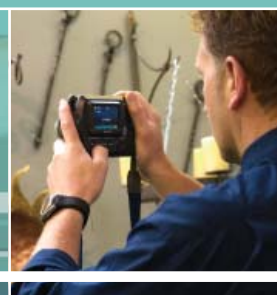# ICT and e-learning in further education:
management, learning and improvement

A report on the further education sector's engagement with technology

Becta Research

November 2006

Contents

Summary of the findings

1.1   The purpose of the study

This study is the seventh in a series that assesses progress in the provision of ICT within further education (FE) and sixth-form colleges since 1999. It also forms part of the evidence base that will inform the development of post-16 e-learning by examining the integration of this provision with the teaching and learning process.

1.2   Key messages

Senior managers are committed to ICT and e-learning in the vast majority of colleges. Encouragingly, managers are increasingly engaged with the implementation of ICT and e-learning in colleges that are late adopters.

There is evidence that some colleges use ICT to personalise learning. Some learning platforms offer basic personalisation features, and some colleges make use of e-portfolios for managing evidence of learning. However, the use of ICT to support personalisation is at an early stage and still has a long way to go.

The skills of teaching staff again show a steady improvement, but the gap between those skilled in their personal use of ICT and those skilled in using ICT with learners has remained broadly the same over the past few years. The need to develop adequate staff skills combined with enthusiasm for e-learning is seen as a key element in embedding ICT and e-learning in any area of the curriculum.

Colleges have a robust ICT infrastructure. Internet connections and networks have been recently upgraded. Colleges purchased 80,000 computers in 2006. This would enable the current level of computer stock of FE colleges to be replaced every five years. This seems to be sustainable at the current level of demand and possibly at a somewhat higher level of demand. However, given the current patchy use of ICT across the curriculum, and pressures to personalise learning, this situation may change in future years.

1.3   ICT infrastructure

We estimate that the total number of computers in the 388 English colleges was around 380,000 in 2006 – more than double the estimated total in 1999. The vast majority of these (95 per cent per cent) allowed access to the internet. Around 80,000 (22 per cent per cent) computers had been purchased during the year. The current level of purchase would replace the whole computer stock every five years, reaching a steady-state of around 400,000 computers.

During 2004–5, the United Kingdom Education and Research Networking Association (UKERNA) began a phased programme of bandwidth upgrades of JANET connections for FE and sixth-form colleges to 4Mbps or 10Mbps. This migration had largely taken place by 2006. At the time of the survey, 69 per cent per cent of colleges did not plan to purchase any additional bandwidth.

> The need to develop adequate staff skills combined with enthusiasm for e-learning is seen as a key element in embedding ICT and e-learning in any area of the curriculum

A large number of colleges upgraded their local area networks (LANs) between 2004 and 2005, perhaps to make best use of the new bandwidth upgrades. This improvement continued into 2006. Gigabit Ethernet has become the dominant feature of FE college networks. 100Mbps Ethernet declined dramatically over the last year and 10Mbps Ethernet was used by a very small number of colleges.

1.4   Access to ICT

An adequate level of access to the ICT infrastructure is the foundation of a college's ability to deliver e-learning effectively. In 1999 the FE and sixth-form college sector was set targets for access aimed at achieving two key targets: ratios of one internet-enabled computer for every five FTE students, and one internet-connected computer for every permanent member of teaching staff.

The median ratio of FTE students per internet-enabled computer was 4.8:1 at the time of the survey in 2006. This is a vast improvement on the 1999 ratio of 21:1, but a continued decline from 2003 when this ratio was 4.1:1, and similar to the 2005 level of 4.7:1. However, the current ratio remains comfortably within the target of 5:1, with a clear majority of colleges at or below this level. Colleges' success in recruiting and retaining more students in recent years is a major determinant of these worsening ratios in the face of increasing numbers of computers.

The target of one internet-connected computer for every permanent member of teaching staff was achieved or bettered by 58 per cent per cent of colleges. This has improved from a level of 26 per cent per cent of colleges in 2003, and 15 per cent per cent in 2001. This achievement is further reflected in the median value of the ratio of internet-connected computers to permanent teaching staff. This bettered the target level of one member of staff for every machine in 2006, compared to three members of staff per machine in 2000.

Just under half the institutions surveyed (47 per cent per cent) reported that they could not cope with the demand for computers in 1999. This level stood at 30 per cent per cent in 2006, close to the lowest level in 2001. Improvements in access to the internet also improved. Some 51 per cent of respondents described access to computers for internet use as 'easy at any time'. This is similar to the 2003 level and an improvement on the previous two years.

1.5   Teaching and learning resources

College intranets and networks continued to be extensively used for learning. Commercial or open-source VLEs have continued to be increasingly widely used. In 2006, 82 per cent of colleges used a VLE, compared to 59 per cent in 2003. However, not only did use of these VLEs increase across colleges, they were also most widely cited as a college's main platform.

Colleges made heavy use of all three types of learning platform as repositories for course documents. However, nearly three-quarters of colleges with a VLE used it across most types of learning activity. However, the ability of a learning platform to link with a

college's MIS is not an outstanding feature of any platform. The difficulty of linking to an MIS is a significant weakness of VLEs. Only 33 per cent of colleges with a VLE say that this platform is linked to the college's MIS.

Learning platforms are beginning to develop features that address personalisation. Around half of college platforms could associate individual learners with particular courses, and with particular preferences. Just under 20 per cent of platforms could remember where a student has got to in a particular course and to recognise the student's prior learning. Only 6 per cent of colleges said their learning platform outputs to an e-portfolio.

E-learning materials tended to be used at the discretion of the individual teacher. This was the case in 52 per cent of the colleges surveyed. Planning for the use of these materials at a higher level was far less widespread. Only 19 per cent of colleges had college-wide plans and 27 per cent had department- or course-level plans.

Most colleges obtain learning materials from a wide range of sources. The internet was again the most frequently used source of learning materials, being used in 97 per cent of colleges and regarded as common practice in 31 per cent. Some 91 per cent of colleges stated that they made use of in-house-developed materials. Some 34 per cent described this as common practice.

1.6   ICT in the teaching and learning process

ICT remained more widely used for learning support and independent learning than for formal delivery. However, the more formal approaches became more widespread in 2006, having stalled to a large extent in 2005. Perhaps unsurprisingly, this increase in usage was more pronounced in the more e-enabled colleges.

The number of colleges offering learndirect programmes continued to decline in 2006. Almost three-quarters of colleges offered these programmes in 2003, but by 2006 less than half were doing so.

The average number of staff considered to be competent or advanced in their personal use of ICT has grown steadily from 67 per cent 2000 to a level of 78 per cent in 2006. Alongside this an average of 62 per cent of college staff were reported to be competent or advanced in using ICT with learners (e-learning skills). This latter figure was 42 per cent in 2000. Both sets of skills have improved, though whereas the gap closed between 2000 and 2003, it has remained at a steady level of just below 20 per cent since.

The survey asked respondents to give reasons for high and low ICT use in particular curriculum areas. The most frequently given reasons centred on staff enthusiasm and skills. Enthusiasm was cited by 44 per cent as contributing to high use of ICT and e-learning. A lack of confidence or competence with ICT was cited by 38 per cent as reasons for low use.

The average number of staff considered to be competent or advanced in their personal use of ICT has grown steadily from 67 per cent 2000 to a level of 78 per cent in 2006.

1.7   Policies and strategies for ICT and e-learning

The overwhelming majority of respondents reported that they have champions of ICT and e-learning at senior level in their colleges. Some 43 per cent stated that their principal was a vocal advocate of e-learning and a further 42 per cent that there were strong ICT champions at senior management level. ICT was driven forward by department heads in 7 per cent of colleges and was the domain of small groups and enthusiasts in the remaining 7 per cent.

Over 85 per cent of colleges collaborated with other organisations on ICT-related activities. Colleges most frequently collaborated with other FE colleges, and almost as frequently with schools. Well over half of colleges collaborated with either or both FE colleges and schools. Whereas these latter proportions are little changed from 2005, increasing numbers of colleges are collaborating with employers.

One way that a college translates its strategy into action is through setting targets. Some 34 per cent of colleges set formal targets for the use of ICT and e-learning across all programmes. A further 36 per cent set targets where they considered these appropriate, and 26 per cent did not set targets for ICT and e-learning at all.

Colleges identified as late adopters of ICT and e-learning, showed the greatest increases in management interventions such as target setting. On the other hand, the most e-enabled colleges appeared to make fewer management interventions. However, these latter colleges increased levels of access for learners and achieved wider implementation of e-learning. These indicators suggest two hypotheses. Firstly, college managers in late adopting colleges are beginning to engage with ICT and e-learning. Secondly, at the e-enabled end of the spectrum, ICT and e-learning become increasingly self-sustaining and require less direct management input.

2.1 Context and purpose of the study

Becta carried out this study in January and February 2006 on behalf of the Learning and Skills Council. The survey assesses progress in the provision of ICT within the further education (FE) and sixth-form college sector, along with the extent to which this provision is integrated into the teaching and learning process (e-learning).

Six previous studies, undertaken in 1999, 2000, 2001, 2003, 2004 and 2005 provide comparative data against which to judge the impact and development of ICT infrastructure and e-learning in this sector.

2.2 Survey methodology and response

The study took the form of a survey by questionnaire of all 388 FE and sixth-form colleges in England. The questionnaire explored quantitative issues relating to infrastructure, management and practice. The questionnaire was published and disseminated simultaneously in both paper-based and web-based formats. A total of 122 colleges (31 per cent of the sector) submitted completed ICT and e-learning survey questionnaires in time to be included in the analysis.

The profiles shown in the tables below, together with the response rate, lead us to a high degree of confidence in the data. The survey was detailed and conducted to a tight timescale, so it is understandable that some returns were incomplete in some sections. For this reason the basis of calculation in the report varies from the sample maximum at times. Unless otherwise stated, all tables and charts are based on the percentage of respondents to the survey.

2.3 Profiles of the colleges in the survey

Table 1 shows the breakdown of respondents to the survey by type of college.

The breakdown by college type reveals that sixth-form colleges are slightly over-represented in the sample, and the more specialised colleges are somewhat under-represented. The actual number of specialised colleges in the total population and in the sample prevents us from making specific observations about them as a group. However, the relative proportions of general colleges and sixth-form colleges is close enough to the distribution of these colleges in the population to ensure a high level of confidence in any inferences drawn from the data.

The regional breakdown of respondents to the survey is shown in Table 2. In general a higher proportion of colleges from the midlands and north of England submitted responses along with a correspondingly lower proportion from the south. However, the general profile of the respondents still mirrors the sector quite closely.

Table 1 Respondents by college type

College type	Sector		Respondents	
	No.	Percentage	No.	Percentage
General FE and tertiary college	252	65	85	70
Sixth-form college	101	26	31	25
Other colleges	35	9	6	5
Total	388	100	122	100

Table 2 Respondents by regional location

Region	Sector		Respondents	
	No.	Percentage	No.	Percentage
South West	34	9	7	6
South East	67	17	22	18
Greater London	55	14	15	12
Eastern region	34	9	11	9
East Midlands	27	7	11	9
West Midlands	49	13	15	12
North West	62	16	21	17
Yorkshire and Humber	41	10	12	10
North East	23	6	8	7

Table 3   Respondents by college size

FTE band	Sector		Respondents	
	No.	Percentage	No.	Percentage
0–750 FTEs	19	5	5	4
751–1,750 FTEs	102	26	23	19
1,751–3,000 FTEs	94	24	32	26
3,001–5,000 FTEs	93	24	31	25
5,001 FTEs and above	80	21	31	25

Table 3 shows the profile of colleges responding to each survey, grouped according to numbers of full-time-equivalent (FTE) students enrolled at each college. The survey shows a bias towards the medium-sized and larger colleges. This reflects the lower response rate of specialised colleges in the sample noted above.

