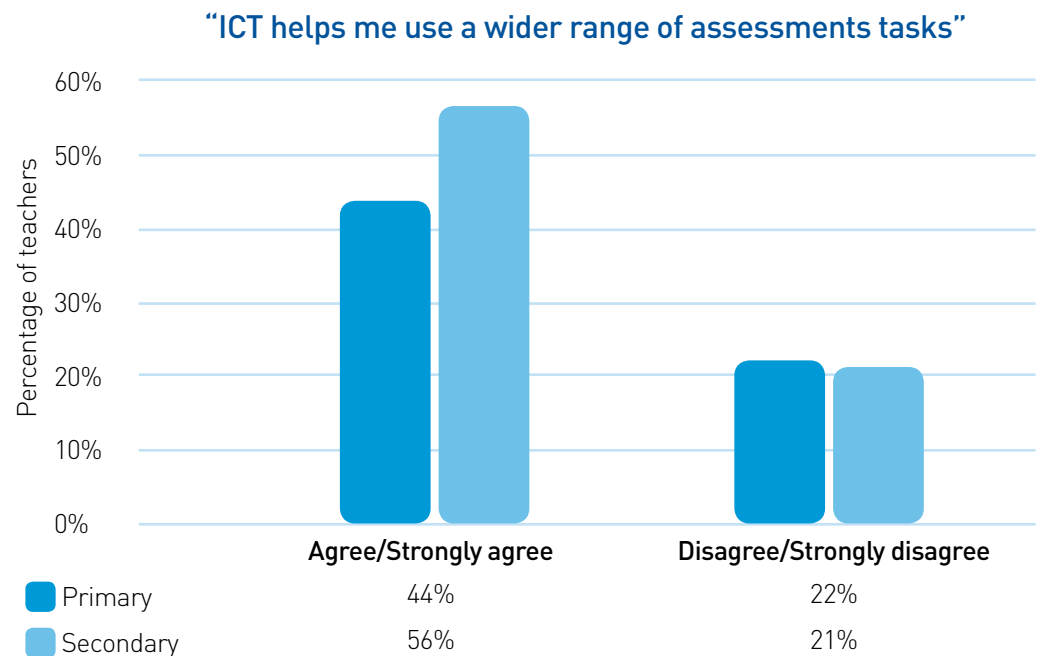
The extent of technology use for assessment

Technology is used infrequently for assessment purposes, and tends to be used for reporting rather than more interactive forms of assessment. 10 per cent of secondary school teachers use technology for analysing or reporting assessment data at least once a week. This figure rose to 76 per cent doing so at least once a term (Smith *et al.*, 2008). Nearly all teachers used some form of electronic approach to produce pupil reports, the majority saying they re-used or modified prepared templates. There has been a slight decrease since 2007 in primary teachers using technology for pupils to demonstrate learning and for assessing work and offering feedback since 2007.

Teachers using e-assessment at least once a month...

	to enable pupils to demonstrate learning	to offer feedback to pupils	for pupil-to-pupil reflection	for pupil-to-teacher reflection
Primary	21%	11%	5%	6%
Secondary	26%	21%	10%	15%

Secondary school teachers use electronically held pupil assessment information more frequently and for a greater variety of purposes than primary or special school teachers. For instance, they were roughly three times more likely to use the information to enable pupil self-assessment and to make information available to parents at least once a term.

The range of assessment tasks available to teachers

Teachers tend to agree that ICT helps them use a wider range of assessment tasks (Smith *et al.*, 2008). Some 44 per cent of primary teachers and 56 per cent of secondary teachers agreed or strongly agreed with this. However, teachers were much more equivocal that ICT could help in giving individualised feedback to pupils. Only 23 per cent of primary teachers agreed with this, a proportion that has decreased considerably from 38 per cent the previous year. Secondary teachers are more positive about this, the proportion agreeing remaining at a similar level to the previous year (52 per cent as opposed to 56 per cent).

"ICT helps me use a wider range of assessments tasks"

	Agree/Strongly agree	Disagree/Strongly disagree
Primary	44%	22%
Secondary	56%	21%

In recently 'turned around' schools, staff felt that technology facilitated pupil progress and achievement by enabling them to evaluate their own work (Hollingworth *et al.*, 2008). Several schools used educational software or online materials which involved self-assessment. Some primary schools used video and audio recording to support pupil evaluation of their own and others' work in speaking and listening. Several secondary schools were beginning to use software in PE lessons so students could evaluate their own performance.

