



Evaluation



# Evaluation of the ICT Test Bed Project

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Centre for ICT, Pedagogy and Learning  
Education and Social Research Institute,  
Manchester Metropolitan University

Division of Psychology,  
Nottingham Trent University



Bridget Somekh  
Jean Underwood  
Andy Convery  
Gayle Dillon  
Tanya Harber Stuart  
Janis Jarvis  
Cathy Lewin  
Diane Mavers  
Diane Saxon  
Peter Twining  
Derek Woodrow

Centre for ICT, Pedagogy and Learning  
Education and Social Research Institute,  
Manchester Metropolitan University

Division of Psychology,  
Nottingham Trent University





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## Executive summary

This evaluation report presents preliminary findings on the impact of investing high levels of ICT in schools and colleges, with specific reference to areas of socio-economic deprivation. The report focuses on key findings from the ICT Test Bed project which will inform educational policy and practice.

### **Management and administration**

#### **Institutional change can be embedded rapidly through a whole-school approach to innovation using ICT**

The ICT Test Bed project adopted a 'whole-organisational' approach to change in schools, incorporating external consultancy as well as rapid investment in infrastructure development. In colleges, the project was tightly focused on three 'whole' course areas. This whole-institution strategy caused strong mutual support mechanisms to be developed which has enabled considerable technological maturity to be achieved between 2003 and 2005, evidenced by high levels of workforce and student confidence and competence. This collaborative culture has led to improved corporate planning in the schools. A culture of readiness for change has led to good use of externally provided change management tools.

#### **In order to make embedded use of both ICT infrastructure and resources, institutions need a flexible workforce open to change**

In many of the ICT Test Bed schools and colleges, enhanced ICT has triggered greater flexibility of roles, with many teachers taking a lead role in developing the use of different equipment. The role of teaching assistants has been enhanced, administrative staff have taken on new responsibilities for managing management information systems (MIS), and technicians and support staff have taken on new roles to support teaching and learning. The roles of all staff are potentially changed in ICT-rich schools and colleges and this has led to a more integrated and inclusive staffing culture.

#### **Effective management information systems (MIS) provide a tool for leaders to achieve their institutional vision**

Educational vision and leadership, together with good management, are crucial for institutional change. Enhanced ICT infrastructures have provided ICT Test Bed managers with incentives and tools to develop visionary leadership by providing quality information which is readily available and easily shared – through larger server capacity and management information systems (MIS) – facilitating, for example, target-setting and analysis of assessment. This has improved insight and decision-making. Effective use of such systems depends on good support and training. Sharing information with central government and local authorities is clearly facilitated by ICT; schools are becoming increasingly sophisticated in their analysis of such information for the benefit of the school.

### **Electronic registration improves attendance**

Electronic registration, including lesson-by-lesson registration in secondary schools, has improved attendance in some ICT Test Bed schools. The speed of registration has made lesson starts smoother and absence/lateness more public. Enhanced analysis reveals 'selective attendance', which facilitates prompt action and improved communication with parents. In primary schools, the immediate availability of data to the school secretary prompts an early morning contact with parents/guardians that has had a major impact on attendance, raising it in some instances by three to four per cent, and improved security.

### **Behaviour monitoring aids discipline**

The use of behaviour monitoring software has made communication between teachers and pastoral care managers quicker, more consistent and focused, leading to more efficient responses to behavioural problems. The impact of this will be investigated in the forthcoming year.

### **ICT Test Bed appears to have facilitated improvement in attainment**

Overall, ICT Test Bed local authorities (LAs) narrowed the gap between their own student attainment levels and those of LAs selected as benchmark comparators. This is a considerable achievement after just one full year of working with enhanced levels of ICT. Preliminary evidence from the benchmarking shows that attainment of students within ICT Test Bed LAs improved significantly for some subjects at some key stages between 2003 and 2004. The final evaluation report will present further evidence of any changes in students' attainment during 2004 to 2006.

### **Curriculum impact**

#### **ICT Test Bed has led to embedded ICT use across the curriculum**

There has been a clear shift in the ICT Test Bed project towards embedding ICT in teaching and learning across the curriculum in all schools and colleges. This is a very positive move forward from the position recorded by the ImpaCT2 evaluation in 2002, when most use of ICT was for teaching ICT skills. In primary schools, this is evident in all curriculum areas; in secondary schools, despite some unevenness between the extent of use in different subjects, most subjects now have ICT-rich elements; in FE colleges, all the target departments show greater use of ICT for learning and teaching.

### **The secondary school timetable is a barrier to making good use of ICT**

Implementing change in secondary schools poses challenges relating to scale, departmental cultures, and movement within school both of teachers and students. Secondary teachers are severely hampered in using ICT for teaching and learning because the timetable fragments the day into short teaching periods with frequent movement of students and staff. There are logistical difficulties in repeatedly issuing and 'logging on' laptops for use by different students in each period, as well as insufficient time for students to engage fully with ICT. In order to embed ICT in secondary schools, consideration should be given both to the way in which the school day is planned and to designing infrastructure arrangements that serve both current and anticipated future needs of secondary schools and their students.

### **ICT use for teaching and learning declines before formal tests and examinations**

The current arrangements for national tests, and the recommended national strategies, were not designed with ICT-rich schools in mind, with the result that teachers consciously reduce the extent of ICT use in the year leading up to tests to ensure learner written performance on the tests and to safeguard attainment levels. The introduction of online tests for Key Stage 3 ICT SATs has been welcomed. The use of ICT for recording and evidencing in the baseline assessment at the foundation stage in ICT Test Bed schools shows that alternative, and in our view more fit-for-purpose, teacher assessment arrangements can be facilitated by ICT.

## **Learner impact**

### **Learners' motivation and engagement in learning and education is increased by access to ICT**

Learners in the ICT Test Bed schools and colleges are very confident in their use of ICT. In primary schools and FE colleges, they are consistently enthusiastic about the positive impact it has on their learning. Secondary students are less unanimous in their approval and some expressed frustration in interviews; a key factor is the extent to which learners are given personal access, autonomy and choice in using ICT.

### **There has been a significant increase in the home use of ICT by learners**

Access to a computer at home has increased with over 90 per cent of learners now reporting that they have home access. This is frequently used to research information over the internet. For FE students, the internet, rather than books, is now the favoured way of accessing information.

### **ICT is highly motivating for learners with special educational needs (SEN)**

Some learners with special educational needs (SEN), such as autism and attention deficit syndrome, have shown greatly improved attention when teachers use ICT for whole-class presentations, or allow them to use digital equipment such as cameras and microscopes. There is some evidence that use of an interactive whiteboard provides a public forum for primary SEN students to demonstrate their abilities in a non-textual medium, impacting on self-esteem and sense of achievement. In secondary schools, the multiple stimuli and varied approaches, coupled with more interesting skill-practice materials, are increasing motivation.

### **Increased dependence on ICT by learners needs improved keyboard skills**

As learners' use of ICT increases, their lack of keyboard skills is increasingly a nuisance and some ICT Test Bed institutions are now tackling this issue.

## Teacher impacts

### **ICT Test Bed teachers now have high levels of skills and motivation in using ICT**

There have been exceptional gains in the competence and confidence of primary school teachers and FE course tutors who now routinely use ICT in all their teaching. Secondary teachers' use is more varied between departments and individuals, but many are making extensive use of ICT. New technologies that provide a good 'fit' with existing practices, such as interactive whiteboards and visualisers, are obviously the first to become embedded, but others like video conferencing, digital video, microscopes and virtual learning environments are now being incorporated, providing evidence of ongoing learning by the workforce. Increased competence leads to a demand for even greater competence. Training needs to continue to support innovative pedagogy.

### **ICT enables shared planning of teaching, improving quality and ease of curriculum construction**

There is significant evidence of ICT being used to formalise co-operative planning by teachers and making curriculum plans easily available to colleagues and managers. There are considerable time savings in medium and long-term planning which can be corporately shared, reducing teacher workloads. Short-term planning is certainly of a higher quality and more detailed, often including samples of what students are expected to achieve and efficient links to resources for use in lessons. In some clusters, a corporate and co-ordinated approach to planning and resource creation has been a useful lever for staff development.

### **ICT has improved student curriculum access in FE colleges**

In FE colleges, the development of e-viewers has had a major impact in making systems more accessible and easier to access via web-based interfaces. Once complex tasks such as in-depth analysis of specific aspects of information are now routine and require little effort. This enables tutors to develop more meaningful learning experiences with their students, offering more examples and increased interaction.

### **Increases in the detail and efficiency of learner assessments have resulted in improved target-setting**

ICT has provided the context for increased sharing of work between staff and this has improved the quality and efficiency of the assessments of learners' work. Records can be kept electronically and examples of learners' work can be stored and analysed collaboratively. This has led to clearer target-setting for learners and to improvements in reporting to parents. For FE learners on work placements, the use of digital cameras to record their work has enhanced assessment portfolios.