Infrastructure

3

3.1 College computer stock

In February 1999, Becta's original survey estimated that there were around 160,000 computers in English further education (FE) colleges. Of these, only 38 per cent (around 60,000 machines) were of an acceptable specification for use with internet applications. By 2001 colleges had replaced 70,000 computers, 44 per cent of the 1999 computer stock.

By February 2006, the total number of computers had increased to an estimated 380,000. This is more than twice the 1999 figure. The vast majority of these (95 per cent) allowed access to the internet. Around 80,000 (22 per cent) computers had been purchased in the previous year. Chart 1 illustrates the growth in computer numbers over this time.

In general, colleges have continued to be reluctant to part with older computers, some 30 per cent pre-dating 2002-03. Between 1999 and 2006 around 460,000 computers were purchased, while around 210,000 were removed from service. If colleges purchase new computers at 2006 levels, then the whole computer stock could be replaced every five years. At the same time, the total stock of computers will reach a steady-state of around 400,000 computers. However, colleges have to decide on a level of computer provision that matches the extent of access they wish to provide, for both learners and staff. We look at levels of access in some detail in Section 4 of this report.

The computers available on the market in 2006 are clearly of a higher specification than those available in 1999. However, even the standard applications used in 2006 make greater demands of the hardware on which they are installed. They may require improved speed and memory, which may in turn render obsolete even relatively recent purchases. Older computers may then be assigned to basic duties, like word processing.

Chart 2 shows the type of availability of computers averaged across all colleges. As might be expected, computer availability was at its greatest in the daytime, decreased in the evening, and was at its lowest at weekends. A higher proportion of open-access computers than classroom-access computers remained available beyond daytime hours, with around one third of these open-access machines available for use at weekends. These proportions have remained broadly unchanged since this question was first asked in 2003. However, though colleges may wish for a greater proportion of computers to be open access, the actual space available in college buildings may prove a constraint.

Chart 1   Estimated change in computer stock over time

	1999	2001	2003	2004	2005	2006
2005/06 purchases						80,000
2004/05 purchases					70,000	70,000
2003/04 purchases				40,000	40,000	40,000
2002/03 purchases			100,000	100,000	100,000	70,000
2000/01 purchases		170,000	150,000	140,000	130,000	110,000
Pre 2000 purchases	160,000	90,000	50,000	40,000	30,000	10,000

Chart 2   Computer placement

	Daytime	Evenings	Weekends
No access	1%	23%	79%
Classroom access	74%	56%	13%
Open access	26%	21%	8%
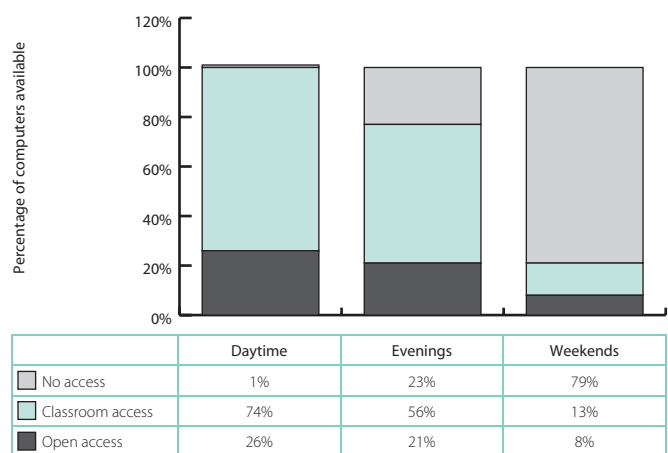
These issues illustrate the balancing act performed by colleges. Are new computers assigned to the existing users of memory-hungry applications? Is the deployment of hand-me-down computers to late adopters of new technology a disincentive to develop e-learning in these areas?

3.2 Internet connectivity

During 2004, the United Kingdom Education and Research Networking Association (UKERNA) began the process of upgrading colleges' free 2Mbps internet connection via JANET as part of the National Learning Network (NLN) initiative. UKERNA upgraded colleges' bandwidth either to 4Mbps or 10Mbps, a decision based on a college's aggregated overall traffic flow.

Table 4 shows that this migration had largely taken place by 2006. The small number of colleges stating that they had free connections other than 4Mbps or 10Mbps may have been mistaken. Another explanation is that some colleges are members of consortia that share bandwidth, thereby increasing the amount theoretically available.

Some 69 per cent of colleges do not plan to purchase additional bandwidth. Of those that are planning more bandwidth, 11 per cent of colleges aim to use JANET and 8 per cent aim to use BT. The remaining 12 per cent of colleges identified a range of different ISPs providing them with some connectivity.

3.3 Local Area Networks (LANs)

While 35 per cent of the colleges surveyed were single-site institutions, a further 32 per cent operated on two or three major sites, and 25 per cent on four or five sites. The largest multi-site college in the sample operated on 11 major sites.

Most sites were networked. Some 94 per cent of colleges had all their major sites connected to the college network. Of the remaining eight colleges in the survey, six had one major site that was not networked and another two had two sites not networked. None of the colleges in the survey had more than two sites not connected to the college network.

Chart 3 shows how LAN specification has improved over the years. This is broadly in line with the numbers of computers that networks support. A large number of colleges upgraded their LANs between 2004 and 2005, perhaps to make best use of the internet upgrade mentioned above. This has resulted in Gigabit Ethernet becoming the dominant feature of FE college networks. 100Mbps Ethernet declined dramatically and 10Mbps LANs remained in use in very few colleges. Two colleges also recorded LAN backbones in excess of 1Gbps, signalling the beginning of a further phase of LAN development.

Colleges made considerable use of wireless LAN technologies. While only 2 per cent of colleges have a wholly wireless network, a further 10 per cent describe wireless as forming a substantial

Table 4   Total bandwidth

Bandwidth	Free bandwidth connection	Planned bandwidth
2Mbps	4	1
4Mbps	32	24
6Mbps	2	5
8Mbps	1	2
10Mbps	57	45
More than 10Mbps	2	17

Chart 3   LAN backbone

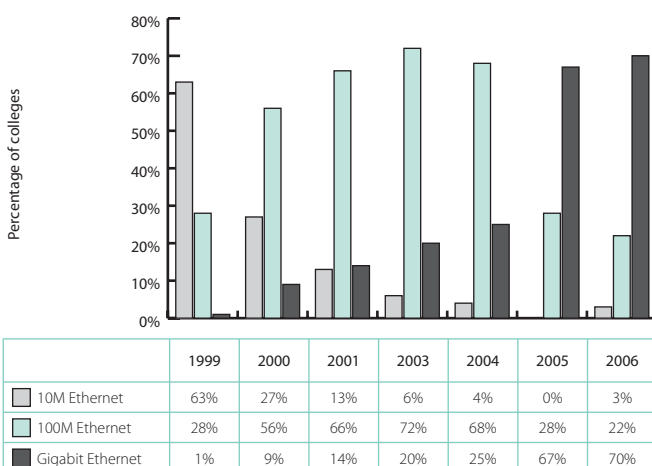|	1999	2000	2001	2003	2004	2005	2006
10M Ethernet	63%	27%	13%	6%	4%	0%	3%
100M Ethernet	28%	56%	66%	72%	68%	28%	22%
Gigabit Ethernet	1%	9%	14%	20%	25%	67%	70%

part of their college network. Nearly three-quarters of colleges (74 per cent) use wireless for a small part of their network, perhaps to connect remote buildings or sites.
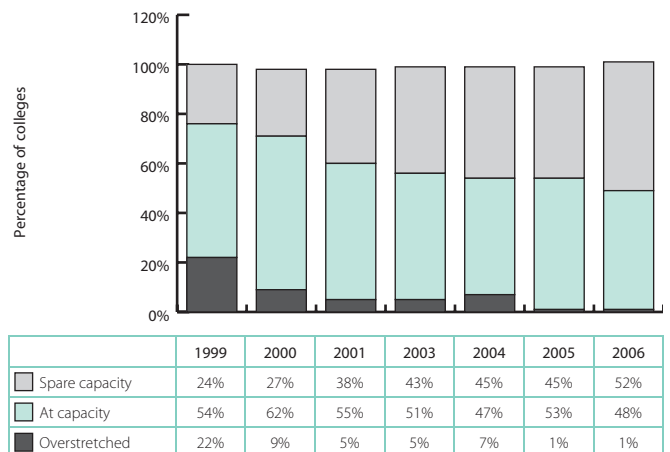
3.4   LAN performance

The improvement in LAN specification between 1999 and 2006 has been associated with an improvement in performance and in capability to meet demand. However, Chart 4 shows that the dramatic improvement in technical specification between 2004 and 2005 was associated with only a relatively modest improvement in capacity. In 1999, only 24 per cent of colleges had the capacity to meet an increase in demand on their networks, while 22 per cent could not cope with existing calls upon them. By 2004, 45 per cent of respondents said that they could cope with a significant increase in traffic. In 2006 this number increased to more than half of respondents (52 per cent) for the first time.

Chart 4   Network capability to meet demand

Percentage of colleges

	1999	2000	2001	2003	2004	2005	2006
Spare capacity	24%	27%	38%	43%	45%	45%	52%
At capacity	54%	62%	55%	51%	47%	53%	48%
Overstretched	22%	9%	5%	5%	7%	1%	1%

While technical improvements contribute to wider benefits to the system, there are also other forces at play. There may be a 'motorway effect', which sees traffic rapidly adjust upwards each time an additional lane is opened, which continues to affect the nature of demand for ICT in colleges. Not only must each college network support its share of the additional 260,000 machines we estimate to have been added since 1999, but it must also deal with the increased proportion of the total that are networked (97 per cent) rather than stand-alone. The burden is further increased, moreover, by the increasing use of networked applications.

Colleges continued to restrict network traffic in bandwidth-hungry applications. Some 70 per cent of colleges identified large files as an actual or potential source of problems on the network, and sought to control their use. Despite the continuing improvement in colleges' technical infrastructure, this percentage is only 14 per cent fewer than the 84 per cent that cited large files as a problem in 1999. 'Bandwidth hungry' is of course a relative term and, in a further demonstration of the 'motorway effect', ever more greedy applications eat into newly increased LAN capacity.

Relatively few colleges allow students to connect their own devices to the college network. Some 77 per cent of respondents reported that their college did not permit this. The remaining colleges allowed students to make a physical connection (12 per cent), or a wireless connection (10 per cent), or both of these (1 per cent). However, 69 per cent of colleges allow remote access to college systems to all students. A further 10 per cent allow remote access to particular groups of students and 3 per cent allow access on a case-by-case basis. Some 18 per cent do not allow remote access to students. Not surprisingly, none of these latter colleges allow students to connect their own devices to the college network.