However, when there are large differences in pupils' confidence and self-esteem, the level of inequality in pupils' self-assessment and evaluation can increase. In one school it was found that this was an issue with less confident learners.
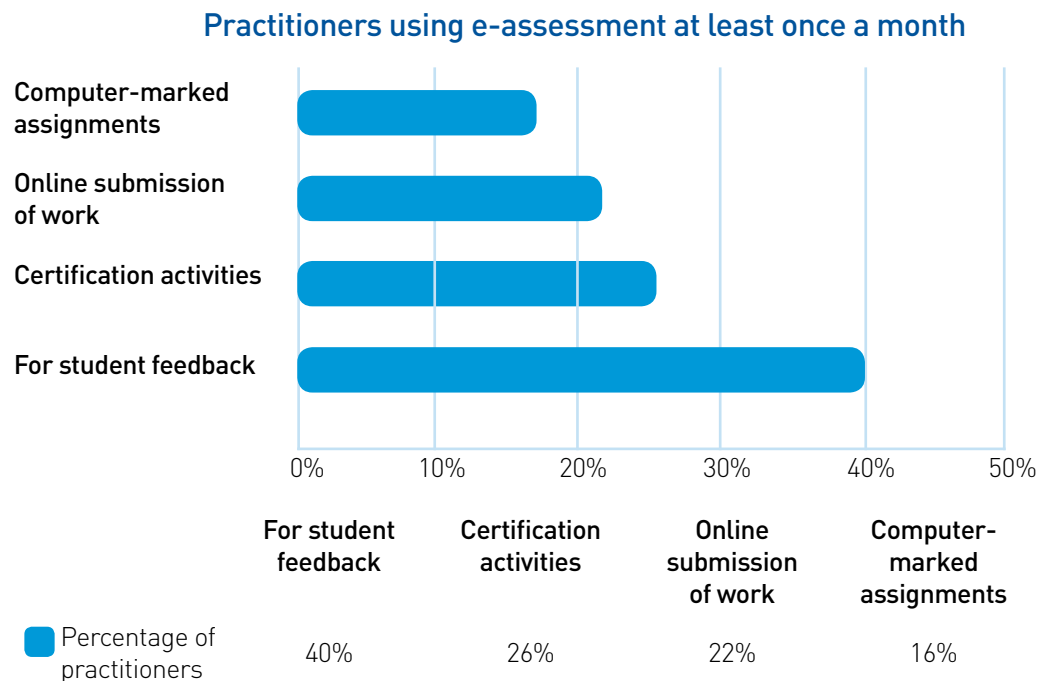
In the FE and Skills sector

Use of ICT for assessment

Some 31 per cent of colleges reported that they commonly use online assessment on many courses or across the whole college (LSN, 2008). This compares with only 12 per cent that reported that online assessment was widespread in 2006.

Nearly all colleges (96%) made some use of ICT for initial assessment of learners, with more than half (52%) doing this across all programmes. However, these figures remain at a similar level to 2006, where 50 per cent of colleges reported widespread use.

The most commonly used electronic assessment activity reported by practitioners was for student feedback. Some 40 per cent of practitioners reported doing this at least once a month.

Practitioners using e-assessment at least once a month

	For student feedback	Certification activities	Online submission of work	Computer-marked assignments
Percentage of practitioners	40%	26%	22%	16%

In contrast, just over a quarter (27%) of all learners had received feedback from their tutor electronically (GfK NOP, 2007b). Feedback was more likely to have been given to learners studying business-related subjects (36%), humanities (36%), science and maths (35%), hospitality (35%) and ICT (31%).

Younger learners were more likely to have received electronic feedback than older learners (35 per cent of 16 to18-year-olds compared with 23 per cent of learners aged 25 to 44 and 16 per cent of learners aged 45+). Learners on full-time courses were also more likely than those on part-time courses to be receiving electronic feedback from their tutor (35 per cent compared with 21 per cent).

Just under a third of all learners (30%) had taken part in a computer-based test or quiz that counted towards their final mark.

Again, younger learners and those studying the same subjects as those who had received electronic feedback were more likely to say that this was the case. Those with a computer at home or those more confident with computers were also more likely to have taken part in a computer-based test or quiz. Around two thirds of learners (65%) also felt they did better in assessments as a result of using computers.

Use of e-portfolios

Few colleges make extensive use of e-portfolios, but this use is growing (LSN, 2008). Only 9 per cent of college learning platforms output to an e-portfolio, an increase from 6 per cent in 2006. Some 46 per cent of colleges did not use e-portfolios at all for NVQ evidence, though this is a large improvement on 2006 when 70 per cent of colleges did not do this. Again, 49 per cent did not use any other kind of e-portfolio, as opposed to 80 per cent in 2006.

Just one fifth of further education learners (20%) reported that they were required to use an e-portfolio on their course. Learners on hairdressing and beauty therapy courses (31%) and engineering, technology and manufacturing courses (28%) were more likely to use an e-portfolio compared with those studying other subjects (GfK NOP, 2007b).

In work-based learning providers, the largest increase in ICT use between 2006 and 2007 was in the use of online NVQ evidence management (MacKinnon, 2008). This increase was due to providers making more widespread use of technology-based evidence management in some of their programmes rather than through an organisation-wide introduction.