## Related issues

### **Schools do not have the capacity to manage the distribution of computers into students' homes**

The experience of the ICT Test Bed project indicates that schools do not have the capacity to manage the distribution of computers to homes in areas of socio-economic disadvantage. Factors such as the expense of connectivity and software licences, poor available infrastructure and lack of landlines in homes, and the time needed to provide technical support, impose demands that schools cannot meet.

### **In FE colleges, ICT has enabled considerable changes in communications with employers**

In FE colleges there have been considerable savings of time and money by using email to communicate with employers and set up work placements.

# 1. Introduction

## 1.1 Purposes of the report

This is the penultimate report of the evaluation of the ICT Test Bed project, based mainly on data collected during the academic year 2004-05. It builds on the 2004 annual report, but has quite different purposes. The earlier report tracked the complexities of planning, procurement and the development of new practices to embed ICT in the work of the schools and colleges. This report presents preliminary – and necessarily tentative – findings on the impact of the investment on the five key aspects of ICT Test Bed work in the 28 schools and three further education colleges: teaching and learning; leadership and management; workforce development; cross-cluster relationships; and home and community links. However, the timing of the report has meant that it was not possible to include data from the 2005 national test and examination results, so the evidence focusing on levels of attainment is not yet available to us.

This report provides a succinct summary of the preliminary findings with indicative evidence and short illustrative examples. It draws on a number of more detailed reports on all aspects of the evaluation work which are available on the ICT Test Bed Evaluation website [<http://www.evaluation.icctestbed.org.uk>].

By its very nature, a test bed project is ambitious and exploratory. It asks the question: "How much can be achieved by this intervention?" The schools' and colleges' action plans, drawn up in the autumn of 2002, focused on specific activities and tentative targets, but the outcomes of the ICT Test Bed project were necessarily unpredictable. Its aim was to see to what extent high levels of ICT resources could enable schools and colleges to change the life chances of children and young people in areas of socio-economic deprivation. The job of the evaluation in this third year has been to collect early evidence of impact and develop explanatory theories about both the drivers and barriers to success. We are looking for key learning from the initiative which can inform policy and practice in ICT in education. In the final year of the evaluation, our attention will shift to a focused exploration of how successes can be consolidated by the schools and colleges and the extent to which barriers can be overcome. The final evaluation report will contain recommendations for schools and policy-makers.

## 1.2 The ICT Test Bed project

The ICT Test Bed project (2002-06) was set up by the Department for Education and Skills (DfES) to explore how ICT can be used to support the Government's wider agenda for education reform. The project is taking a holistic approach to ICT implementation in three areas of social disadvantage (two within inner cities and one in a rural area). The level of investment over four years is £34 million. This has given the 28 ICT Test Bed schools and three colleges access to very high levels of ICT hardware and appropriate software, as well as support to make the most effective use of this investment. ICT Test Bed work is focused on using ICT to:

- raise standards and performance, especially in the areas of school and college improvement, student attainment and raising the quality of teaching and learning
- enable more effective leadership and management in schools and colleges
- help teachers to concentrate their time on their core task of teaching
- enable more effective collaboration between schools and their local colleges
- provide wider learning opportunities to students, their families and the wider community in a home environment.



### 1.3 Evaluation methods

The purpose of the evaluation is to assess the effectiveness of the ICT Test Bed project in terms of its five key foci. It incorporates external and internal strands which are interrelated to maximise formative impact on the project. The evaluation has adopted a mixed methods approach, incorporating both quantitative and qualitative strands. The report draws on three kinds of evidence which are presented alongside one another to strengthen the reliability of the analysis:

#### Quantitative evidence of three kinds:

- An annual questionnaire survey is conducted to measure pupil, parent and staff perceptions of aspects of ICT provision, use and effectiveness.
- Annual test scores and examination results in the ICT Test Bed institutions are compared against those of 'benchmarked' institutions and local authorities (LAs) to measure differences in gains which may result from higher levels of investment in ICT.
- There is annual 'maturity modelling' of ICT Test Bed institutions on six developmental themes – the five ICT Test Bed foci and additionally technological maturity. This modelling process has two purposes: to track development of institutions over time, and to identify whether high levels of maturity on any one dimension show a relationship with formal (for example, GCSEs) and non-formal (for example, absenteeism) measures of an institution's performance. When the maturity modelling process has been completed, it will have predictive power and could be used by policy-makers and school leaders to plan how to focus effort to achieve the greatest impact. This will be covered in the final report when there have been a sufficient number of rounds of data collection to enable this kind of analysis.

These three kinds of quantitative evidence provide a secure foundation for the evaluation. They make it possible to ground evaluation findings in a body of factual information relating to publicly recognised indicators of achievement (test scores) and the perceptions of teachers, students and parents. The process of maturity modelling also provides a method of self-evaluation which encourages institutions to set specific and quantifiable targets for development, year on year.

#### Qualitative evidence from the independent, external evaluation

A range of evidence has been collected by the evaluators through focused studies of particular aspects of ICT Test Bed work across the five themes. This has involved methods such as classroom observations, interviews with staff and students and document analysis. The validity and reliability of this extensive body of evidence is continuously checked and cross-checked over the life of the project and in relation to the quantitative evidence. It is possible to draw clear messages from this evidence to inform policy and practice relating to schools and colleges in similar contexts.

#### Evidence from the internal evaluation carried out by ICT Test Bed staff through action research

Between January and December 2005, teachers and para-professionals from the ICT Test Bed institutions, working in partnership with the external team as participant evaluators, completed 61 action research studies of their innovative work with ICT. This complemented the 23 studies conducted during 2004. These studies, all of which are available on the ICT Test Bed Evaluation website, combine accounts of development work with evaluation of its impact and subsequent further development. For the purposes of this report, cross-case analysis of these studies has been carried out to identify commonalities and trends.

## 2. Preliminary findings: Overview

### 2.1 Culture change and 'whole-institution development'

#### Primary schools

The evaluation provides clear evidence of the success of the ICT Test Bed project's focus on 'whole-institution development' in the primary sector. This has enabled a change in culture that has embedded the use of ICT in everyday routines of practice. It has encompassed both innovations in teaching and learning and in the way that staff (teachers, teaching assistants and technical support staff) collaborate in planning and developing ICT resources for classroom use and/or to support learners.

#### Secondary schools

In secondary schools the impact on whole-institution development is particularly strong in relation to improved management of information and better access to data at all levels (from overall figures down to the individual child) to inform decision-making. While teachers and students report increased confidence in their ICT skills and satisfaction with levels of equipment, observation and interview data reveal considerable variations in the use of ICT for teaching and learning between subject departments as well as frustrations experienced by some students.

#### All schools

In both primary and secondary schools, culture change has been driven forward by the vision and leadership of senior management teams. There is also considerable evidence of a high level of collaboration between schools, which was initiated by the demands of managing the project but is now embedded in work practices. In one cluster the primary headteachers have worked extremely closely with one another to great advantage. The area where there has been least progress in both primary and secondary schools is the development of an infrastructure for electronic links between schools and students' homes.

### **Further education colleges**

In the three further education colleges, where the majority of the ICT Test Bed funding was located within selected curriculum areas, there have been spectacular changes in the teaching practices and culture of some course teams. This is particularly noticeable in those areas, such as hairdressing and plumbing, which have not traditionally used ICT. Whole-institutional change was not the aim in the colleges. However, all three invested in greatly improved management information systems (MIS) and this has had the effect of involving staff in recording information electronically with clear benefits to senior managers. Investment in virtual learning environments (VLEs), although initially problematic, is now leading to a changed approach to teaching and learning in the ICT Test Bed curriculum areas, with provision of online resources and formative assessment materials. This is not, however, college-wide. In the 2005 survey of all ICT Test Bed college staff, only 9% stated that they use the VLE daily. As in primary and secondary schools, there is a clear relationship between this kind of embedded change and day-to-day involvement of the senior management team in promoting ICT and supporting middle managers within the chosen curriculum areas. All three colleges now have closer links with the ICT Test Bed schools in their cluster, but because of their different governance it is not clear to what extent that will be sustained beyond the life of the project.

### **All ICT Test Bed institutions**

Further evidence of sustained culture change is provided by the maturity modelling process which has measured the rate of change in ICT Test Bed institutions against all five areas of development. The analysis showed that the rapid rate of increase in ICT maturity achieved by ICT Test Bed institutions in the first year, which had slowed in year two, continued into year three, albeit again at a slower pace. Hence, there was no evidence of a plateau in development in year three. In 2004-05 (year three), the institutions had continued their upward trajectory across all six models, including the curriculum model. This slowing but continual change is to be expected: change is more difficult, and therefore, less achievable as the integration of the systems becomes more complex.

## 3. Preliminary findings: Teaching and learning

### 3.1 Positive indications of improvements in attainment

At the time of writing the report, test score data was only available up to the second year of the project (2004). Some indications were found of improved attainment in national tests and examinations, which is particularly encouraging only one year after the new equipment had been fully installed in the ICT Test Bed schools. Both the 2005 and 2006 results will be included in analysis before publication of the final report.