Chart 5   Network performance
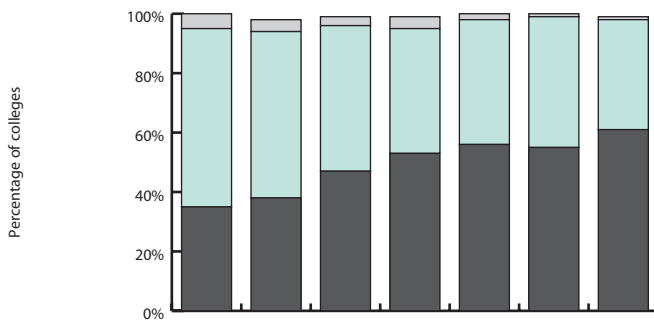
	1999	2000	2001	2003	2004	2005	2006
Slowness a problem	5%	4%	3%	4%	2%	1%	1%
Slow at busy times	60%	56%	49%	42%	42%	44%	37%
Always smooth	35%	38%	47%	53%	56%	55%	61%

Chart 6   Technical support services

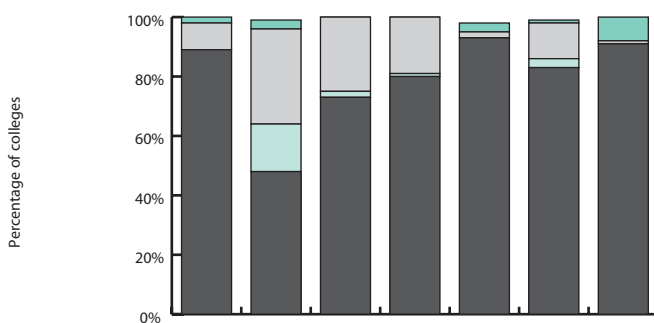|	AV support	Telephony	Data/MIS	Network support	PC support	Internet	Helpdesk services
Not offered	2%	3%	0%	0%	3%	1%	8%
Partly outsourced	9%	32%	25%	19%	2%	12%	1%
All outsourced	0%	16%	2%	1%	0%	3%	0%
In house	89%	49%	74%	80%	93%	83%	91%

Chart 5 shows a steady improvement in network performance over the period 1999–2006. A clear majority of colleges (61 per cent) described their network performance as always smooth, and 37 per cent reported their network performance to be slow at busy times. This is almost an exact reversal of the situation in 1999. However, the most dramatic changes took place between 1999 and 2003, the overall trend slowing since that time. In the 37 per cent of colleges where networks are slow at busy times, the student experience of ICT will be affected by a kind of lottery. Those whose networked learning is scheduled at busy times will face a worse experience than the winners in the lottery of timetable slots, who are scheduled to use the network when traffic is low.

There have clearly been considerable technical improvements to connectivity and college networks over the last two years. However, these improvements have only been translated into modest improvements in perceived performance.

3.5   Technical support services

FE colleges employ technical staff to deliver a wide range of services. In 2006, the median number of technical staff directly employed by colleges was eight, and the median ratio of computers to employed technicians was 110:1. This is an increase from a ratio of 100:1 in 2005 and is accounted for by the increase in total numbers of computers described in 3.1 above.

In-house technical support tended to be concentrated in the area of end-user computing. PC support, audiovisual support and technical helpdesk services were the services most often provided by in-house staff. Around 90 per cent of colleges delivered these services entirely in-house (see Chart 6 below). Around 80 per cent of colleges delivered internet and network support services in-house. Most of the remainder partially outsourced these services. Data services, including management information systems (MIS), and telephony support were most likely to be at least partly outsourced. Data services were handled in-house by 74 per cent of colleges, and telephony by only 49 per cent.

Technical support is handled well in the majority of colleges. Some 72 per cent of respondents reported that technical problems were usually resolved within a reasonable time. A further 23 per cent reported that there were peak times when these problems were difficult to resolve and only 5 per cent stated that there was always a significant backlog of technical problems awaiting resolution.

4.1   Constraining influences

The access ratios discussed in this section are a shorthand measure for colleges' ability to deploy ICT for the benefit of both learners and staff. However, we need to remember other issues that complicate or constrain this picture. Several of these were identified in Section 3 of this report. Firstly, 30 per cent of the current stock of computers were purchased before 2002–3. If certain groups of learners or staff routinely access these older computers, their experience of ICT will be constrained. Secondly, around three quarters of computers are sited in classrooms. This constrains the type of use to which they are put and limits their use out of class time. Thirdly, 37 per cent of colleges report that their networks are slow at busy times. Students unlucky enough to be timetabled to use the network at these times will again get a lower quality experience of ICT and e-learning.

4.2   Calculating the access ratios

The survey requested a count of computers available in the college. Based on this data, we calculated the availability of computers for both students and staff within colleges. The proxy variables we used to estimate this are the ratios of students and staff to computers. All six previous studies used these measures, and comparisons over time can be drawn. These ratios were used by the Learning and Skills Council (LSC) to define the targets for access to computers that it encouraged colleges to achieve by 2002.

There is no single unambiguous measure of student numbers that can safely be used to calculate access ratios. Full-time-equivalent (FTE) student data allows for total hours of attendance, which other possible measures such as a simple count of student numbers do not. We therefore used these data for our calculations. This allowed us to get closer to the underlying question – how easy is it for a student to access a computer within the institution? We have not tried to distinguish particular groups of students, or to separate out attendance mode, pattern or site, although we recognise that in practice these may also have an influence in determining access.

We used the latest complete set of FTE student data available from the LSC, which covers student numbers for the academic year 2004–5. The numbers of FTE students have risen markedly over the past few years, reflecting the greater levels of recruitment and retention of students across FE. The total number of FTE students stood at 0.9 million in the academic year 2000–1, but had increased to 1.15 million by 2002–3. This had increased further to 1.28 million by 2003–4 and remained at this level for 2004–5. If student numbers have continued to grow in the intervening period, then comparing student numbers in 2004–5 with computer numbers in 2006 will distort the apparent ratio, rendering it slightly more optimistic than it is in reality. However, such an effect is likely to be minimal and, given that year-old FTE figures have been consistently used by this series of surveys, their value for comparison over time will not be affected.

We have examined two key statistics:

- The ratio of FTE students to all computers in the college
- The ratio of FTE students to internet-enabled computers.

This latter statistic has allowed the LSC to monitor its target for colleges of one internet-enabled computer for every five FTE students.

Chart 7   Ratio of FTE students to all computers

Percentage of colleges

	1999	2000	2001	2003	2004	2005	2006
5:1 and better	21%	59%	75%	87%	84%	72%	68%
6:1 to 7:1	36%	28%	20%	11%	13%	22%	25%
8:1 to 11:1	35%	11%	5%	2%	3%	6%	7%
12:1 and over	8%	1%	0%	0%	1%	1%	0%
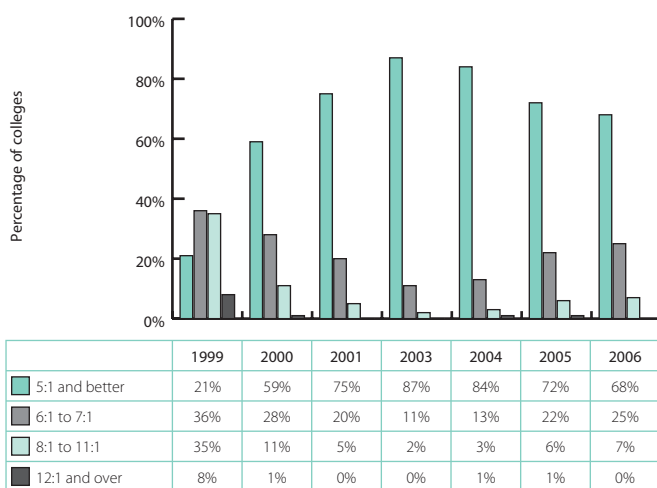
Chart 8   Ratio of FTE students to internet-connected computers

Percentage of colleges

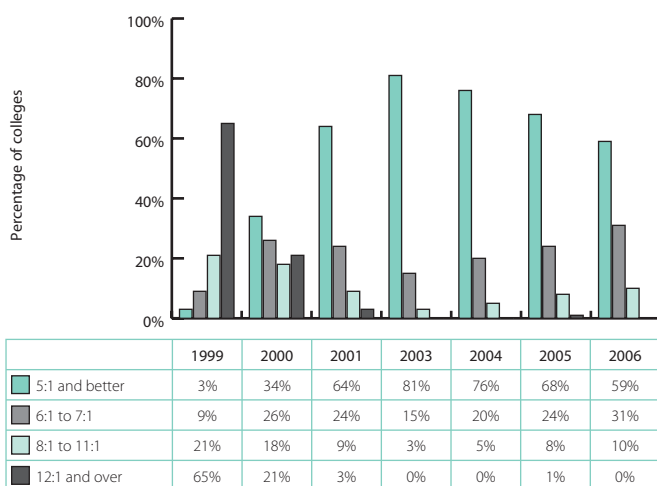|	1999	2000	2001	2003	2004	2005	2006
5:1 and better	3%	34%	64%	81%	76%	68%	59%
6:1 to 7:1	9%	26%	24%	15%	20%	24%	31%
8:1 to 11:1	21%	18%	9%	3%	5%	8%	10%
12:1 and over	65%	21%	3%	0%	0%	1%	0%

4.3   Access to computers

The change since 1999 in the availability of computers for students is shown in Chart 7. The mean number of FTE students per computer was 8.2:1 in 1999. This figure was most favourable in 2003, when it was 4.1:1. However, it has since crept back to a level of 4.5:1 in 2006. The median number of FTE students per computer was 4.4:1 in 2006 (from 4.0:1 in 2003 and 7.6:1 in 1999). As the median value is not distorted by extreme results, it is likely to be the better estimate of the typical situation in colleges, and to offer a better value for comparison over time. The highest value calculated for 2006 was 9.4:1 at a single college, with only 7 per cent of the respondents having ratios of 8:1 or worse, a similar level to the previous two years. This compares with 43 per cent that had ratios of 8:1 or worse in 1999.

Colleges have had to face the challenge of maintaining their technological infrastructure to keep it reasonably up to date. At the same time they have had to meet the demand created by growing numbers of FTE students. However, during this last year the number of FTE students has stabilised, while the student: computer ratios have slightly worsened. The small increase in numbers of computers reported in Section 3 have resulted in an improvement to the staff:computer ratios reported in 4.6.

The disparity noted in earlier surveys between different types of college in terms of levels of resources continued to widen in 2006, having closed in 2003. The median ratio of FTE students to computers for sixth-form colleges again improved. This ratio was 3.3:1 in 2006, compared to the level of 4.1:1 in 2003. On the other hand, this ratio for general FE colleges was 4.8:1, similar to the 2005 level of 4.9:1. This ratio had been 3.9:1 in 2003. The median ratio for land-based and other specialist colleges stood at 4.9:1, slightly worse than the 2003 level of 4.6:1.

4.4   Access to internet-enabled computers

A key feature of chart 8 is the dramatic increase in internet access in the FE sector between 1999 and 2001. The chart also demonstrates a steady improvement to 2003, followed by some deterioration, resulting in a profile in 2006 marginally worse than that in 2001. The median number of FTE students to computers with internet access was 4.8:1 in the current study. This was a similar level to 2005, though a deterioration from the level of 4.1:1 in 2003. This is still a vast improvement on the level of 21:1 in 1999. A clear majority of colleges (59 per cent) remained within the LSC target level of 5:1. However, the number of colleges within that target level had declined from a proportion in excess of three quarters of colleges in 2003.

4.5 Managing demand for student access to ICT

In 1999, colleges overwhelmingly described student demand for computers as 'widespread'. Since that time demand has clearly continued to grow in the face of a greatly increased number of high-specification computers available for use by learners. Just under half of institutions (47 per cent) reported that they could not cope with the demand for computers in 1999. As Chart 9 shows, this level now stands at 30 per cent. Also, the number of colleges reporting that they are able to cope with increased demand has reached a peak of 13 per cent. The chart illustrates the fluctuations in colleges' response to changes in demand and student numbers.