Qualitative interviews supported this finding. Many providers were introducing e-portfolio systems. However, none felt they had found the right system. Providers were concerned not only about the initial costs of purchasing systems, but also about the ongoing licence fees. They felt that e-portfolios would add significantly to their costs but had not seen any financial saving from using these systems.
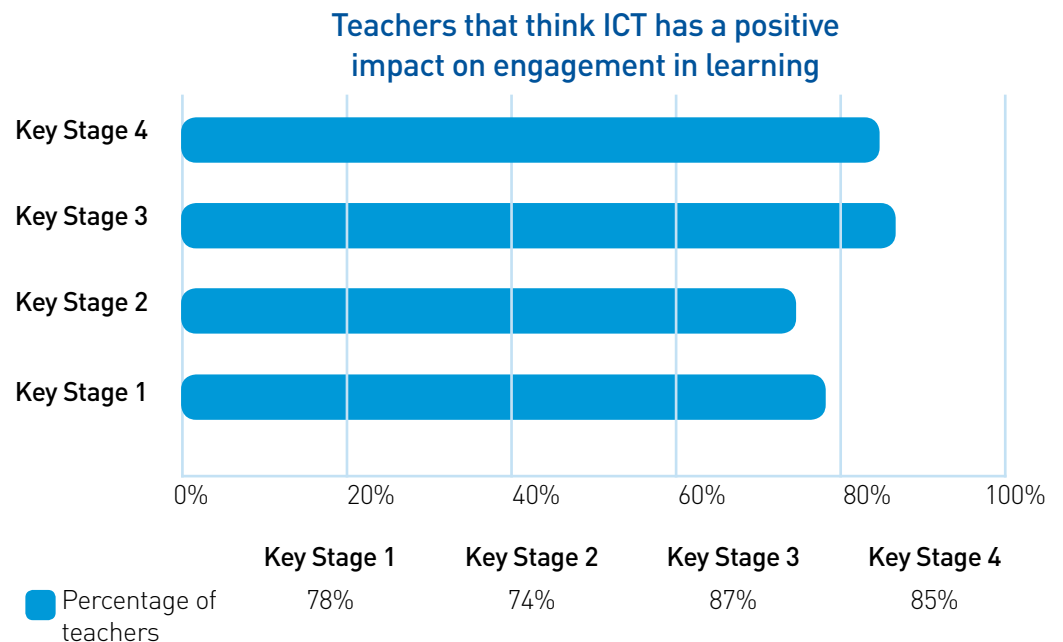
5.3 Does technology offer engaging learning experiences that support deep and higher-order learning?

In schools

The impact of technology on engagement in learning

In addition to studies which have reported over the last few of years, such as interactive whiteboard evaluation studies in primary (Somekh *et al.,* 2007a) and secondary schools (Moss *et al.,* 2007), the ICT Test Bed evaluation (Somekh *et al.,* 2007b), and a large-scale research review (Condie *et al.,* 2006), new findings offer positive evidence of the benefits of technology for learning.

The majority of teachers across the key stages agree that ICT has a positive impact on engaging learners (Smith *et al.,* 2008). This feeling is especially strong among secondary teachers. Teachers also felt that ICT could help all pupils, regardless of sex, ability or special educational needs.

Teachers that think ICT has a positive impact on engagement in learning

	Key Stage 1	Key Stage 2	Key Stage 3	Key Stage 4
Percentage of teachers	78%	74%	87%	85%

However, longer-serving teachers tended to agree less that ICT makes learning more effective. Those with five years or less of teaching experience were more likely to 'strongly agree' that ICT makes learning more effective (31%). The proportion of those who agreed strongly decreased with the length of teaching experience, so that only 16 per cent of teachers with more than 20 years' experience 'strongly agreed'.