#### Local authority (LA) analyses

Between 2002 and 2004 the ICT Test Bed local authorities (LAs) have narrowed the gap in their test score performance for some tests with those LAs selected by the evaluators as benchmark comparators, that is, the rate of improvement in Test Bed LAs was higher than that for the comparator LAs. For the Key Stage 2 English test, for example, Test Bed LAs improved by 4.68% between 2002 and 2004, while comparator LAs improved by 4.09%. In keeping with this is the finding that the Test Bed LAs were also found to have significantly improved on their own performance over the course of the project for Key Stage 2 and Key Stage 3 English. Especially encouraging was the finding that the number of students achieving A\* to C grades at GCSE over the course of the project within Test Bed LAs had also significantly increased, although the Test Bed LAs were still trailing the comparator LAs in this respect. Since the ICT Test Bed LAs were chosen to participate in the project because of the serious socio-economic deprivation of their communities and low levels of student achievement, this is a very encouraging effect. It is particularly important in the light of the forthcoming report from researchers at University College and King's College, University of London (Taylor 28/2/06), which shows that the overwhelming determinant of students' attainment is not the school but their social background. An additional factor to note is that the comparator schools will also have increased their ICT equipment over the same period as part of the general increase in ICT across all schools in England.

#### Primary schools

Attainment *within* the Test Bed LAs) has significantly improved over the course of the project for the Key Stage 2 English tests. The decrease in scores seen in Key Stage 2 science was replicated by the comparator LAs and whereas the decrease in scores for the Test Bed LAs was not found to be significant, the decline in the comparator LA scores for this test was found to be significant, that is, the comparator schools had fallen back further from their 2003 levels than the ICT Test Bed schools.

Table 1: Key Stage 2

Year	% achieving level 4 in English (S.D)	% achieving level 4 in maths (S.D)	% achieving level 4 in science (S.D)	Average point score (S.D)
2002	70.61 (15.57)	72.18 (16.37)	85.29 (14.03)	27.02 (1.89)
2003	72.30 (15.59)	72.00 (15.83)	85.56 (12.62)	27.08 (1.87)
2004	75.29 (15.51)	72.37 (16.18)	84.99 (12.86)	27.21 (1.91)

### Secondary schools

Attainment *within* the Test Bed LAs) has significantly improved over the course of the project for the Key Stage 3 English tests, Key Stage 3 maths tests and the number of students achieving GCSE A\* to C grades. A significant change was also detected for the Key Stage 3 science test, although performance on this test within the Test Bed LAs was found to have decreased rather than increased between 2003 and 2004. This was also true for the comparator LAs whose Key Stage 3 science achievements had also decreased. This may reflect a general issue with the tests rather than any differential outcome for the target and comparator schools.

Table 2: Key Stage 3

Year	% achieving level 5 in English (S.D)	% achieving level 5 in science (S.D)	% achieving level 5 in maths (S.D)	Mean point score KS3 (S.D)
2003	62.02 (14.58)	61.83 (14.6)	63.97 (14.09)	32.94 (2.02)
2004	65.95 (15.83)	59.40 (14.13)	66.35 (13.44)	32.96 (2.11)

Table 3: GCSE

Year	5 or more A*-C GCSE (S.D)	5 or more A*-G GCSE (S.D)
2002	41.28 (14.99)	87.71 (6.86)
2003	44.32 (16.57)	87.42 (7.07)
2004	46.35 (16.20)	87.89 (6.46)

### School analyses

#### Secondary schools

Performance on the Key Stage 3 maths test in 2004 was found to have improved significantly for the ICT Test Bed schools by comparison with their performance between 2002 and 2003. No other tests score variations for ICT Test Bed schools between 2003 and 2004 were statistically significant.

## 3.2 Learning and teaching in ICT-enhanced classrooms

### Primary schools

#### Students' attitudes, skills and knowledge relating to ICT

Technology is an integral part of primary children's everyday classroom experience in ICT Test Bed schools. In the 2005 students' survey, children at Key Stage 1 were unanimous in saying that their preferred lessons were ones in which ICT was involved. The responses from Key Stage 2 children showed a significant increase in the use of digital cameras (55% in 2005 compared to 38% in 2003), scanners (27% in 2005 compared to 17% in 2003), and email (57% in 2005 compared to 31% in 2003). They have had sufficient opportunities for hands-on use of equipment, such as laptop computers, digital cameras and Digital Blue video cameras, to feel very competent and confident in their use. Primary students' use of the internet has increased very substantially (for Key Stage 2 97% in 2005 compared to 85% in 2003; for Key Stage 1 95% in 2005 compared to 56% in 2003). In Key Stage 2 the internet is used more at school than at home (school 97%, home 61%). While much of the use of interactive whiteboards and large screens with visualisers/electronic slates<sup>1</sup> is by teachers for whole-class presentations, the great majority of primary students (80% in 2005 compared to 50% in 2003) say that they have had the opportunity of using them to present their own work.

As a direct result of their greatly increased use of computers, primary students' low level of keyboard skills is becoming a nuisance. Some ICT Test Bed schools are taking steps to support students in gaining keyboard skills with computer-based typing tutors.

Children in ICT Test Bed primary schools also have excellent knowledge and awareness of ICT. For example, in interview they showed good awareness of different functionalities and input devices associated with whole-class technologies such as the touch screen, pens, cordless mouse, remote keyboard, projector, microscopes, scanners and concurrent viewing on a desktop PC. They showed good command of technological terminology, such as 'recalibrating' (when interactive whiteboard writing is what they called 'dodgy') and the 'control panel', and were able to remember and recite sets of instructions, such as how to upload their work to the shared site to enable teacher access.

#### Use of whole-class technologies

Observations in primary schools and interviews with both teachers and students provided ample evidence of the everyday classroom use of whole-class technologies to teach all subjects, as well as uses beyond the curriculum and in whole-school contexts such as assemblies.

Students told the evaluators that the whole-class technologies were used by all of the teachers all of the time:

*"It stays on, and anything they don't want us to see they click on the desk, no show, so people can do their private work and no one can read it."*

They described the use of whole-class technologies as primarily teacher-controlled but involving students either touching the interactive whiteboard, writing with interactive whiteboard pens or using devices such as 'zappers'. There was an overwhelmingly positive attitude to whole-class technologies:

*"The best computer that we could have had was the whiteboard."*

*"We don't need projectors and those transparent sheets anymore – all the Christmas songs are now typed up and it's brilliant."*

<sup>1</sup> Elsewhere in this report these are often referred to as 'whole-class technologies'.

The size of the screen was identified as one of the greatest benefits: "Everyone can see." Another advantage was seen to be the interactive whiteboard's efficiency, convenience, ease of editing, automatic functions and orderliness:

*"...and the whiteboard pens don't break. They are like cotton on there, and it's better because it wouldn't break or anything."*

*"There's like a rubber there, you can just rub it, you can just rub it off, and clear the screen."*

### **The positive impact of ICT on students with special educational needs**

In primary schools there is strong evidence from teachers' interviews and action research reports of the very beneficial impact of ICT, and in particular interactive whiteboards and large display screens, on the attention and motivation of students with special educational needs (SEN). Several teachers report on spectacular initial impact on children with attention deficit disorder and autism; it will be important to track whether this impact leads to actual gains in attainment.

It may be that the very strong focus in primary education on the written word, and assessment of attainment in terms of ability to handle the making and deciphering of textual signs, creates a strong sense of failure and lowering of self-esteem in children who do not have the capability to handle text at an early age. There is some evidence that use of an interactive whiteboard provides a public forum for such children to demonstrate their abilities in a non-textual medium. Further study is needed to explore whether working with the 'drag and drop' facility of an interactive whiteboard might be a successful strategy to help such children overcome their sense of failure and wean them to learning to handle text with confidence.

Where action research studies have been conducted with SEN students, teachers have recorded how they benefit from handling equipment such as digital cameras and microscopes. SEN students seem to experience an increased sense of control and positive identity from handling ICT equipment.

### **Teachers' planning, record-keeping and assessment of children's work**

There have been radical changes to the process of planning and sharing materials and recording assessments, particularly in primary schools. One problem, however, is that the requirements of the national tests, and the primary strategy materials which are designed to help teachers prepare students for them, were not designed with ICT-rich schools in mind. As with the strategy materials, some LA schemes are not sufficiently flexible to mesh well with ICT-enabled practices. Primary teachers reported in interviews that this restricts the educational opportunities of using ICT. Many teachers reduce children's use of ICT during the year preceding key stage tests.

Nevertheless, there are examples of ICT-led assessment, particularly at the foundation stage, where the electronic collection of samples of pupils' work is used to validate and moderate baseline assessments. This suggests the way in which testing might develop in the future as an evidence-based procedure rather than a test-taking activity. Teachers store examples of pupils' work for transmission to parents to keep them informed. There are examples of using text-tracking methods to help pupils to draft and redraft work, leading to a clearer understanding by them of how writing is assessed and developed. There are also some examples of using 'voting systems' as a means of assessment, especially for such activities as 'mental mathematics'.

Teachers are enthusiastic about the record-keeping facilities of ICT, both for their security and ease of access.