The same general picture applies to meeting demand for internet access. Table 5 indicates that the number of colleges that were unable to meet current demand fell from just over half in 1999 to one quarter in 2001. This proportion peaked again at 33 per cent in 2005 and fell back again in 2006 to 30 per cent. Over the time of this study, colleges have been more able to meet demand for the internet than for computers per se. Given that access to computers is necessary for access to both the internet and all other applications, this discrepancy is to be expected.

These fluctuations can again be seen in Chart 10, which shows the pattern of access to the internet. In 2006, 51 per cent of respondents said that access to computers for internet use was 'easy at any time'. This is a similar level to the peak of 53 per cent of respondents in 2003, and up from the level of 42 per cent in 2005.

4.6 Access for staff

The provision of computers for the exclusive use of staff has improved on previous years. The National Learning Network (NLN) target of one internet-connected computer for every permanent member of the teaching staff was achieved or bettered by 58 per cent of colleges, well over half. This proportion shows a steady improvement on 47 per cent in 2005, and well ahead of the level of 26 per cent in 2003, and 15 per cent in 2001.

The attainment of the target for staff access to computers had proved slower to achieve than the target for student access. The median value of the ratio of internet-connected computers to permanent teaching staff, was 0.9:1, comfortably within the target level for the first time. The figure imputed for 1999 (when the question was not directly asked) was 7:1. (See Table 6.)
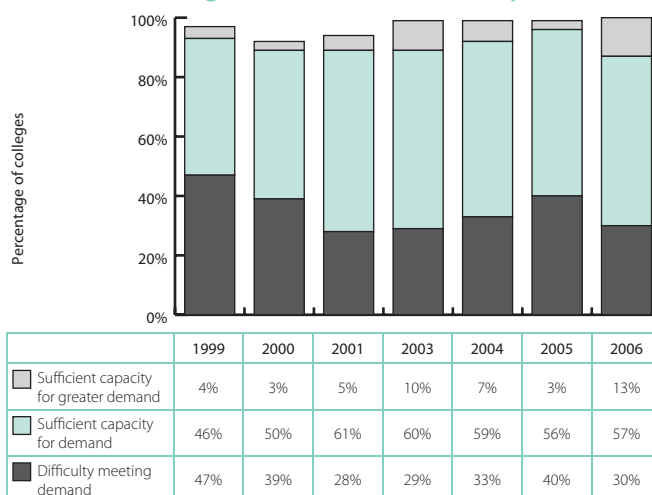
Chart 9 Meeting student demand for computers

	1999	2000	2001	2003	2004	2005	2006
Sufficient capacity for greater demand	4%	3%	5%	10%	7%	3%	13%
Sufficient capacity for demand	46%	50%	61%	60%	59%	56%	57%
Difficulty meeting demand	47%	39%	28%	29%	33%	40%	30%

Table 5 Meeting student demand for internet access

College capability	1999	2001	2003	2004	2005	2006
Cannot cope with current demand	54	25	25	25	33	30
Can cope with current demand	25	58	63	61	56	57
Can cope with greater demand	5	11	11	12	10	13

Chart 10 Ease of student access to the internet

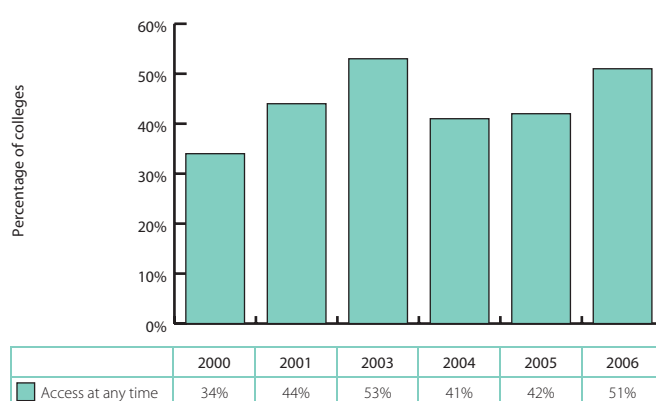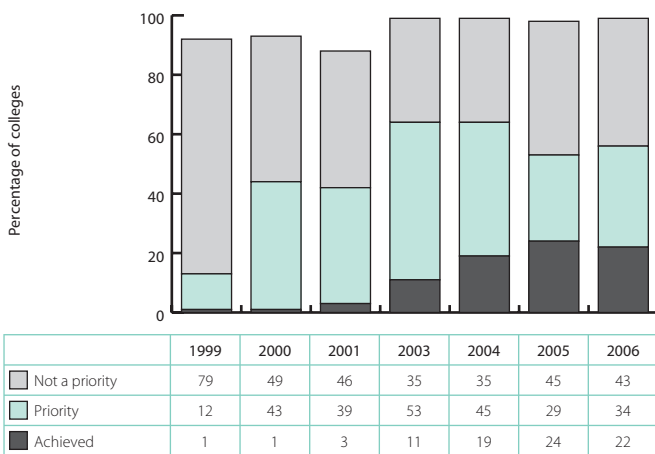|	2000	2001	2003	2004	2005	2006
Access at any time	34%	44%	53%	41%	42%	51%

Table 6 Median ratio of teaching staff to internet-connected computers

	1999	2001	2003	2004	2005	2006
All teaching staff	12.0:1	3.5:1	2.4:1	1.9:1	1.7:1	1.2:1
Permanent staff	*7.0:1	1.9:1	1.4:1	1.0:1	1.0:1	0.9:1

*Estimate based on 1999 data.

Chart 11 Priority given to providing teaching staff with access to own designated computer

	1999	2000	2001	2003	2004	2005	2006
Not a priority	79	49	46	35	35	45	43
Priority	12	43	39	53	45	29	34
Achieved	1	1	3	11	19	24	22

Access to internet-enabled computers for all teaching staff has also improved. This is of particular significance given the heavy reliance by colleges on sessional staff to deliver programmes of learning. The ratio of teaching staff to internet-enabled computers has fallen from 12.0:1 to 1.7:1. We have chosen not to report separately the ratios for staff and all computers, including those without internet capability, because these now differ little from the figures given in Table 6.

The connection of staff computers to the college network brought early improvements in access to internet-enabled computers. In 2006, 75 per cent of all computers set aside for staff use were networked desktop machines, and 24 per cent were laptops. Only 1 per cent of staff computers were stand-alone desktop machines. However, the improvements this year seem to have been the result of a greater number of the computers identified in Chart 1 being allocated for staff use.

There has also been a trend towards giving each member of teaching staff their own designated computer. Chart 12 reveals college priorities changing in the light of the increase in available resources. By 2006, sole use of a computer for teaching staff had been achieved by 22 per cent of colleges, a similar level to 2005, but an increase from 11 per cent in 2003. However, among those colleges who have not achieved this, sole use has declined as a priority over the last year, having been reported as a low priority by 43 per cent of colleges. The achievement of sole use of a computer for teaching staff by 22 per cent of colleges may appear to sit awkwardly with the other reported achievement of a ratio of teaching staff to computers of 1:1 by 58 per cent of colleges. Although many colleges have enough computers for all permanent teaching staff, these machines are not designated for the sole use of a particular individual.

Sole access to a computer for learning support staff is seen as less of a priority for colleges than sole access for teaching staff. Even so, 21 per cent of colleges had achieved this type of access in 2006, which is almost the same percentage as had achieved sole access for teaching staff. However, 57 per cent of all colleges did not regard sole access as a priority for their learning support staff.

The pressures on access to college infrastructure have changed over the years. In the early years of this study, colleges chose to address the issue of student access. Staff access was given a lower priority. The LSC target for this ratio was not achieved until 2004. Increases in student numbers further complicated the picture, affecting the balance of staff vs student demands.

5.1 Electronic communications

Previous studies in this series showed that email as a tool for staff communication was common practice across the sector. This reflects practice across all sectors of the economy. Electronic communication with learners was less common. Chart 12 shows the extent to which electronic communications are used with learners on college programmes. Nearly all colleges made some use of email for staff–student communication. This was widespread, that is, used on all or most college programmes, in 24 per cent of colleges. Though there is some use of other electronic communications with learners, these are widespread in very few colleges.

5.2 Learning platforms

We asked colleges to indicate the types of learning platform they used. A learning platform could be the college intranet, a commercially-produced or open-source virtual learning environment (VLE), or the general college network (using joint drives or public folders, for example). Colleges also indicated whether this usage could be described as frequent and also, if frequent, whether the particular learning platform could be described as the college's main platform. Chart 13 shows the change in use of the different platforms over the years 2003–6. College networks continued to be extensively used, while college intranets have become less widely used over that period. VLEs have become much more widely used. In 2006 they were used in 82 per cent of colleges compared to 59 per cent in 2003.

Chart 14 below shows the extent of use of these three types of platform in 2006. VLEs not only increased in use in colleges, they were more widely cited as a college's main platform. VLEs were the main platform in 30 per cent of colleges as opposed to 16 per cent in 2004. Intranets continued to be used as the main learning platform in 15 per cent of colleges, whereas college networks were the main platform in 20 per cent of colleges, compared with 40 per cent in 2004.

The increase in VLE use appears to have been achieved partly at the expense of the other two types of platform. In 2006, the proportion of colleges frequently using the college network remained the same as in 2005, but there was a sizeable decrease in colleges claiming the network as their main platform. Intranets, on the other hand, remained the main platform in the same percentage of colleges since 2004, but with fewer making frequent use of them. More than half (52 per cent) of colleges frequently used a VLE or used it as their main platform, more than double the 2003 level of 22 per cent.
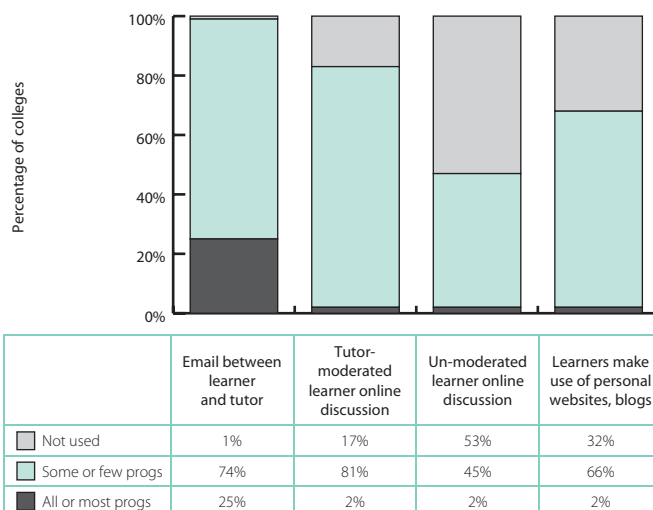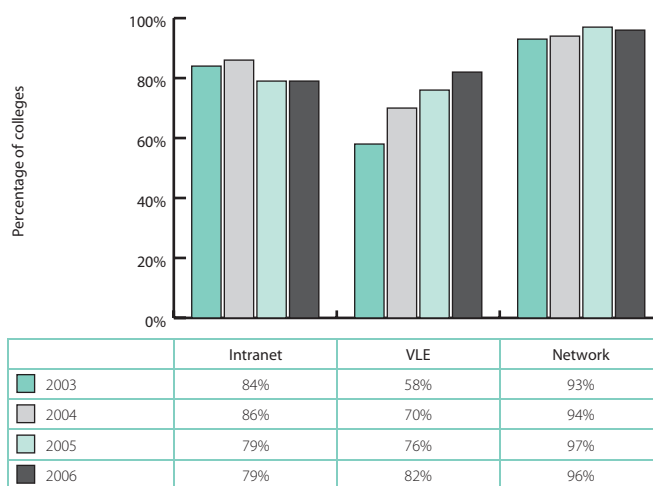
Chart 12 Use of e-communications with learners