Differences in pupils' ICT engagement between schools were found in a study of 7 to 11-year-olds (Cranmer *et al.*, 2008). The nature of ICT engagement in terms of what children were using ICT for, when and where they were doing it, and with what outcomes, all differed significantly between the five schools studied. There were a range of possible influences identified. These included the physical location of the computers within the school; the curricular organisation of the school; the experience of the teachers; the type of learning environments beyond the schools, as well as the range and depth of support from local authorities. It is worth noting that school attended acts as a proxy for a range of other issues, not least differences in socioeconomic status, income, parental educational background and geography.
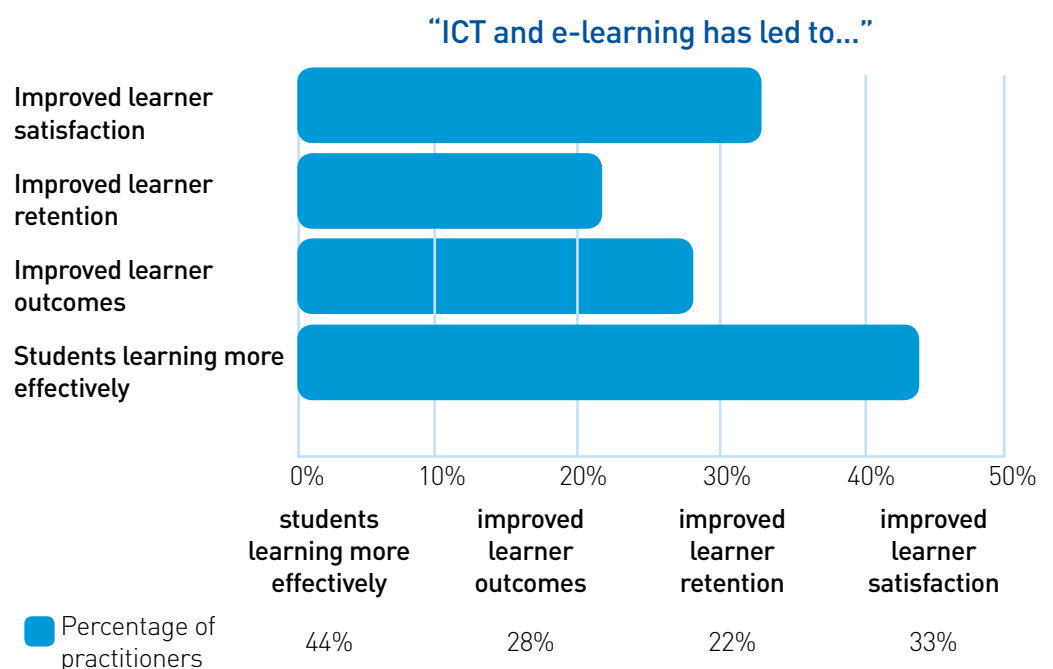
Teachers in recently 'turned around' schools reported that technology enables access to a greater range of learning strategies such as visual learning, collaborative learning, creative or project-based learning (Hollingworth *et al*., 2008). They suggested that technology allowed for more active learning and could motivate pupils disengaged from more passive methods. They felt that access to these different learning strategies enabled a more equal provision of education to different types of pupils. Secondary school staff were more likely to agree with this than primary school staff.

Teachers found that using technology to facilitate creative and project-based learning could engage disaffected pupils. Schools that placed high importance on ICT were also more likely to use technology for creative learning. Project-based learning also allows a deeper understanding to develop rather than just having one hour on the timetable. Some teachers also claimed that the often collaborative nature of using technology for project-based learning can engage pupils who do not enjoy working alone and can improve confidence by discussion in class.

The evaluation of projects in primary and secondary schools in Bristol and Wolverhampton offers further evidence (McFarlane *et al*., 2008). This has identified emerging practices with mobile personal technologies which appear to add significant value to learning. These are in the areas of.boys and writing, revision for exams, and games-based testing and practice.
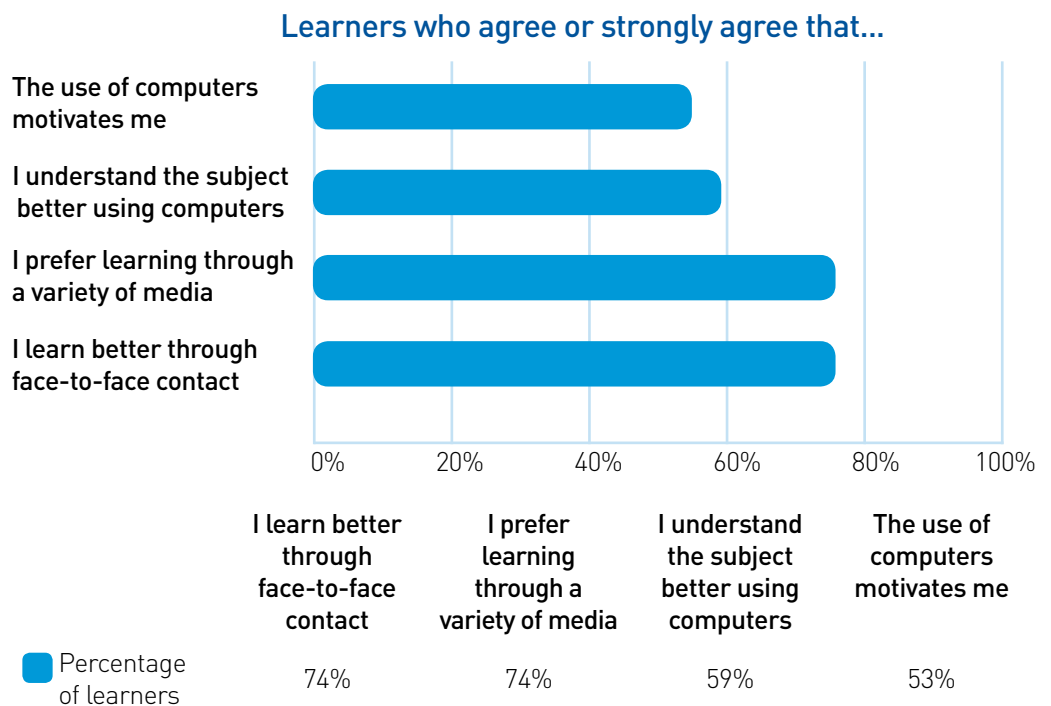
In the FE and Skills sector