## Secondary schools

In the 2005 survey, the number of students that reported 'always' enjoying school had doubled (34% in 2005 compared to 17% in 2004). At a time when there is widespread concern about secondary students' motivation to learn and high levels of truancy, this is a very encouraging finding. It seems likely that this is related to the use of ICT for teaching and learning across the curriculum.

### Use of whole-class technologies

Many secondary teachers told the evaluators that the interactive whiteboards or large-screen displays of computer screens and visualisers have had a radical impact on their teaching, enabling them to present material with greater clarity and hold students' attention better. Some teachers understand the potential of these whole-class technologies to improve the interactivity of teaching and are using them innovatively. However, few secondary teachers are making as sustained use of interactive whiteboards as their primary colleagues and inevitably skills in using them well are less universal in secondary schools. Visualisers require much less specialist skill development but it is possible to use them in a minimalist way, for example, simply to display the page in a text book.

Secondary students were very positive about their teachers' use of these whole-class technologies, but it was clear from student interviews that secondary teachers' skills are more uneven than those of primary teachers.

### The positive impact of ICT on students with special educational needs

In many of the ICT Test Bed secondary schools, the high levels of ICT have clear benefits for students with special educational needs. This is particularly the case with whole-class technologies. For these students the multiple stimuli and varied approaches on the one hand, coupled with more interesting skill-practice materials on the other, are increasing motivation. Teachers' action research studies also show that SEN students enjoy being in control of ICT, for example, they are highly motivated and appear to benefit from using digital cameras and electronic microscopes. It will be important to track whether these apparent benefits are reflected in raised attainment.

### Embedding ICT in the curriculum in secondary schools

Although frequency of use varies considerably between subjects and teachers, ICT is now becoming embedded in teaching and learning across the whole secondary school curriculum, largely through teachers' use of whole-class technologies such as interactive whiteboards and visualisers/interactive slates linked to computers. This is important in light of the findings of both the ImpaCT2 evaluation and the NGfL Pathfinder evaluation that the focus of ICT use in schools during the period 2000-02 was on teaching ICT skills (DfES 2002; DfES 2002). The ICT Test Bed schools are at the third stage of ICT development – the integration of ICT with curriculum subjects – as set out in the ImpaCT2 report. This finding is confirmed by the maturity modelling data relating to secondary schools' use of ICT in the curriculum.

In many subjects, the scale of ICT Test Bed funding enabled secondary schools to acquire full sets of commercially produced digital learning resources as a single purchase, rather than buying them piecemeal over time. This has made it easier to integrate their use with teaching and learning across whole departments as well as making it easier to organise staff training and build an ethos of mutual support.

The majority of students reported that both the hardware and software in their school were sufficient to enable them to complete their work (82% cumulative responses in the 'agree' categories for hardware – an increase of 6% from the previous year and 22% from 2003 – and 83% cumulative responses for the software category – an increase of 6% from the previous year and 18% from 2003). However, a number of students were dissatisfied and unfavourable home-school comparisons may be the cause of this (most responses in this respect fell in the 'disagree' rather than 'strongly disagree' category). Some 90% of secondary students reported having access to a computer at home and many use it for sustained periods of time. The internet is now seen by 88% of secondary students as the best means of accessing information for project work and assignments, in preference to books; this is in contrast to their reported preferences at the start of the project. (See also Section 7 of this report.)



Yet, there are a number of organisational issues which make implementing ICT development in secondary schools difficult to manage. Real difficulties are caused by the timetable which involves short teaching periods and frequent changes of classroom by students and often also by teachers. This means that the students and teachers need to refocus on the in-class ICT equipment at the start of every lesson. Students need to log on the class 'banks' of laptops if they are used and teachers need to distribute the equipment and often refresh their own log-in. This all takes time at the beginning and end of each lesson and teachers do not see that as efficient or productive. It also places stress on both the hardware and the wireless network systems. The ICT needs of different subjects vary and therefore the resources vary, and the students have to adjust to that. Implementing change in secondary schools poses challenges relating to scale, department cultures and movement within school of both teachers and students.

### **Assessment and record-keeping**

The provision of Key Stage 3 tests for ICT as an online activity was generally welcomed. In other subjects the teachers regularly stressed the importance of the written word over the electronic word in order to prepare for SATs and GCSEs, which are the basis for the school's position in league tables. This clearly diminishes the extent to which ICT could be used by students. It led to departments timetabling the use of ICT into particular discrete periods of the term to control its impact and to requiring homework to be paper-based in preparation for the examinations.

ICT has, however, made it easier to make assessment outcomes publicly visible and this has led to much improved departmental assessment policies. Electronic sharing of exemplars of student work has improved moderation procedures in all years, and has led to better target-setting for classes and students. Most schools are also working towards the central collection of some (though not all) assessments to aid management and policy-making. This is based on termly (or half-termly) assessment, which is also leading to parental reports being more related to the achievement of targets by the students rather than the verbal comment style of report. At departmental level, recording of assessment is often by spreadsheet but central analysis is usually done through some form of MIS assessment manager.

### **Limitations to the 'hands on' use of ICT by students in secondary schools**

There is evidence from logs of ICT use and interviews that Year 8 students in ICT Test Bed schools are making only limited use of the power of ICT during the school day. For example, during one week in February 2005 a sample of students from all three clusters recorded on average 45 minutes a day of ICT use at school. This appears to relate to the high demands on computer equipment made by specialist examination syllabuses. Use varies between subjects and the logs recorded particularly low use in science. Regular, sustained, hands-on use of ICT is largely reserved for ICT, design and technology or business students studying for examinations in Years 10 and 11. In interviews, secondary school students in Year 8 told the evaluators that formal ICT lessons are often boring and this appears to relate to the Key Stage 3 ICT curriculum. Some told the evaluators that they felt they could make much better use of the available resources. Others expressed frustration at the limitations placed on their use of the internet by the security software and filters on the school's network. Students also said that it is rare for them to be asked by teachers to use ICT for homework. These findings come from a sample of students drawn from the three ICT Test Bed clusters, but reflect similar findings in the ImpaCT2 evaluation (DfES 2002; Somekh, Lewin et al. 2002) and the ESRC-sponsored Screenplay project (Facer, Furlong et al. 2003).

## Further education colleges

In the three FE colleges, students in the designated ICT Test Bed subject areas reported that they had good access to ICT and had developed a high level of competence and confidence in its use, and these findings were confirmed by observations and interviews.

### ICT within the curriculum

In each of the ICT Test Bed colleges, three curriculum areas have been selected for special funding to provide high levels of ICT equipment. Different areas have been selected in each college so that lessons could be learnt about the impact of ICT across a wide spectrum. Curriculum areas that already had ICT equipment have updated and expanded their resources and those which traditionally did not have such resources have been equipped for the first time. Students report that the new equipment *“has made a big difference”*. Some are able to access a computer at any time they are in college – for example, one said: *“We can get a laptop out when we want and use it for the internet or whatever. This has been very helpful. There isn't any waiting for equipment.”* Others have some classes in ordinary classrooms and only use the computers once or twice a week.

The introduction of interactive whiteboards has been a major innovation. Lecturers commented on the difference it makes to their teaching, to the ambience of the classroom and to the motivation of the learners. Sets of laptops stored in trolleys for easy use in the classroom are popular with lecturers, but they need careful management to match the class requirements with the right functionality and software on the laptops. The presence of the ICT seems to impart a sense of greater efficiency in the delivery. Lecturers believe that they can get through more in a session when they use technology but are aware of the danger of going too fast for less able learners.

Students gave many examples of the use of ICT in subjects across the ICT Test Bed curriculum areas. The majority said they were using the technology to create their own presentations to show the results of their research or assignment work to the rest of the class. They often worked in small groups. In interviews, they told the evaluators that the high levels of ICT have improved the quality of their work and their learning. For example, they can use digital cameras and video, produce better presentation of assignments and portfolios, and tutors have more time to give them individual help. These findings are reflected in the 2005 survey. FE students reported increased confidence and competence in using the internet rather than books to locate information (67% in 2005 compared to 51% in 2003). The internet is now their favoured research tool and in 2005 this became the most daily used application in colleges. In interviews, students rated word processing and the internet as the most useful technologies. In 2005, daily use of word processing actually dropped (14% down compared to 38% in 2004) and there was a shift from word processing being used mostly in college to being used mostly at home.

### Virtual learning environments (VLEs)

Virtual learning environments (VLEs) are being used with increasing effectiveness in the ICT Test Bed curriculum areas in the three FE colleges. This comparative success in the colleges probably results from expectations across the FE sector as a whole that students should be able to access online materials. All three colleges report increasing use of the VLE for making learning resources available to students, although much of the material is textual material or presentations rather than interactive or collaborative material. Generally, staff in the ICT Test Bed course areas were very positive in interviews about their use of the VLE and, as their use of the systems matures, the proportion of interactive materials and materials for formative assessment should continue to increase. Student use of the VLE in the ICT Test Bed course areas is becoming more established as electronic learning and assessment materials are developed. However, student use of the VLE remains patchy; some students use it effectively but others make little use of it. Most ICT Test Bed staff upload the materials to the VLE after the lesson because they fear that attendance would be adversely affected if students were able to get the materials before attending the class. Further information on leadership and management issues relating to the installation of VLEs is given in Section 4.