	Email between learner and tutor	Tutor-moderated learner online discussion	Un-moderated learner online discussion	Learners make use of personal websites, blogs
Not used	1%	17%	53%	32%
Some or few progs	74%	81%	45%	66%
All or most progs	25%	2%	2%	2%

Chart 13 College learning platforms

	Intranet	VLE	Network
2003	84%	58%	93%
2004	86%	70%	94%
2005	79%	76%	97%
2006	79%	82%	96%

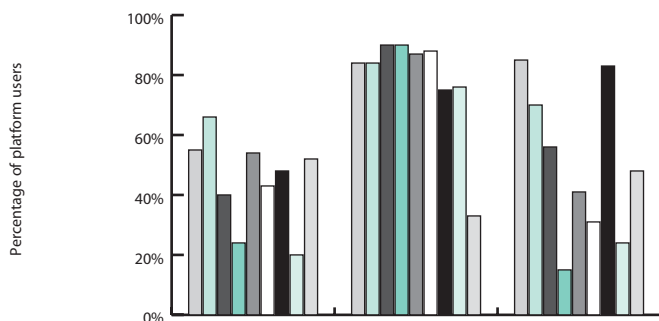## Chart 14 College learning platforms – frequency of use
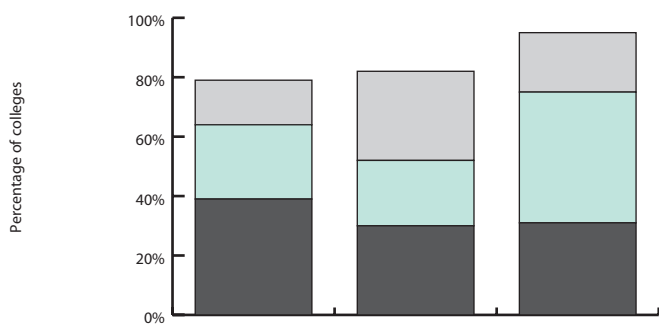
	Intranet	VLE	Network
Main platform	15%	30%	20%
In frequent use	25%	22%	44%
In use	39%	30%	31%

Chart 15 Use of college learning platforms

	Intranet	VLE	Network
Store course docs	55%	84%	85%
Access to digital resources	66%	84%	70%
Deliver learning activity	40%	90%	56%
Discussion	24%	90%	15%
Remote staff access	54%	87%	41%
Remote learner access	43%	88%	31%
Resource sharing	48%	75%	83%
Tracks student activity	20%	76%	24%
Links to MIS	52%	33%	48%

In order to identify the uses of these different learning platforms, we asked respondents to select from a list of features of learning platforms. These features were derived from a typology published in a Joint Information Systems Committee (JISC) National Institute of Adult Continuing Education (NIACE) report on choosing and using a learning platform in adult and community learning (Powell and Minshull, 2004).

Chart 15 shows the range of uses of the different platforms in 2006. The figures shown are the percentages of those colleges that have each of the three platform types. Colleges made heavy use of all three types of learning platform as repositories for course documents and digital resources. However, the college network was the most widely used platform for sharing resources by tutors. VLEs were used most widely across the range of learning activity. Some 74 per cent of colleges with a VLE made use of seven or more of the nine features listed. The ability of a learning platform to link with a college's management information system (MIS) improved on 2005 for all three platform types. However, this key element is not an outstanding feature for any platform. The difficulty of linking to an MIS remained a significant weakness for VLEs. Only 33 per cent of colleges with a VLE said that this platform was linked to the college's MIS.

We asked colleges to state the VLE product they used. Chart 16 shows the four most widely used VLE products compared to figures from the 2001 study where we last asked for this information. Moodle has gained a clear lead in this market, having become available since 2001. Blackboard doubled the number of colleges using its VLE over the five years, whereas WebCT (now merged with Blackboard) and Learnwise remained at similar levels.

Personalisation is a central aim of the government's e-strategy. Table 7 shows the extent to which learning platforms are beginning to develop features that address this aim. The most common features allow the platform to associate individual learners with particular courses, and with particular preferences. Less common features allow the platform to remember where a student has got to in a particular course and to recognise the student's prior learning. Least common is the ability of the platform to output to a student's e-portfolio. The type of learning platform also seems to have a bearing on the features available. Colleges that used a VLE as their main platform listed an average of 2.8 features. Those that used the college network as their main platform listed an average of 1.8 features and those that used the college intranet listed an average of 1.2 features.

5.3   Electronic learning materials

E-learning materials continued to be most often used at the discretion of the individual teacher. This was the case in 52 per cent of the colleges surveyed. The use of e-learning materials was directed by a college-wide plan in only 19 per cent of colleges and by a plan at department or course level in 27 per cent. These proportions have fluctuated slightly over the years, but remain at similar levels to 2003.

Chart 17 shows the main sources of learning materials used with students. Each source was used by over 90 per cent of colleges. College-produced materials and the internet were the most frequently used sources of learning materials. Both these sources were in common use in around one third of colleges (34 per cent and 31 per cent respectively). Of the 97 per cent of colleges that used NLN materials, 17 per cent described their use as common practice. This is an increase from 4 per cent describing the use of NLN materials as common practice in 2003. Some 91 per cent of colleges used other publicly-funded sources of materials. These were in common use in 11 per cent of colleges.

Some 80 per cent of colleges offered staff development programmes to support staff who wished to develop or adapt e-learning materials. Around 66 per cent offered support from e-learning 'champions' and 68 per cent offered support from technical staff. These proportions again remained broadly the same over the last few years. Of the 26 per cent of colleges that offered other support, a number mentioned support from other members of staff, often on a one-to-one or mentoring basis. Several colleges also mentioned the deployment of a dedicated materials development team. Others offered some remission of
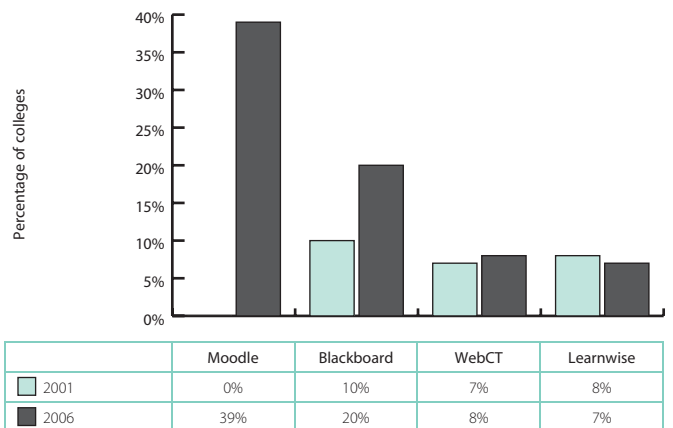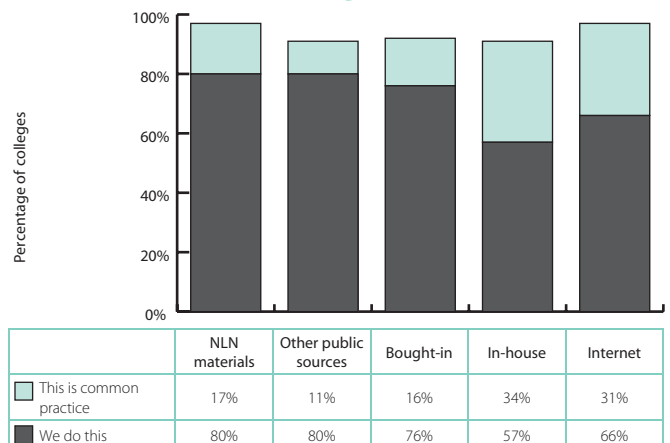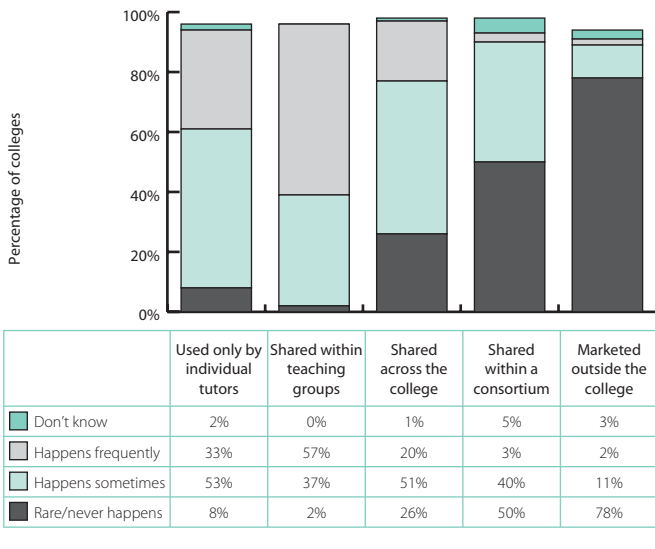
Chart 16   Main VLE products in use

	Moodle	Blackboard	WebCT	Learnwise
2001	0%	10%	7%	8%
2006	39%	20%	8%	7%

Table 7   Platform features that encourage personalisation

	Percentage of colleges
Recognises which course(s) the learner is studying	52
Automatically remembers accessibility settings	44
Desktop can be personalised by the learner	41
Recognises prior learning	19
Knows where each learner has got to	18
Outputs to an e-portfolio	6

Chart 17   Source of e-learning materials used with students

	NLN materials	Other public sources	Bought-in	In-house	Internet
This is common practice	17%	11%	16%	34%	31%
We do this	80%	80%	76%	57%	66%

Chart 18 Sharing of e-learning materials

	Used only by individual tutors	Shared within teaching groups	Shared across the college	Shared within a consortium	Marketed outside the college
Don't know	2%	0%	1%	5%	3%
Happens frequently	33%	57%	20%	3%	2%
Happens sometimes	53%	37%	51%	40%	11%
Rare/never happens	8%	2%	26%	50%	78%

time and sometimes funding. A number also mentioned involvement in projects, sometimes with sector agencies or as part of a consortium, as a source of support.

Chart 18 shows the extent to which college-produced materials are shared. Sharing occurs most often within teaching groups. Some 57 per cent of respondents described this type of sharing as happening frequently and a further 37 per cent described this as happening sometimes. College-produced materials are used only by individual tutors somewhat less often. One third (33 per cent) of respondents described this as happening frequently. Sharing more widely within the college happened less often, happening 'frequently' in 20 per cent of colleges and 'sometimes' in 51 per cent. However, this did not happen at all in 26 per cent of colleges. Sharing or marketing materials beyond the college was a relatively rare occurrence, with only a few respondents saying this happened frequently.

Some 79 per cent of respondents stated that college staff sometimes repurpose electronic learning materials. However, only 6 per cent said this happened frequently and 15 per cent said this never happens. College staff used the full range of office and web-editing software to repurpose materials. Specialised software was mentioned by some colleges. Reload was mentioned by 14 per cent of respondents and CourseGenie by 3 per cent.