Practitioners' views of ICT impact

"ICT and e-learning has led to…"

	students learning more effectively	improved learner outcomes	improved learner retention	improved learner satisfaction
Percentage of practitioners	44%	28%	22%	33%

Some 44 per cent of further education practitioners agreed that the use of ICT has led to their students learning more effectively, and one third (33%) felt that it had improved learner satisfaction (LSN, 2008). However, fewer felt that it had helped improve learner outcomes (28%) or learner retention (22%).

As with the school sector, there are good examples of practice in FE colleges and the wider skills sector which is improving learning, as evidenced by the FE Technology Exemplar Network [http://excellence.qia.org.uk/page.aspx?o=158557]. Using technology to support genuine improvements in quality of teaching and learning has generally been developing well in this sector. However, as with the school sector, recognition of good practice and professional standards is still limited. This practice needs to develop to ensure that learning benefits are delivered more consistently, and good practice is embedded across the sector.

Learners' views of ICT impact

Learners who agree or strongly agree that...

	I learn better through face-to-face contact	I prefer learning through a variety of media	I understand the subject better using computers	The use of computers motivates me
Percentage of learners	74%	74%	59%	53%

Further education learners were largely positive about using computers (GfK NOP, 2007b). Almost three quarters (74%) agreed or strongly agreed that they preferred to learn through a variety of media than just reading books or listening to the tutor. In addition, almost six out of ten (59%) were in agreement that they understood their subject better because of the way that computers were used on their course, while 28 per cent felt they learnt less well when computers were used.

Although computers were not seen as a replacement for face-to-face contact and printed material, learners recognised that they provided more choice, a better understanding of the subject and helped to improve the quality of learners' assignments.

6. Impact on national priorities

There is an increasing body of evidence on how technology can support the wider education priorities of raising achievement, narrowing achievement gaps, engaging disadvantaged and vulnerable learners, and improving capacity, quality and efficiency. In some of these areas evidence comes from examples of practice which are not embedded broadly. In other cases there is more general evidence of impact.
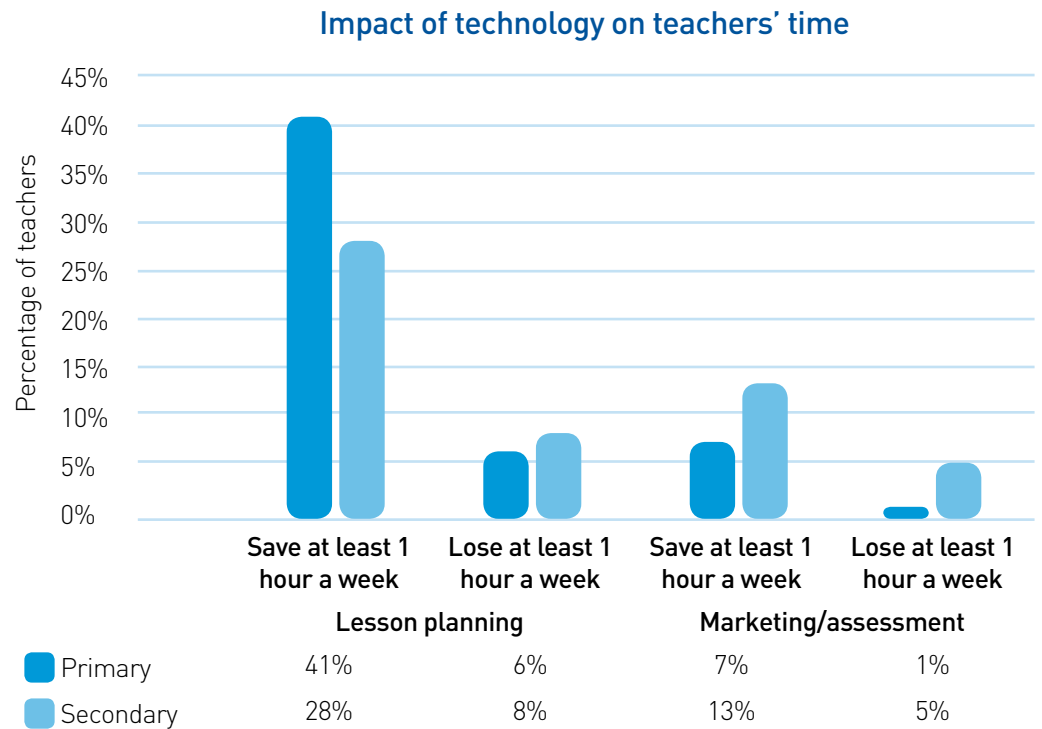
6.1 Improving capacity, quality and efficiency

The strongest general impact of technology across education related to improvements in efficiency, notably impact on the use of teachers' and further education practitioners' time. Practitioners generally re-invest any time they may save into core tasks (PwC, 2004), resulting in higher quality experiences for learners.