### **Assessment and record-keeping**

ICT is being used to assist in the collection, marking and return of student work and assignments. Interactive learning activities and questioning are enhancing formative assessment. The development of online individual learning plans (ILPs) and digital portfolios is changing the nature of summative assessment. Examples of innovative practice include craft students using digital cameras to take photographs and creating a CD as evidence of their work. Work-based assessors are using personal digital assistants (PDAs) to record the achievement of competence as the student in the workplace demonstrates it.

### **Student attitudes**

Students in ICT Test Bed curriculum areas are overwhelmingly positive about ICT – both in terms of helping them to do their course and in their attitudes to technology. They see ICT as a useful, in some cases essential, tool in helping them succeed on their courses. They described how the high levels of ICT equipment has made it easier for them to study in a number of ways. For example, they can get course notes and assignments from the college's VLE, it is easier and quicker to get information from Google than books, and information on the web is sometimes more up to date than the books in the library.

## **All ICT Test Bed institutions**

### **Differential impact between sectors**

There is clear evidence of a differential impact of the ICT Test Bed investment across the three sectors. Whereas the impact in primary schools has encompassed all aspects of their work, the impact in secondary schools has been considerable at the administrative level, but uneven across different subject departments. In part, this is related to the size and complexity of secondary school needs and infrastructure compared with those of primary schools. However, the impact in FE colleges has been more beneficial than might have been expected, given the size and complexity of their infrastructure and the fact that the project worked mainly in three course areas.

This suggests that differences of impact between the sectors are related to institutional structures, such as the timetable of short teaching periods and frequent movement between teachers of different subjects. For example, short periods mean less time for sustained work with ICT, and logistical problems in repeatedly distributing and collecting class sets of laptops and keeping their batteries charged. There is also evidence that teachers' motivation to allow students to use 'hands-on' ICT is reduced because national tests and examinations, with their focus on pre-specified attainment targets and handwritten answers, are not a good 'fit' with the style of learning that ICT offers. This effect is stronger in secondary schools where time pressures to 'cover' the curriculum in short time periods are considerable.

This is an important finding because it suggests that investment in ICT is not able to have the impact it should in secondary schools within the present education system.

## 4. Preliminary findings: Leadership and management

### 4.1 Achievements in leadership and management

At the end of the third year it is clear that management of the change to an ICT-enabled institution has been carried out with vision, energy and commitment in the great majority of ICT Test Bed institutions.

The introduction of a high level of ICT into a school or college poses major challenges for leadership and management at all levels: classrooms, departments, institutions and, in the case of schools, the LAs. The process of managing this change has been a complex one. Initially, senior managers had to focus mainly on the imperatives of procurement, installation and solving logistical problems. At the same time the educational vision of what the new ICT equipment could offer students and staff had to be developed and actively promoted. Once the equipment was fully installed (which in the case of more complex systems was not until the autumn of 2004), the focus shifted to process management, to put into place new ways of working to maximise the value of ICT.

The 2005 maturity modelling of the ICT Test Bed schools and colleges indicated that overall they have a clearer and more focused vision of the use of ICT across all aspects of their work. The way schools and colleges are governed and managed has changed with the introduction of new MIS systems and improvements in the way data is collected, recorded and handled. The increase in maturity over the first three years indicates a change in the way ICT is co-ordinated within institutions. For example, there is now more proactive rather than reactive management of initiatives involving the use of ICT, and integrated ICT-based assessment and recording systems are in place that are available to all staff, at least within the institution, if not from home as well.

### 4.2 Definitions of key terms

#### Leadership and management

The terms leadership and management are generally used rather loosely to cover the activities of principals, headteachers and members of the senior management team in schools and colleges. However, it is useful to make a distinction between them, as follows:

*Management* is the formal processes of senior managers and middle managers carrying out work according to their role in the organisation, which involves accountability to a line manager and responsibility for overseeing the work of others, in both cases as specified in the organisational chart. Senior managers are responsible for accessing funding streams, meeting external requirements for accountability and ensuring the quality of service offered to students, their parents and the community.

*Leadership* encompasses the interrelated processes of developing a vision and communicating it to others in ways that unlock their energies and inspire them to give time and commitment to working towards shared goals. In practice, leadership is partly dependent upon – and constrained by – management structures, and partly depends on informal connections and the ability to understand and make use of the micro-political substructures that shape the organisation's culture. To change organisational culture, both good management and good leadership are essential.

#### Management information systems (MIS) and virtual learning environments (VLEs)

*Management information systems (MIS)* in education provide a way of enabling the school or college to manage the essential elements of the business, including student numbers, buildings, timetables and budgets, and enable them to make decisions, to plan and to respond to requests for information from managers, LAs, governors and funding or other external agencies. WordNet<sup>2</sup> describes an information system as “a system consisting of the network of all communication channels used within an organisation”. The activities involved in operating an MIS include inputting data, processing and storing the data, and the production of outputs such as management reports.

A *virtual learning environment (VLE)* is a software application which facilitates the delivery and management of learning for pupils and students. The VLE provides access to a wide and increasing range of learning content controlled and structured by the teachers. In addition to providing access to content, most VLEs include modules for discussion forums, synchronous chat, surveys, announcements and calendars. The VLE enables assessment of progress through quizzes and exercises which can often comprise randomly selected assemblies of multiple-choice, true/false and one-word answer questions. The VLE system provides feedback to the learner as they do the tests and, at the same time, tracks the learners' progress and stores this in a grade book which can be monitored by the teachers. Some systems include new features such as blogs<sup>3</sup> and Wiki<sup>4</sup> where learners can contribute to the development of the content. VLEs can be used as the basic learning medium for distance education but within schools and colleges they are frequently used as supplementary material to classroom activities.

### 4.3 Leading and managing change with ICT

#### Primary schools

##### Staff satisfaction

Management of ICT is particularly strong in primary schools where the the 2005 staff survey showed high levels of satisfaction with management among primary teaching and support staff. For example, 87% of support staff and 86% of teaching staff stated that their school had an effective approach towards managing change. Around three quarters of the primary school staff agreed that their school's management of resources was satisfactory in terms of appropriate class sizes and use of ICT in managing resources; that there was a good match between what people do and their skills (support staff: 88%, teaching staff: 81%); and that there was an effective strategy for record-keeping (support staff: 92%, teaching staff: 88%).

##### Use of management information systems (MIS)

ICT Test Bed primary schools already had in place some elements of an MIS system before the ICT Test Bed project was launched and typically have utilised only some elements of the full MIS system. As a management tool, full access and administrator's rights are normally restricted to the primary school headteacher and secretary. Primary teachers in general currently only feel the need to access a small number of elements: pupil profiles, registration, partial access to assessment systems. Target-setting and analysis of assessments in primary schools is usually the responsibility of the headteacher and a named co-ordinator, and the co-ordination of assessment data is well developed in most primary schools in order to satisfy DfES target-setting.

Experience indicates that primary schools require the support of the LA in setting up and running the MIS, as commercial providers have little understanding of their needs. ICT Test Bed primary schools have also benefited greatly from technical support provided by the secondary school.

#### Secondary schools

##### Staff satisfaction

The 2005 maturity modelling of the ICT Test Bed secondary schools showed more uneven progress than for primary schools or FE colleges. This is perhaps as a result of the greater complexity of their task, certainly when compared with primary schools. Satisfaction rates in the staff survey are somewhat disappointing with 43% of secondary support staff and 38% of secondary teaching staff considering their institution's methods of managing change to be unsatisfactory.

##### Use of management information systems (MIS)

The ICT Test Bed secondary schools were disappointed in the lack of fine-tuning of the systems to meet their own school requirements. The suppliers have produced a generic package but appreciation of how it may need to be customised has been lacking. Furthermore, the suppliers appear not to have the resources needed to customise the provision.

In ICT Test Bed secondary schools the systems are generally managed by dedicated administrative staff who maintain the integrity of the data. Analysis of the data is the responsibility of specified members of the senior management team. Access to data is not generally available to all staff.

<sup>2</sup> <http://wordnet.princeton.edu/>

<sup>3</sup> A blog is an online diary which is published to a webpage.

<sup>4</sup> Wiki is software that allows users to freely create and edit webpage content using any web browser. Wiki supports hyperlinks and uses simple text syntax for creating new pages and links between internal pages.

In one ICT Test Bed cluster, secondary classroom teachers have been involved in gathering data for assessment and behaviour management. However, without experience of how the analyses are carried out, significant data may be omitted and the task can seem to be merely administrative. It is imperative, therefore, that the user interface between the classroom teacher and the system is as easy to manage as possible.

Electronic registration is generally seen as helpful. In secondary schools, the ability to monitor lesson-by-lesson attendance is working positively to reducing truancy and unauthorised absence. In some ICT Test Bed primary schools, the ability to link to 'same day calling' of parents/guardians has raised attendance by 3-4%.

### **All schools**

The successful implementation of any new computer system requires drive and commitment from the senior managers and a significant nucleus of other staff.