Use of ICT in the teaching and learning process

6.1   Display screen technologies

Display screen technologies have made significant inroads into teaching practice. All the colleges that replied to the question about display screen technologies (98 per cent) used data projectors, and only 2 per cent of colleges stated that electronic whiteboards were not available in their college. Chart 19 shows the extent of availability of these technologies in colleges. Both technologies were sited in at least some teaching rooms in over 90 per cent of colleges. This figure was 80 per cent in 2005. Data projectors were available in all or most teaching rooms in 33 per cent of colleges, clear progress on 14 per cent in 2005. These technologies are becoming increasingly widespread in colleges. However, there is still some way to go until a tutor can expect to find these technologies in any teaching room.

6.2   ICT in student induction

Chart 20 shows the proportion of colleges that used ICT in the student induction process. Respondents were asked to indicate whether ICT was used for a variety of activities. These can be divided into two sets. One set of activities involved using ICT to share basic information about the college, about the subject under study or about the availability and use of learning resources. The other set of activities were diagnostic and skill oriented, assessing learners' knowledge, skills and learning styles. Of these activities, only college induction and initial assessment have shown steady progress since 2003. While the other activities have increased since that time, there has been no significant change from 2004 to 2006.

Chart 21 shows those colleges that described the use of ICT in student induction as common practice. This indicates some widening of ICT use for initial assessment and subject induction. However, the use of ICT for the other induction activities seems to have declined. These changes are not large enough to represent a downward trend, but they do indicate that some of the initial enthusiasm for some of these activities is on the wane.

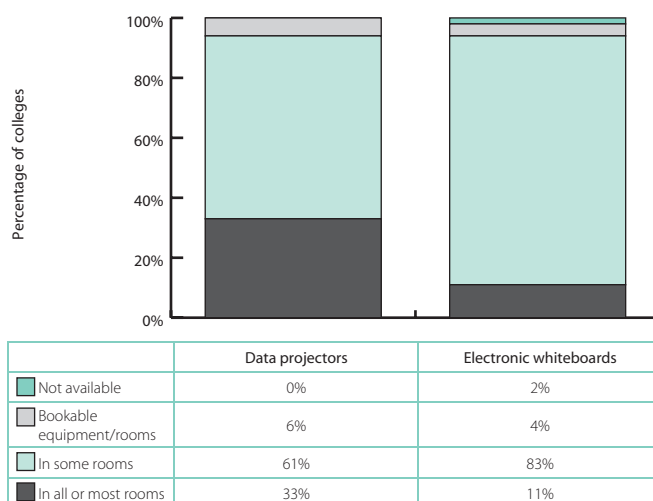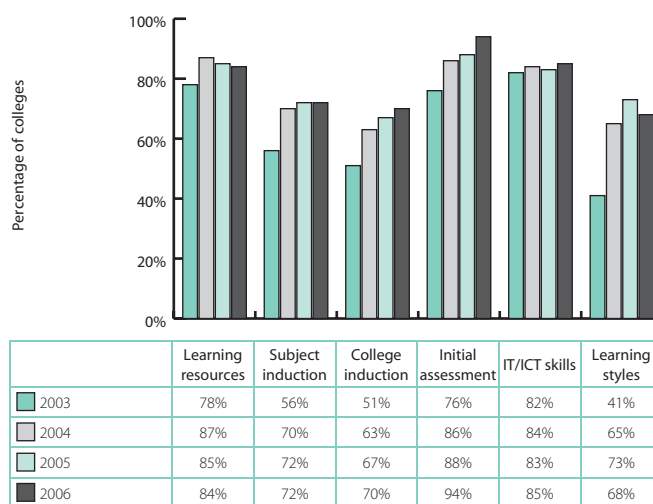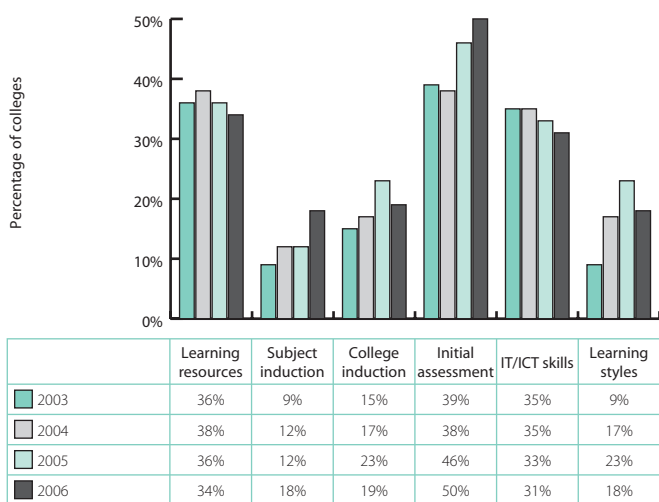### Chart 19 Availability of display screen technologies

	Data projectors	Electronic whiteboards
Not available	0%	2%
Bookable equipment/rooms	6%	4%
In some rooms	61%	83%
In all or most rooms	33%	11%

Chart 20 Total use of ICT in student induction

	Learning resources	Subject induction	College induction	Initial assessment	IT/ICT skills	Learning styles
2003	78%	56%	51%	76%	82%	41%
2004	87%	70%	63%	86%	84%	65%
2005	85%	72%	67%	88%	83%	73%
2006	84%	72%	70%	94%	85%	68%

Chart 21 Common use of ICT in student induction

Percentage of colleges

	Learning resources	Subject induction	College induction	Initial assessment	IT/ICT skills	Learning styles
2003	36%	9%	15%	39%	35%	9%
2004	38%	12%	17%	38%	35%	17%
2005	36%	12%	23%	46%	33%	23%
2006	34%	18%	19%	50%	31%	18%

Chart 22 Use of ICT in all or most mainstream college programmes

Percentage of computers

	Individualised programme	Remote access	At learners own pace	In learners own time	Part of blended learning	Traditional classroom tool	To support learning
2003	4%	8%	10%	17%	18%	21%	48%
2004	1%	10%	11%	20%	20%	24%	53%
2005	1%	12%	9%	18%	24%	21%	43%
2006	4%	26%	12%	25%	31%	34%	52%

6.3 ICT and e-learning in mainstream programmes

We asked colleges to identify the extent to which they used e-learning in mainstream college programmes. The model of e-learning developed by Jenny Scribbins and Bob Powell (in Becta, 2002) was used to structure, for the purposes of the questionnaire, the variety of ways in which electronic media and resources can enable and support effective teaching and learning. It is worth noting that this model of e-learning is a descriptive one and does not seek to prescribe a set of activities that all colleges must follow. Each e-learning activity can aid high quality, effective teaching and learning when it is appropriate to the needs of the learner.

Chart 22 shows the percentage of colleges that used these approaches to e-learning in all or most of their programmes. Many of these approaches appeared less widespread in 2005. However, the upward trend seen in 2003–04 returned in 2006.

The use of ICT to support learning remained clearly the most frequent use. This featured in all or most programmes in 52 per cent of colleges, similar to the 2004 level of 53 per cent. This type of activity typically takes place outside scheduled learning and complements or supports the main programme. The kind of ICT use envisaged here includes using the internet for research and technology-based exercises for revision or practice. These activities also require the least formal input from the colleges, and in many cases may be carried out entirely at the initiative of the student.

The use of ICT as a traditional classroom tool was widespread in 34 per cent of colleges. This category would include the use of display screen technologies. Widespread use of ICT for this type of activity was identified by 21 per cent of respondents in 2005 and 24 per cent in 2004.

Use of ICT and e-learning with traditional learning resources to produce blended learning has increased steadily over the years. This was seen as widespread by 31 per cent of colleges, an increase from 24 per cent in 2005 and 20 per cent in 2004.

A similar picture emerged for the more learner-focused uses of ICT, albeit on a smaller scale. Widespread use of ICT for remote access to learning increased considerably, following more modest increases since 2003. The overall trend seems to be in the use of ICT to enable learners to access some or all of their programme at a convenient pace or time.
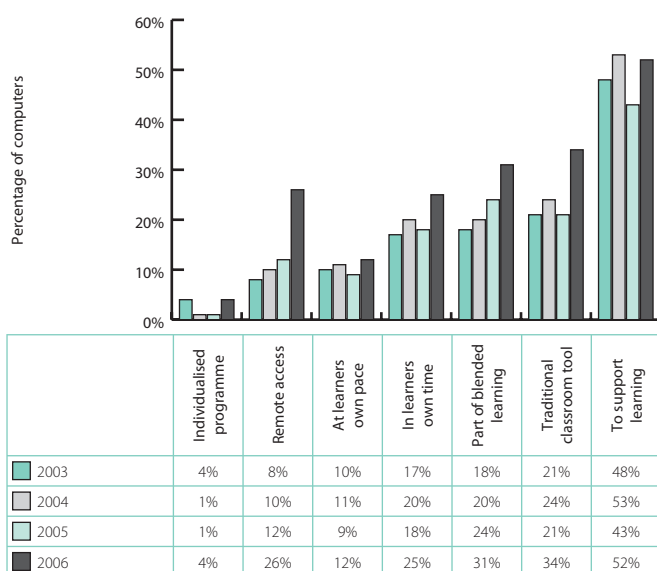
In 2006, less than half of colleges (48 per cent) delivered learndirect courses (see Chart 23). This percentage has fallen steadily from 72 per cent in 2003. On the other hand, remote learning not delivered via learndirect was offered by 52 per cent of colleges in 2005. This figure has remained relatively static over the period since 2003, when it stood at 55 per cent. Some 29 per cent of colleges offered neither form of remote learning, a similar proportion to 2005. This figure has grown from 21 per cent in 2003.

6.4   E-learning and the curriculum

We asked respondents to list the curriculum areas that made highest and lowest use of ICT and e-learning. Retail and commercial enterprise was the only curriculum area not to appear on both lists. This area merited only two mentions as a low user of ICT. The rest of the 17 curriculum areas considered by the inspectorates featured in both lists. Tables 8 and 9 list the curriculum areas described as high and low users of ICT by more than 10 per cent of respondents.

Four of the nine areas most often cited as high users of ICT also appear among the six areas most often cited as low users. This indicates that for these areas at least, there is no reason ICT cannot be deployed successfully.

However, there may be curriculum areas that are not delivered in most colleges. There may also be other areas that are small or peripheral within individual colleges. These areas may be 'below the radar' of a questionnaire like this.