Some teachers saved time through the use of technologies. Around one fifth of teachers said that online resources saved them up to an hour and a further one fifth said that this saved them between one hour and two hours (Smith *et al.*, 2008). Teachers were also likely to disagree with the statement that it is easier to find relevant teaching materials in textbooks than on the internet.
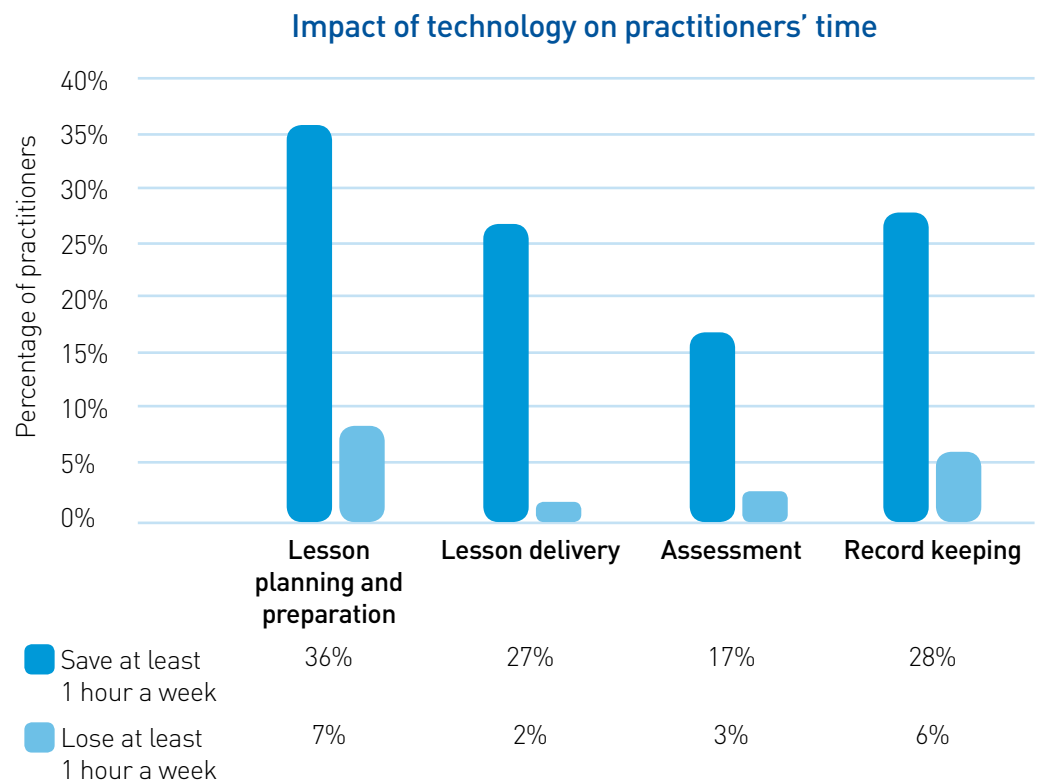
About a quarter of teachers felt that interactive whiteboards saved them time. Teachers did not identify learning platforms and management information systems as time-saving, though this may reflect the stage of embedding, as considerable proportions of teachers said that these technologies were not applicable to them.

In terms of specific tasks, teachers saved most time in preparing for lessons through using technology. Overall, around half of teachers reported some gains in time from use of technology, with just one in ten reporting losing time. Also 41 per cent of primary teachers and 28 per cent of secondary teachers reported saving over one hour per week in this area.

Impact of technology on teachers' time

	Lesson planning		Marketing/assessment	
	Save at least 1 hour a week	Lose at least 1 hour a week	Save at least 1 hour a week	Lose at least 1 hour a week
Primary	41%	6%	7%	1%
Secondary	28%	8%	13%	5%

In addition, the number of practitioners who said they lost time from using technology fell across all sectors. In the case of lesson planning, the number of teachers reporting losing time halved from 21 to 11 per cent in the last year.

The pattern in further education was broadly the same as in schools. FE providers thought using ICT could help save time in teaching and learning. However, this was strongest for planning and managing work, rather than interacting with learners (LSN, 2008).

Impact of technology on practitioners' time

	Lesson planning and preparation	Lesson delivery	Assessment	Record keeping
■ Save at least 1 hour a week	36%	27%	17%	28%
■ Lose at least 1 hour a week	7%	2%	3%	6%

FE practitioners also thought ICT and e-learning resources could help save time, although less strongly than providers. More than a third of practitioners did not use either interactive whiteboards or VLEs. Of the practitioners that did use particular technologies, those that used online resources said they saved most time. Some 64 per cent said this, compared to 41 per cent for a VLE, 40 per cent for MIS and 35 per cent for interactive whiteboards.