#### **Use of management information systems (MIS)**

MIS is a tool which greatly assists schools in providing information for central government, often through the mediation of the LA. Not surprisingly, therefore, requirements for information have been a major driving force behind the development of school MIS systems. It is clear from monitoring the implementation of MIS in the ICT Test Bed schools that, while much of this information is very useful to the school in its planning and development, some is of less obvious value. Paradoxically, the ease of data collection and storage has left schools feeling that they are being overloaded with information being sent by the LA and DfES. Although the information may not be wholly pertinent, it has to be read in order to ascertain its importance. It is recognised that the DfES does have procedures in place to deal with this, especially through the annual return which is found valuable, but the provision of information to schools continues to need to be monitored and assessed for pertinence.

Finance in most schools is still audited and managed by the LAs who have developed reportedly good MIS systems to deal with this. Schools use their financial management systems to provide reports and analyses for senior management, the governors and the LA, which is made possible by the relational basis of the new MIS systems.

#### **Use of virtual learning environments (VLE)**

VLEs are still at an early stage in development and the schools have experienced the problems of being trailblazers.

For most primary schools in the clusters where a VLE has been introduced, integrating its use with everyday teaching and learning has not been a major priority. As with some elements of the MIS system (for example, assessment) the earlier piecemeal resolution of some resource management issues (such as storage of curriculum materials) makes it less likely that teachers will move across to a new and probably more complicated (even if more efficient) system.

In one ICT Test Bed cluster, the secondary school has spearheaded the procurement and installation of a VLE to provide ready access to the community. Protocols for access and the necessary firewalls are only just being developed and are complex. However, the secondary school has invested a considerable amount of money and time in developing materials for learning and teaching to populate the VLE. The commitment of the senior management may lead to a successful VLE being in place in the near future which is linked to students' homes, and this will be a focus for research in the final year of the project.

In another cluster, an early decision was made that a cluster-wide VLE would not be cost-effective. A secondary school which bought a VLE in the early stages of ICT Test Bed found that it proved unsatisfactory and is now considering purchasing another system.

In the third cluster a cluster-wide VLE has been installed, and although supported by the cluster managers the client interface has proved difficult for the teachers. In the secondary school two very poor training sessions from the provider have significantly affected the confidence of the staff in its effectiveness and no doubt delayed its development significantly. The importance of quality training for central systems implementation cannot be too strongly stressed if they are to be well used by the teaching staff.

In the final year of the project, research will focus on tracking the implementation and value of VLEs and also other less complex alternatives which give some of the same functionality.

## Further education colleges

### Staff satisfaction

The three ICT Test Bed further education colleges recorded a good level of development through the maturity modelling process in 2005. However, the 2005 staff survey<sup>5</sup> revealed that 50% of FE teaching staff considered their institution's methods of managing change to be unsatisfactory. It is important to note that the survey was administered to all staff in the college rather than only those in curriculum areas with ICT Test Bed funding. Nevertheless, the upgrading of MIS systems, with ICT Test Bed funding, could be expected to have an impact on management across the college. Staff reported that there was increasing clarity in roles and responsibilities within the colleges but there was a more mixed response to questions about the clarity of decision-making processes and an increase in the number of staff who do not believe that there are good communications or that they are kept well informed (62% compared to 34% in 2004).

These are disappointing findings that may, however, be partly explained by the size and complexity of the colleges' activities and infrastructure. It is also important to note that one of the colleges underwent major restructuring during 2004-05.

### Models of successful management of change in the ICT Test Bed FE colleges

The work of the ICT Test Bed FE colleges provides evidence that clearly defined management structures and stable senior management teams are important conditions for effective leadership of change in major ICT innovations. The active support of a senior manager, and supportive interest of the whole senior management team, are essential.

To use ICT effectively, colleges are likely to need to make changes to their management structures, including making new senior appointments and establishing new committees to maximise staff participation.

ICT tools that provide structures for project management, collaborative working and financial planning/tracking (spreadsheets) are enormously powerful in managing change and tracking its progress.

Additionally, leadership strategies need to fit the existing culture of the organisation and play to the strengths of all participants. Standard business models of project management have to be substantially changed to fit the structures and culture of FE colleges which have very diffuse middle management responsibilities by comparison with business organisations.

The ICT Test Bed project provides two useful but contrasting models of change management with ICT in FE which illustrate this process. These can be customised for use by other colleges. (See Appendix 1 for a table setting out the features of the two models.)

In one college an experienced project manager was brought in from industry to manage ICT Test Bed and adopted what he called a 'franchise model'. He explained:

*"It's like a series of franchises internally, that's the way I think of it. You have got schools, departments... you have got lecturers and each one is given an element of freedom for what they want to deliver, but they have to use the supplied materials. In the well-known franchises you are all similarly branded but in essence you are almost self-employed, and you have got a larger degree of autonomy."*

In another college an experienced member of the senior management team led the project as an extension of his previous responsibilities for developing ICT in the college and he adopted what he called an 'empowerment model'. He explained:

*"Initially, there were individual practitioners who were the obvious choice either because of the role they were playing or... [personal qualities]. But others have come through – the team has evolved a true sense of bottom-up implementation. At all levels it's welling up from practitioners across the piece. For example, the joinery technician has taken it on himself to video things and produce demo materials for students. It's been really empowering staff – it's about having the faith in staff to truly empower them, not just empower them as long as they are doing what you want."*

<sup>5</sup> Only two out of the three colleges completed this section of the questionnaire.

### Use of management information systems (MIS)

The three FE colleges had well-established MIS systems and development plans prior to the ICT Test Bed project. The impact of ICT Test Bed appears to have been in facilitating and speeding up the development of the systems, their embedding in the day-to-day operation of the college, and in increasing the access and usability of the systems for college academic and business support staff. Business support teams have been restructured and reskilled to become multi-skilled teams who ensure benefits are realised from the MIS systems. Colleges are different from schools in their level of financial independence and responsibility so there was a realisation from the start that new hardware brings an ongoing cost in terms of upgrading and replacement.

Sophisticated MIS systems are streamlining business processes across the college. It is easier to find out about courses and enquiries are processed faster and more comprehensively. Enrolment has changed drastically over the last few years because of increased use of ICT and the traditional delays and long queues are largely a thing of the past. Managing students on courses is more effective and efficient. Tutors are much more aware of student needs and the progress they are making. All of these factors are tangible benefits to the students and to the operation and efficiency of the college.

Historically, MIS systems in FE colleges have been perceived as inaccessible and difficult to use and as providing data that was often not accurate. This perception appears to be changing as the increased ease of getting accurate data improves staff perceptions of the systems. Staff interviewed were very positive about the systems and the benefits they derived from them.

Staff are much more aware of data and its role in what they do. Managers make regular use of data to help them manage the curriculum and their staff and to monitor performance. Tutors use data to manage their student cohorts and their progress.

Development of e-viewers has had a major impact in making systems more accessible and easier to access via web-based interfaces. Once complex tasks such as drilling down into specific aspects of the data are now routine and require only a few clicks of a mouse.

Staff are increasingly engaging with quality issues through easier access to quality procedures; this facilitates quality improvement across the organisation. Quality procedures themselves have become more manageable and easier for staff to update and amend.

Developments in MIS systems have had a significant impact on the whole college and its operation, particularly when considered in terms of the proportion of ICT Test Bed funding that was invested in MIS. As a relatively small part of the ICT Test Bed funding, they have acted as a major catalyst to changing the culture within the colleges.

MIS developments are likely to be sustainable developments and the rapid improvements seen during the ICT Test Bed project will have a lasting impact in the colleges and provide a solid base for future developments. College environments are increasingly complex and subject to frequent and unpredictable change – as staff leave or change roles, as departments move rooms, from site to site or to new buildings – and equipment may not be replaced or updated. In this environment, it may be that change in teaching and learning in the colleges is transient; there is perhaps a tendency to revert to the 'stable state'. ICT Test Bed could be viewed as a project designed to bring about change in teaching and learning, but given the limitations to specific curriculum areas within the colleges, it may be that the developments in MIS discussed in this report represent the real impact of ICT Test Bed for FE.

The Becta review (Becta, 2005) looked for colleges that were e-enabled. E-enablement is defined in the PwC report and reported in the Becta review as *"An 'e-enabled' institution is one where there is clear evidence of strategic thinking around the use of ICT, self-assessment and future willingness to embed ICT are high and the institution fairs well in terms of the traditional indicators of the use of ICT."* (PwC, 2005, p78) The review found that only 8% of colleges could be considered as e-enabled, a figure somewhat lower than that for schools (see Table 4). It is clear that MIS developments in ICT Test Bed have raised the level of e-enablement in the ICT Test Bed colleges.