Chart 23 Delivery of remote learning in colleges

Percentage of colleges
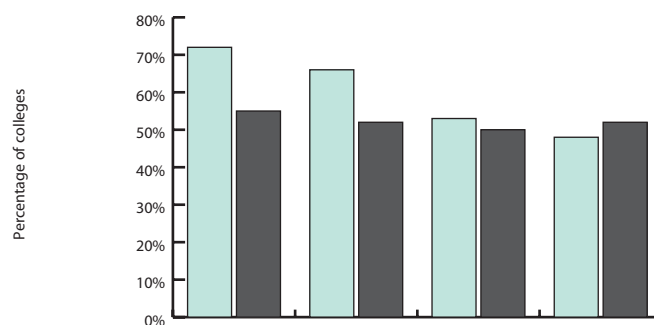
	2003	2004	2005	2006
Delivers learndirect programmes	72%	66%	53%	48%
Delivers other remote learning	55%	52%	50%	52%

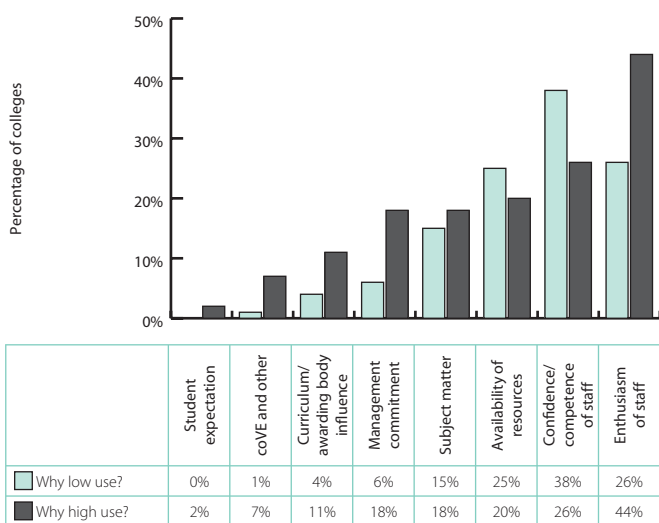### Table 8   Curriculum areas making highest use of ICT and e-learning

	Percentage of colleges
Information and communications technology	56
Business administration and law	38
Health, public services and care	35
Arts, media and publishing	31
Science and mathematics	29
Engineering and manufacturing technology	18
Preparation for life and work	16
Construction, planning and the built environment	11
Leisure, travel and tourism	11

Table 9   Curriculum areas making lowest use of ICT and e-learning

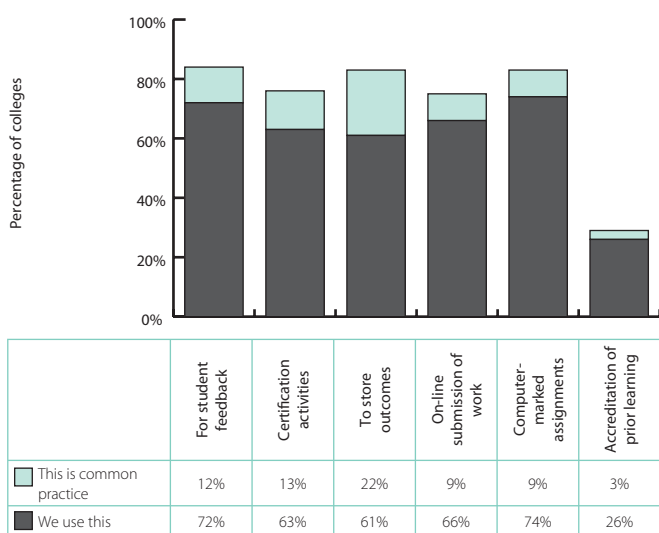|	Percentage of colleges
Health, public services and care	22
Arts, media and publishing	20
Languages, literature and culture	18
History, philosophy and theology	15
Construction, planning and the built environment	12
Leisure, travel and tourism	11

Chart 24 Reasons for high and low use of e-learning

	Student expectation	coVE and other	Curriculum/ awarding body influence	Management commitment	Subject matter	Availability of resources	Confidence/ competence of staff	Enthusiasm of staff
Why low use?	0%	1%	4%	6%	15%	25%	38%	26%
Why high use?	2%	7%	11%	18%	18%	20%	26%	44%

Chart 25 Online assessment activities

	For student feedback	Certification activities	To store outcomes	On-line submission of work	Computer-marked assignments	Accreditation of prior learning
This is common practice	12%	13%	22%	9%	9%	3%
We use this	72%	63%	61%	66%	74%	26%

We asked respondents to give reasons for high and low use of ICT in their college. Respondents came up with reasons for low use that mirrored reasons for high use. For example, staff enthusiasm was often given as a reason for high use, and lack of enthusiasm was often given as a reason for low use. Chart 24 summarises their responses.

The most frequent reasons given centred around staff enthusiasm and skills. Enthusiasm was most often cited as contributing to high use of ICT and e-learning. A lack of confidence or competence with ICT was most often cited as a reason for low use. A secondary set of reasons centred on the particular subject matter under study. Of these, availability of appropriate resources contributed more to low use. Subject matter that obviously lent itself to e-learning contributed more to high use. The less frequently cited reasons were influences outside the curriculum area itself. These were: commitment to e-learning from college management; the influence of any awarding or professional body; CoVE or other additional funding; and student expectation that ICT would be used. All these influences contributed more to high use of ICT and e-learning.

6.5   ICT and online assessment

Online assessment was considered insignificant or limited to individual enthusiasts in 28 per cent of the colleges surveyed. It was a widespread activity in only 12 per cent of colleges. These figures improved on the previous year, when online assessment was considered insignificant or limited in 35 per cent of colleges and widespread in 6 per cent.

This increase in the use of online assessment is reflected in the extent to which the assessment activities are seen as common practice in Chart 25 below. All the assessment activities identified in the chart became more widely used in colleges, but the extent of common usage remained small. The most extensive use of ICT remained being to store and record outcomes of assessment, which occurred in 83 per cent of colleges. However, only 22 per cent described this as common practice. The use of ICT for assessment activities that lead to formal certification remained the least widespread type of activity. In 2006 we asked if ICT was used for the purpose of accreditation of prior learning. Only 29 per cent of colleges do this, 3 per cent describing this as common practice.

6.6   Staff ICT and e-learning skills

We asked respondents to estimate the general skills levels of staff in their college. They identified the proportion of staff with low, medium or high levels of skill (beginner, competent, advanced), both in their personal use of ICT (for example, word processing or using spreadsheets) and in their use of ICT with learners (e-learning skills). We left definitions within these broad classifications to the judgement of respondents on grounds of practicality. We felt that while respondents' assessments of the categories would not be identical, they would share sufficiently similar understandings of degrees of competency to enable comparisons and judgements to be drawn from the results.

However, it is worth noting that the lack of a commonly agreed and well understood set of definitions of e-learning competences, taken together with the uncertainty about what constitutes good practice and effective pedagogy for e-learning, may have led many respondents to overstate the e-learning skills levels of staff.

We calculated an average of the values estimated by each college for each category. The results for teaching staff are shown in Chart 25. Across the sector as a whole, respondents considered that 78 per cent of staff were competent or advanced in their personal use of ICT, compared with 67 per cent in 2000. However, in the use of ICT with learners, 62 per cent of college staff were considered competent or advanced (in 2000 the figure was 42 per cent). This suggests that a little under one-fifth of staff considered competent or advanced in their personal use of ICT were regarded as low-skilled in the application of ICT with learners. However, the trend for both sets of skills has been upward, as shown in Chart 27 below. The gap between ICT competence and e-learning competence narrowed between 2000 and 2003, but has remained more or less constant since.

6.7   Staff development activities

We asked respondents to identify the mode of delivery of various ICT development opportunities offered to teaching staff at their college. The results are shown in Chart 27 below. Face-to-face delivery was by far the most common method of delivering staff development to teaching staff. Blended learning solutions were the next most commonly deployed, with self-study options (either electronic or paper-based) offered by a smaller, though still significant, number of colleges.

Generic ICT skills, along with training in particular packages or applications, were the most widely offered areas for skills development, offered by 99 per cent of colleges. These are the skills necessary to build baseline competence and confidence in the personal use of ICT, and are widely addressed in colleges. However, over 90 per cent of colleges offer some development opportunities in using classroom technologies and

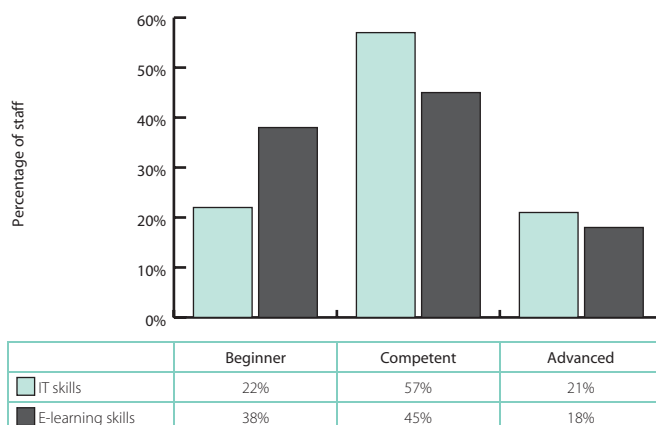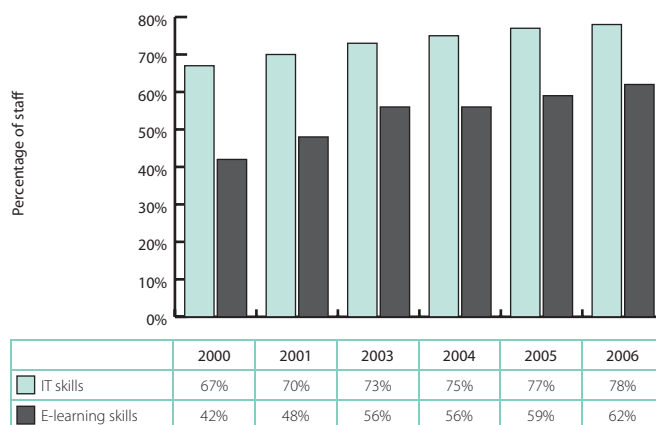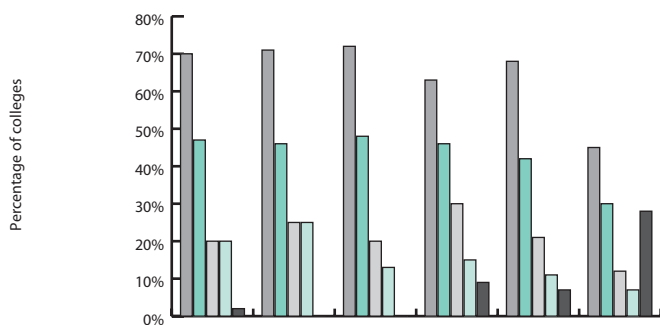### Chart 26   ICT and e-learning competence of teaching staff

	Beginner	Competent	Advanced
IT skills	22%	57%	21%
E-learning skills	38%	45%	18%

Chart 27   Teaching staff considered competent and advanced in ICT/e-learning

	2000	2001	2003	2004	2005	2006
IT skills	67%	70%	73%	75%	77%	78%
E-learning skills	42%	48%	56%	56%	59%	62%

Chart 28 ICT skills development offered to teaching staff

	Generic skills	Using particular packages	Using classroom technology	Using learning platform	Developing materials	Teaching online
Face-to-face courses	70%	71%	72%	63%	68%	45%
Blended learning	47%	46%	48%	46%	42%	30%
Self-study by e-learning	20%	25%	20%	30%	21%	12%
Lo-tech self-study	20%	25%	13%	15%	11%	7%
Not offered	2%	0%	0%	9%	7%	28%

learning platforms, and in developing learning materials. These skills can be readily deployed with learners in a college setting. The skills needed for teaching online were offered far less widely, with 28 per cent of colleges not offering development in this area. The colleges not offering this development were not restricted to those that did not offer remote learning programmes, but were spread across the whole sector.

Policy and strategy

7.1 A strategy for ICT and e-learning

In summer 2000, the then Further Education Funding Council (FEFC) required colleges to submit completed ILT strategies for monitoring. The following year colleges were required to revise their strategies. All colleges complied with this. By 2006 83 per cent of colleges reported that they currently had a separate strategy for ICT and e-learning. A further 14 per cent stated that this strategy was incorporated in the college's teaching and learning strategy. Only 3 per cent reported that they didn't have a current strategy. These strategies were reviewed annually in 65 per cent of colleges and every two years in a further 21 per cent.

The overwhelming majority of respondents reported that they have champions of ICT and e-learning at senior level in their colleges. Some 43 per cent stated that their principal was a vocal advocate of e-learning and a further 42 per cent that there were strong ICT champions at senior management level. ICT was driven forward by department heads in 7 per cent of colleges and was the domain of small groups and enthusiasts in the remaining 7 per cent.