Nearly two thirds (62%) of work-based learning practitioners that use them reported that online resources saved time (MacKinnon, 2008). Just 8 per cent reported they lost time. Nearly half (49%) said MISs saved them time, and 29 per cent save time using interactive whiteboards and 26 per cent using learning platforms. MISs and online resources could save practitioners significant time during a week. One fifth of practitioners reported online resources saved them over two hours per week, while 13 per cent using a MIS reported it saving the same time.
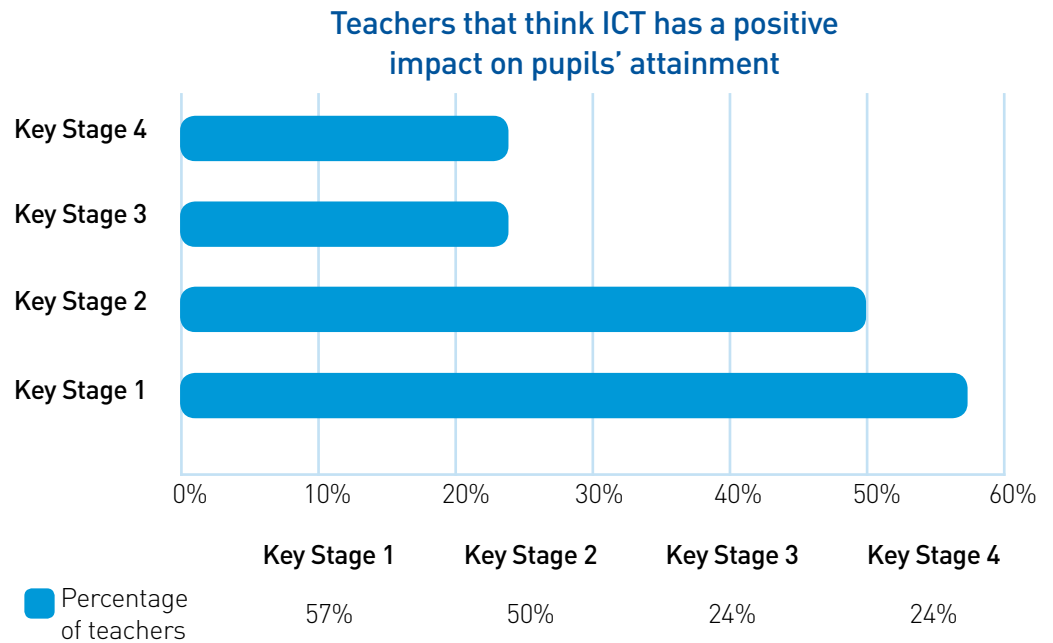
Work-based learning providers who adopt e-learning often do so as a means of managing the costs of training and professional development. Thus benefits in terms of capacity and efficiency are often requirements of their introduction. Overton *et al*. (2007) found that eight in ten employers considered that e-learning provided an accessible, flexible and cost-effective method of delivering training. This enabled organisations to respond rapidly to changing business needs with appropriate skills development. There was also evidence that it increased morale and professional confidence among employees.

Over 60 per cent of personal and community learning practitioners identified several time savings through using ICT. Most identified savings in lesson planning (72%), with clear majorities reporting savings through record keeping (64%) and lesson delivery (62%). Fewer reported gains through using ICT for assessment of learners' work, and 47 per cent reported that ICT made no difference to this. In interviews, practitioners confirmed that ICT may initially lengthen preparation time, but developing reusable resources offered clear benefits in terms of future time savings and higher quality materials (SERO, 2008).
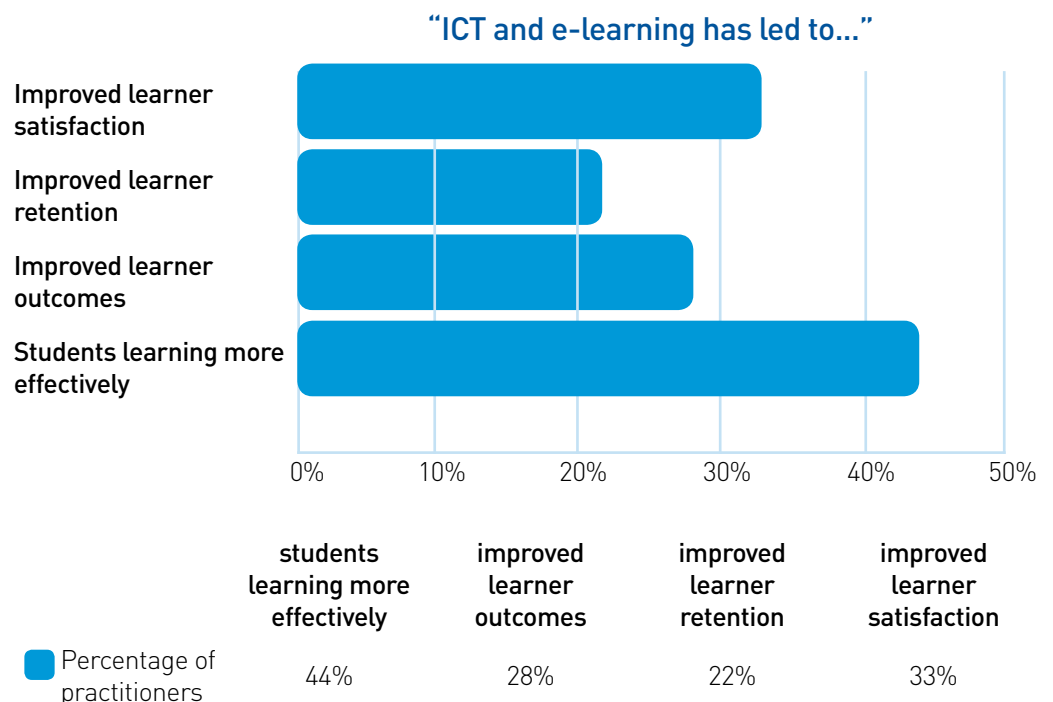
6.2 Raising achievements and improving skills