Table 4: E-enablement in FE colleges

Spectrum of e enablement for FE colleges					
	Late adopters	Ambivalent	Enthusiastic	e-enabled	sample size (N)
FE colleges	20%	23%	49%	8%	99
All schools and colleges	13%	36%	40%	11%	345

Source: *Moving Towards e-Learning in Schools and FE Colleges* (PWC, 2004a)

### Development and integration of VLEs

The use of VLEs had been promoted in the FE sector since 2000 and all three ICT Test Bed colleges used some of their funding to upgrade or replace their existing system. This meant that in the colleges there was a focus on developing effective use of the VLE from 2003, early in the life of the project. In two cases the VLE purchased by the college proved not to provide the expected services and a switch was made to an open source alternative system in 2004, but real progress has been made since and VLE use is now much better established in all three colleges than it was prior to the ICT Test Bed project.

As a result, ICT Test Bed learners have excellent opportunities to access learning materials outside the classroom when they choose to do so.

The success of an open source solution to provision of a college-wide VLE should be noted. These have proved reliable, robust and expandable; they offer a high level of user customisation and the level of acceptance among staff and students is high. In the two ICT Test Bed colleges that changed their VLE during the project, this high degree of functionality has contributed to the rapid establishment of a viable VLE that is becoming a college-wide facility. Such moves will have far-reaching effects in the FE sector and the wider VLE market.

### All ICT Test Bed institutions

#### Change management tools

Change management tools of the kind promoted within ICT Test Bed by consultants from the National Remodelling Team have proved to be powerful in enabling and sustaining change in schools and colleges – if their need is recognised by senior managers and they are used.

A comparison between the extent of use of these change management tools in schools and colleges (recorded by Becta) and the evaluation's maturity modelling data showed a positive correlation between the use of change management tools and the growing maturity of the ICT Test Bed institutions on a number of dimensions.

However, there are subtle differences in factors correlating with level of activity versus those correlating with quality of activity. The frequency with which such management tools were used – that is, the degree to which an institution opted into the change management ethos – was related to the maturing management systems, workforce and technological infrastructure. However, the quality and effectiveness of use were correlated with these and, additionally, with maturity of external technological links from the institution to the home and the community.

Readiness to opt into the change management ethos, linked to the maturity of the workforce, appear to be the keys to both the level and overall degree of change.

## 5. Preliminary findings: Workforce development

### 5.1 Changing patterns of teachers' work

#### Primary schools

Access to high levels of ICT has had a major impact on teachers' work. Most ICT Test Bed primary teachers have their own laptops and find these indispensable used either on their own or in conjunction with whole-class technologies. Many teachers use the personal laptop they take home in the evenings to run the interactive whiteboard in their classroom. This gives them flexibility and choice in where they prepare their teaching, complete pupil records and carry out other administrative work.

It is important to note that the procurement and distribution of laptops for teachers' own use requires a thorough initial needs analysis and plans for upgrading need to be built in. Teachers who are novices require advice rather than being left to choose their own laptop. In one case laptops with a low technical specification were purchased and many teachers hardly used them.

Most schools have developed good email links and have developed a culture in which staff utilise this means of communication readily and regularly. Even small primary schools have found it valuable to be able to record information or a concern at the moment it happens. The within-school use of email between staff is dependent on a change in methods of communication and its uptake varies considerably between primary schools; in some it has become the norm and children are no longer asked to carry messages to other teachers.

In all clusters there is the potential to allow password-protected access to the school network and MIS systems from outside the school, but primary schools have found that teachers do not need this facility since they can transport software and files necessary for planning lessons on their laptop or memory stick. For school managers (heads/deputy heads/assistant heads/ heads of year, etc), this facility has proved occasionally valuable.

#### Secondary schools

Despite variations in the levels of ICT interest, competence and skill, in many of the ICT Test Bed secondary schools the introduction of high levels of ICT resources has acted as a catalyst, promoting greater sharing through excitement and ownership, 'enriching' the departments and contributing to team-building. Many departments have developed their own local recording and assessment systems through departmental discussions pending the transition to a central MIS system. These open data systems have initiated a new openness on information between members of the departments, encouraging joint responsibility and corporate planning.

Senior managers – and indeed all teachers – can arrange to obtain password-protected access to the school's MIS from home but, in practice, managers say they prefer to do this kind of work during school time.

### Further education colleges

Tutors in ICT Test Bed curriculum areas in the colleges are working much more closely together as a result of the new ICT resources. In one college, tutors in three curriculum areas were given responsibility for mentoring their colleagues in other teams outside ICT Test Bed.

Staff are collaborating on course administration tasks, for example, tutors record student progress electronically on the VLE in a much more transparent process than the old paper-based system.

### All ICT Test Bed institutions

The strategy of simultaneously installing whole-class technologies into all classrooms in ICT Test Bed schools, and the selected course areas in the colleges, created a corporate and professionally supportive ethos both within and between institutions. In most cases, access to traditional whiteboards was removed when the new equipment was installed and/or in use, in effect forcing teachers to engage with it immediately. There was strong professional support from working together on the same problems. The demands were enormous and teachers and college tutors invested a great deal of time and effort in the enterprise. None expressed regrets and almost all have grown in ICT expertise and self-esteem.

## 5.2 Producing and sharing resources

### Primary schools

Many primary teachers have spent considerable time producing teaching materials for whole-class technologies. They are able to store resources on the school's network, either in a personal workspace or a shared area, and this has encouraged sharing resources and ideas. The need to develop expertise and resources very quickly has led to task sharing in order to make the work manageable. This is especially true in sharing good visually attractive 'drag and drop' and animated activities in Key Stage 1 or where teachers change the age group they are teaching and need a bank of resources quickly available.

There is a potential for time saving, although resources need tailoring to meet the needs of different groups of students. Already, there is a clear gain when teachers change classes or a supply teacher is employed. In one cluster the science co-ordinators developed a suite of resources for joint use back in 2004, and similar work has since been carried out by other specialist groups. The actual extent of the sharing of such resources will be a focus for research in the final year of the project.

### Secondary schools

Secondary teachers are making choices between creating and 'owning' resources and using ready-made resources. These are influenced by individual teachers' perceptions of the need for flexibility and time constraints, as well as their inclination for challenge and desire for personal satisfaction.

A major impact of ICT Test Bed has been in enabling schools and departments to purchase a full set of commercially produced resources from the outset rather than purchasing modules on a piecemeal basis. This has helped planning and enabled teachers to be fully aware of the structure and nature of the resource. Technology facilitates multiple copies and searching techniques and is saving significant time in comparison to more traditional resource banks.

Some schools are employing professionals to produce curriculum materials, often in what are called 'content creation teams'. Content is now being developed with particular pedagogical approaches in mind, as well as for different locations and contexts for learning. By contrast, however, staff in some departments are becoming reliant on one or two particular pieces of software.

### Further education colleges

FE lecturers are gathering materials from a wider range of sources than before and using their new skills to adapt and refine them. The range and amount of available material makes reviewing a very difficult task and a common solution is to rely on a restricted range of sources and often to develop one's own materials. The FE sector has an ever increasing bank of resources including the National Learning Network (NLN) materials, but as yet there is no effective ways of searching across all resource banks to find materials for specific subjects, levels and groups of learners. This is perhaps why there is very little use of materials such as the NLN materials.

A tutor is often the only person teaching a particular course module or unit and this limits opportunities for sharing resources. However, ICT Test Bed has engendered some sharing of materials, mainly for GCSE and AS-level between colleges and cluster secondary schools.

In ICT Test Bed colleges, the blended learning approach allows integration of the new tools, techniques and equipment with traditional tools and methods. There is a trend towards colleges employing content developers to work with staff and help them improve the quality of the materials they are creating. In one case, this is a resource shared with schools in the cluster and has led to some interesting collaborative projects. In all three colleges, ICT Test Bed teams are creating video resources for use in teaching and learning.

## 5.3 Changes in roles

### Primary schools

The role of the technician has developed alongside the electronic systems and is so important that nearly all the ICT Test Bed primary schools are planning to continue to employ a technician when the funding ends.

Changes in the role of classroom/teaching assistants have also been striking. They have been trained in ICT skills alongside teaching staff, play a full part in supporting the pupils, and are significant in supporting supply teachers and new staff. As the new workforce agreement has been introduced, primary schools have experimented with new ways of using ICT to keep assessment records. There is a difference of opinion on interpretation of the agreement, but some teachers are entering assessment online while in other cases classroom assistants are taking some of this responsibility.

There has been a major change in the workload and status of primary school secretaries who are now often managing the MIS system, working closely with the headteacher. Training for implementing an MIS system is a complex and crucial procedure. In practice, primary schools have normally relied on one or two people, such as the headteacher and school secretary to learn how to use the system. Facilities that are only needed occasionally have proved time-consuming because their use has not been internalised, necessitating recourse to the instruction manual each time.

### Secondary schools

ICT Test Bed enables both administration staff and teachers to do their jobs more effectively, being able to access data more readily and immediately. The new role of a technical support person, with dedicated responsibility for the classroom teaching and learning equipment, is a crucial factor in ensuring that the hardware is up and running.

Administrative staff have assumed increasing levels of responsibility during the last year, partly because of new responsibilities for the MIS system. They are often under considerable pressure.

Technicians have become increasingly important as schools become more ICT-dependent. Quick response to technical breakdown is crucial.