One of the key ways that colleges translate their strategies into action is through setting targets. Some 34 per cent of colleges set formal targets for the use of ICT and e-learning across all programmes. A further 36 per cent set targets where they considered these appropriate, and 26 per cent did not set targets for ICT and e-learning at all. Chart 29 shows the change since 2003. Colleges that set targets across all programmes returned to 2003 levels following a slight decline. However, colleges that set no targets have increased since 2003. This might suggest a dislocation between strategy and action in a growing minority of colleges.

A written strategy, if it is not translated into action, quickly becomes a dead document. If we are asked to describe an organisation's strategy, we look to its actions, rather than to the document on the Chief Executive's desk. Strategy, says Henry Mintzberg, is 'a pattern in action over time' (Mintzberg, 1987).

7.2 A model of e-learning implementation

In order to build a picture of any such pattern in action, we constructed a model of e-learning implementation across five broad dimensions. Each of these dimensions was arrived at by combining four measures derived from the survey data. All the measures were treated equally. Each dimension produced a score out of 20, and when added together, these dimensions gave an overall score out of 100 for each college. The dimensions were:

Access: this dimension describes students' access to the college infrastructure. The measures of access consist of:

- a college's nearness to achieving a ratio of no more than five full-time-equivalent (FTE) students to each internet-enabled computer
- a college's capacity to meet students' demands for computers

Chart 29 Extent to which formal targets are set for e-learning
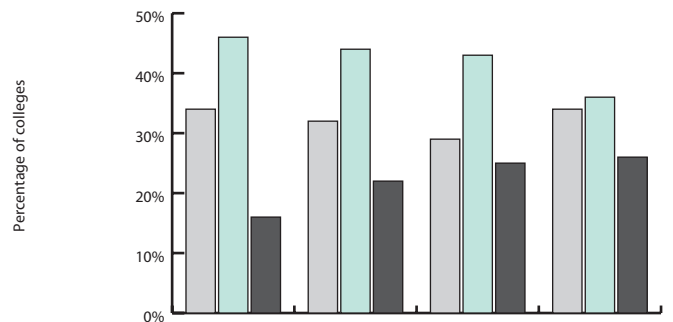
	2003	2004	2005	2006
All programmes	34%	32%	29%	34%
Where appropriate	46%	44%	43%	36%
No targets	16%	22%	25%	26%

- the capacity of a college's local area network (LAN) to meet demand
- a college's capacity to meet students' demands for internet access.

Workforce: this dimension describes the skills of the teaching staff and their ability to access ICT for their work. The measures for this dimension are:

- a college's nearness to achieving a ratio of one permanent member of staff to each internet-enabled computer
- the extent to which staff having a computer for their own personal use is seen as a priority
- perceived skills of teaching staff in their personal use of ICT
- perceived skills of teaching staff in using ICT with learners.

E-learning: This dimension describes the extent to which ICT is deployed for teaching and learning purposes. This is measured by the extent to which e-learning is used for:

- induction
- assessment
- teaching purposes
- supporting learners.

Resources: this dimension describes a college's ability to access, produce and deliver educational content. The measures here are:

- use of in-house-developed resources
- support for in-house development of resources
- use of acquired resources from a variety of sources
- use of a VLE learning platform.

Management: This dimension describes the extent to which ICT is used for management information and the extent to which e-learning activities are planned for at college level. This dimension is measured by:

- the ease with which the college learning platform links with the college's management information system (MIS)
- the extent to which the LAN is allowed to be freely used
- the level at which the use of e-learning resources is planned
- the use of targets to encourage e-learning.

Chart 30 shows the median values for each dimension as they changed between 2003 and 2006. The improvement in level of students' access to the ICT infrastructure following a period of decline (described in Section 4 of this report) is demonstrated graphically here. The other measures have shown steady rises over time, except for management which has leapt forward following three years at the same level. The resources dimension remained at broadly the same level between 2005 and 2006. Some central funding was directly targeted at e-learning resources in 2004–5, but not in 2005–6. This may explain the apparent stalling of this dimension.
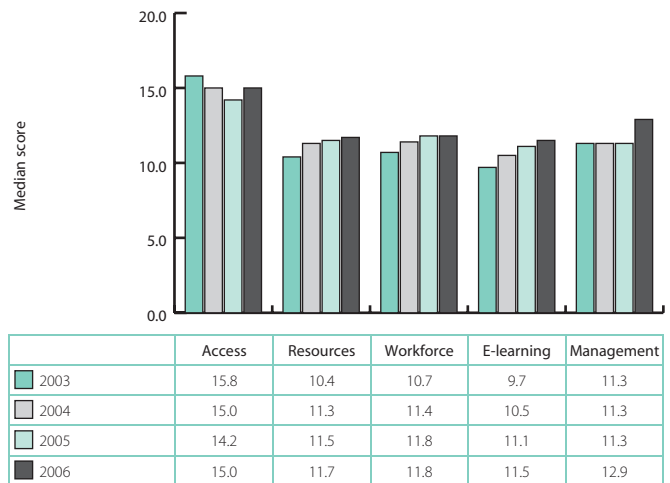
The overall scores produced for each college resulted in a continuum stretching from a minimum score of around 40 to a maximum score of around 80 in each of the four years. Chart 31 shows the percentage of colleges in each of four categories of college taken from a PricewaterhouseCoopers study (PwC, 2004). Scores for colleges at both the high and low ends were more spread out than the majority in the middle, making the most and least e-enabled colleges relatively easy to identify. Colleges with overall scores above 70 were therefore designated 'e-enabled', and those below 52 were designated 'late adopters'. For the majority, however, there were no discontinuities evident in the data, so the median figure for 2003 was chosen to distinguish the 'enthusiastic' and 'ambivalent' groups. We used the PwC categories here because the 2004 proportions could be closely mapped against the proportions found in that study.

The picture here is one of a steady sector-wide movement towards e-enablement. By 2006, 75 per cent of colleges were e-enabled or enthusiastic, from half of all colleges in 2003. However, at the level of individual colleges, or even within particular categories of college, the picture is much more volatile.
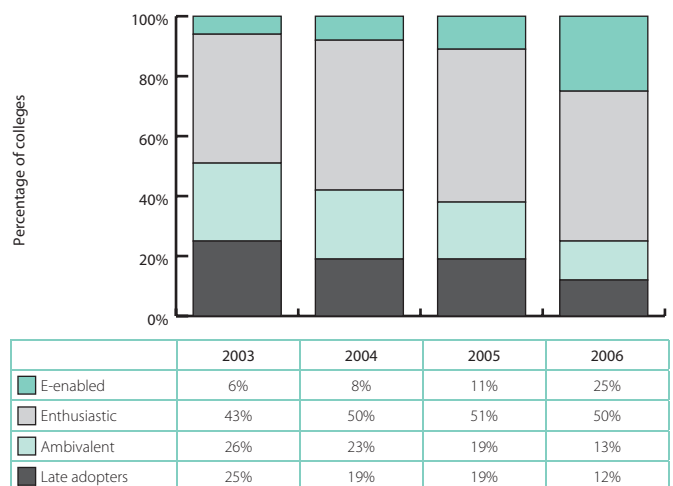
Table 9 compares the median scores for each dimension of e-learning implementation for colleges that fall within each category. As we move from late adopters through to e-enabled colleges, the greatest improvements occur in the resources and management dimensions. Students' access to ICT shows the least improvement between the categories of college. This is a similar picture to 2005.

The numbers in bold type in Table 9 highlight the areas of greatest change from 2005. The area of greatest change is the score on the management dimension for late-adopting colleges. These colleges account for most of the increase in the management dimension noted above. On the other hand, e-enabled colleges have increased on the access and e-learning dimensions, and decreased on the management dimension. These measures suggest two hypotheses. The first is that management in late-adopting colleges are beginning to engage with ICT and e-learning. The second hypothesis is that at the e-enabled end of the spectrum ICT and e-learning become increasingly self-sustaining and require less direct management input.

Chart 30   Measures of e-learning implementation

	Access	Resources	Workforce	E-learning	Management
2003	15.8	10.4	10.7	9.7	11.3
2004	15.0	11.3	11.4	10.5	11.3
2005	14.2	11.5	11.8	11.1	11.3
2006	15.0	11.7	11.8	11.5	12.9

Chart 31   Spectrum of e-enablement

|	2003	2004	2005	2006
E-enabled	6%	8%	11%	25%
Enthusiastic	43%	50%	51%	50%
Ambivalent	26%	23%	19%	13%
Late adopters	25%	19%	19%	12%

Table 9   Categories of e-enablement vs dimensions

	Late adopters	Ambivalent	Enthusiastic	E-enabled
Access	13.3 (0)	14.2 (+0.4)	**15.8 (+1.3)**	**16.7 (+1.7)**
Resources	6.3 (-0.4)	**9.2 (-1.2)**	11.9 (-0.6)	15.2 (-0.6)
Workforce	9.8 (-0.2)	**11.3 (+0.8)**	11.7 (-0.4)	13.5 (-0.1)
E-learning	8.4 (+0.1)	10.9 (+0.3)	11.5 (+0.1)	**14.2 (+0.9)**
Management	**9.6 (+2.9)**	10.2 (+0.3)	12.9 (+0.4)	**15.6 (-0.7)**

(Figures in brackets indicate change from 2005 data)

Chart 32 Colleges in collaboration with various organisations
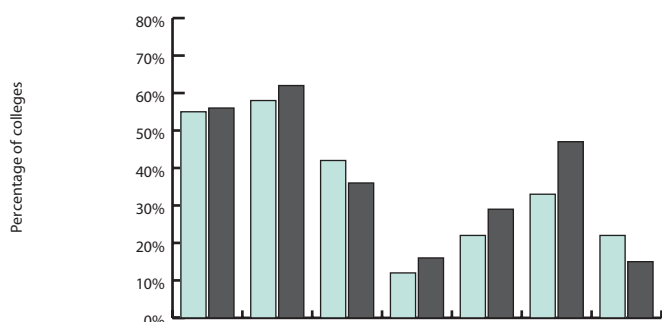
	Schools	Other FE colleges	ACL providers	Specialist colleges	Training providers	Employers	Others
2005	55%	58%	42%	12%	22%	33%	22%
2006	56%	62%	36%	16%	29%	47%	15%

Table 10 Types of ICT collaboration with other organisations

Partner organisations	Joint curriculum development	Joint infrastructure development	Data/information sharing
Schools	36	8	32
Other FE colleges	40	16	34
Adult and community learning providers	17	8	24
Specialist colleges	8	0	11
Training providers	12	7	24
Employers	26	6	31
Others	9	4	10

7.3   Inter-organisation collaborations

Over 85 per cent of colleges were collaborating with other organisations on ICT-related activities in 2006. Chart 32 shows the different types of organisation involved. Colleges most frequently collaborated with other further education (FE) colleges, and almost as frequently with schools, with well over half of colleges involved with either or both. The small number of collaborations with specialist colleges reflects the small number of these colleges overall (around 60 across England). Higher education institutions made up over half of the 'other' category, with a range of public and charitable bodies making up the rest. The overall pattern remained the same as in 2005. However, a much greater proportion of colleges reported collaborations with employers.

Table 10 shows in more detail the types of collaboration involved. Joint infrastructure projects were least common, perhaps because they require amounts of capital funding and a longer-term commitment to the collaboration. Curriculum development projects were more common than information sharing in collaborations with schools or colleges. However, with other types of partner, information sharing was more frequent. Again, this is little changed on 2005.

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