General studies of the impact of technology on achievement and attainment are planned by Becta for 2009. At the moment we have to rely on previous studies such as the interactive whiteboard evaluations and the 2002 Impact2 study (Harrison *et al*., 2003). However, reports from practitioners and providers also offer an indication of the value of technology in supporting the improved attainment of learners.

As shown in section 5, teachers were generally positive about the impact of technology on learners' engagement in learning. However, they were less likely to agree that technology had a positive impact on their level of attainment (Smith *et al*., 2008). Teachers in secondary schools were more sceptical than primary school teachers. Over a half of primary teachers thought that ICT had a positive impact on attainment in Key Stages 1 and 2. In contrast, less than a quarter (24%) of secondary teachers thought it had a positive impact at Key Stages 3 and 4.

Teachers that think ICT has a positive impact on pupils' attainment

	Key Stage 1	Key Stage 2	Key Stage 3	Key Stage 4
Percentage of teachers	57%	50%	24%	24%

In further education colleges, practitioners were also more likely to see greater impact in the learning experience than in outcomes. Some 44 per cent of FE college respondents reported that ICT was a great deal of help in helping students learn more effectively. However, 28 per cent reported that it was a great deal of help.in improving learning outcomes, and 22 per cent in improving learner retention (LSN, 2008).

"ICT and e-learning has led to..."

	students learning more effectively	improved learner outcomes	improved learner retention	improved learner satisfaction
Percentage of practitioners	44%	28%	22%	33%

In work-based learning, e-learning appeared to support delivery of a wide range of skills. These included communications, leadership and management, foreign language training, IT (both for technology professionals and those who use IT in their day-to-day jobs), health and safety and a wide range of company-specific programmes (Overton *et al*., 2007). However, the extent of use of e-learning programmes of this kind across employment sectors was difficult to gauge. Given that up to 35 per cent of work-based learning providers were classified as e-enabled, the remaining two thirds of providers were unlikely to be realising the full benefits of technology-supported learning.

6.3 Narrowing gaps and supporting the vulnerable

Approximately one third of children face some form of disadvantage, and this is likely to affect their educational attainment. This disadvantage results from a range of factors, including housing and schooling along with relationships with family, friends and the local community. Technology has the potential to help disadvantaged pupils by enhancing confidence and promoting positive attitudes towards learning; by helping to re-engage disaffected learners with formal education; as a tool for sharing information; and by enabling confidential support and advice. Unfortunately, this potential remained unmet to a large degree (Bradbrook *et al*., 2008).

However, there are many examples of projects which have made use of technology for supporting disadvantaged learners, although most, with the exception of the NotSchool programme, are currently achieving isolated impact. There are some projects that demonstrate clear benefits in relation to enhancing achievement, confidence and promoting positive attitudes towards learning (Russell and McGuigan, 2007). Pupils who had been turned off from learning became engaged as a result of being involved in activities that tapped into their personal interests and produced 'professional' results. These projects provided successful alternatives to the school environment, enabling confidential support and advice, and sharing information and experiences through peer-to-peer networking.

Evidence in relation to other priorities is as yet limited, suggesting the need for further evaluative studies and impact research. More evidence is needed to understand, for example, the links between parents' engagement in children's learning and the use of technology-based information and communication channels (for example, parent gateways). Similarly, little is currently known about the impact on the well-being of children and young people from increased integration of professional information systems at a local level. These and other areas will provide a focus for future Becta research.

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