Behaviour management systems are seen as very important in secondary schools. In some schools, data is entered centrally from a paper-based memo system, though these procedures could be significantly improved by the use of email reporting. Agreement and understanding is needed of the terms used in behaviour management and schools should develop a simple protocol designed to capture potentially significant information at the time of the incident. The availability of behavioural records helps to coordinate action by different members of staff who might be involved at various stages of the procedures: pastoral heads of year, heads of department, headteachers and their deputies.

Assessment recording in secondary schools takes place at two levels: the departmental level, where the head of department monitors the work in his/her department, and centrally, through a termly or half-termly battery of tests or assessments. This use of the MIS system is changing the nature of school-to-parent reporting so that it is becoming less verbal and more target and attainment oriented.

Where heads of year are able to access attendance data and events relating to individual students through the MIS system, this has helped them to co-ordinate more effectively with their departmental colleagues.

### **Further education colleges**

Selection of the ICT Test Bed curriculum areas has changed the balance of ICT expertise in the colleges. Some curriculum areas participating in ICT Test Bed were previously untouched by ICT and now have tutors who are regarded as leaders in its curriculum use.

Inevitably, there has been some sense of inequity in areas that did not receive funding. To extend the impact of ICT Test Bed into other areas of the college, during or beyond the life of the project, will require a strong commitment from senior management.

ICT Test Bed has generally brought positive changes for MIS personnel who report new systems that work better and help them to be more efficient and effective. Marketing of courses has been helped by CDs or DVDs which are used for publicity purposes. All colleges report good and increasing student numbers in ICT Test Bed areas.

Technical support personnel and ICT resource managers are taking on new responsibilities and, in some cases, working more collaboratively with teaching staff.

### **All ICT Test Bed institutions**

All the ICT Test Bed institutions are heavily engaged in responding to requests for advice and support from teachers and schools not involved in the project. This has given many staff a new leadership role in the profession.

## 5.4 Professional development

### Primary schools

There is evidence of exceptional gains in the competence and confidence of the primary school teachers – and often teaching assistants and administrative staff/school secretaries – with ICT. A number of teachers commented that they are now less concerned when technical hitches and failure occur due to increased confidence in dealing with such issues. Professional development for staff in ICT Test Bed primary schools appears to have been very effective. Most have followed careful plans in its provision, usually collaborating with other schools in the cluster, with good support from the LA and (to varying extents) from the FE college.

A reflection of this growing confidence and competence in the use of ICT was the children's evaluations of the improving quality of teacher support. In 2005 87% of Key Stage 2 respondents said that teachers were the best source of help in school when using ICT, compared to 65% in 2004.

### Secondary schools

Despite variations in the uptake of ICT between departments, the immersion in ICT experienced by many teachers in ICT Test Bed secondary schools has led those who had not been early adopters of technology to develop (rapidly) a wide range of (often advanced) computer skills. Although the project made some formal training available, many such staff referred mostly to learning from informal support given by more technically able members of the department. In 2005, staff competencies peaked for using word processing and communication software such as the internet and email. Around three quarters of both teaching and support staff reported that their skills in word processing, internet use and email were sufficient for their own needs – and for teaching others. As in primary schools, the identification of particular members of departments with specific areas of ICT expertise proved very effective.

In the third year of the ICT Test Bed project a cross-cluster VLE was introduced in two clusters, but in some secondary schools staff have been reluctant to adopt the system, having developed their own ways of using more ad hoc electronic storage systems earlier in the project.

Training for implementing an MIS system is a complex and crucial element which takes some considerable time to implement even when the system installed is an upgrade of the existing systems. In ICT Test Bed secondary schools, training provided by different suppliers in two clusters has been ineffective and, in both cases, the LA has proved to be a much better support mechanism. An important lesson is, therefore, that the LA needs to be involved at an early stage in procurement and implementation decisions for MIS.

## Further education colleges

In the FE colleges gains in teachers' competence and confidence with ICT, within the three specified ICT Test Bed courses, are in many cases as significant as in primary schools. Tutors express a sense of greater enjoyment in their work, perhaps springing from an increased sense of self-esteem and self-worth. Many use whole-class technologies regularly and are skilled in linking them to digital images and sound. There is evidence that they can overcome problems more easily because they normally teach students in half-day blocks. For example, logging laptops onto a wireless network, which is often a slow process, can be staggered over half an hour or longer.

Training in ICT skills has been systematic and successful in some of the ICT Test Bed curriculum areas in the colleges, but the most effective methods of learning have been seeing what colleagues are doing, taking part in team training sessions and practising with equipment personally owned or located in regular work areas.

## All ICT Test Bed institutions

### Uptake of ICT equipment depends on 'fit' with current practice and perceived needs

There is considerable evidence from the ICT Test Bed project that ICT equipment and systems become easily embedded in practice if there is a clear 'fit' between what they offer and perceived needs of teachers and leaders. When clear and easy fit is not evident, use is very unlikely to become established. However, good fit has the disadvantage that it encourages appropriation of the ICT equipment into current practice, so that changes that take full advantage of ICT will only happen slowly over time, and only if teachers continue to experiment with new approaches. Interactive whiteboards and visualisers/interactive slates are good examples of fit where many teachers and students embraced their use enthusiastically for whole-class teaching. The same applies to management information systems (MIS), especially in the three FE colleges which have a shifting student population and complex funding streams that necessitate meeting frequent demands for complex information from the Learning and Skills Council. In all three, MIS were upgraded with ICT Test Bed funding and are now being used very much more fully and effectively than previously. The same effect can be observed in the secondary schools, especially in one where the headteacher perceives the MIS to be of central importance.

### The impact of action research on staff development and embedding change

The cross-case analysis of the action research reports clearly shows an impressive depth and sophistication of understanding of how teachers can use ICT to change the nature of teaching and learning. The analysis suggests that in this second year, when many teachers undertook their second study, there have been identifiable changes in teacher and student classroom relationships and changes in routine practices. There is no suggestion that other teachers may not have made similar changes, but through these teachers' investment in action research their achievements and professional development have been documented.

## 6. Preliminary findings: Collaboration within and between cluster schools and colleges

### 6.1 Overall progress

Between 2002 and 2005 there has been a transformation in the electronic infrastructure linking schools and colleges within the clusters and in the use made by all staff of electronic communications within and between institutions. This is one way in which ICT Test Bed has ensured that educational provision in these three areas of socio-economic deprivation matches the best standards nationally.

Electronic links within schools and between ICT Test Bed schools and colleges were not well developed at the beginning of the project. When the evaluators began work in the spring of 2003, the email system in one of the clusters was not reliable and headteachers and project managers routinely used private email addresses in preference to their LA address. In the other two clusters, email links were fully functional in schools but were not the preferred means of communication for most members of staff. At that time email communications with all ICT Test Bed schools had very variable response rates and the evaluators often followed up emails with phone calls. In the summer of 2003 the great majority of schools and colleges chose to complete paper-based questionnaires rather than teachers and students responding online.

Across all ICT Test Bed institutions there has been a steady rise in the maturity of their in-house and inter-institutional links. Servers and networks are generally functioning well and their use, as appropriate, is well established for the majority of staff. Questionnaires are now routinely completed online by both staff and students. These are considerable achievements, involving changes to working practices at many levels.

### 6.2 Using ICT for collaborative working Primary schools

In all three clusters headteachers and primary staff have established close working relationships with each other and with the secondary and FE colleges. This collaboration has been assisted by electronic communications and often focused on staff development in the use of ICT and ICT-enhanced project work. Under the leadership of the headteachers, primary schools in one cluster have worked exceptionally closely together with clear benefits to staff morale and management efficiency.

Collectively, the primary schools are now all recording scores of three or above on Maturity Model 5 (internal linkage), indicating considerable progress. In real terms this suggests that staff now have easier access to information and formal records, and are able to share resources and expertise with colleagues in both their own school and other cluster schools.

Electronic links between the school and the LA are now well established in all ICT Test Bed primary schools. Data required by the LA or the DfES is routinely submitted electronically.

In the 2005 staff survey, primary teachers (73%) and support staff (71%) reported using ICT for joint planning of work. Collaboration in developing teaching materials for whole-class technologies and sharing of web-based resources are both now common among teachers and support staff in the primary schools.

Planning is now much more public and more corporate. In interviews, headteachers reported having easy access to lesson plans which are stored and collated in shared files on the school's server.

It looks unlikely, given the time taken to adapt and update teaching materials, that short-term planning time will be much reduced, but planning is certainly better and more detailed, often including samples of what pupils are expected to achieve. Medium and long-term plans are much easier to modify and bring up to date and this represents a growing saving of time and effort.



There has been some very interesting use of video conferencing during the third year of the project. (It was hardly used in years one and two because of 'innovation overload' with other ICT equipment.) Video conferencing has improved inter-school support mechanisms and the sharing of rare or particular expertise. For example, children in two primary schools held video-conferencing sessions with artists and story-tellers, followed up by a video conference between children in the two schools to share their responses. This was a completely new experience for the children and they responded very well to the sense of participating in a 'public' event.

Some primary schools are also seeking to use video conferences to link with other countries in order to develop citizenship. The schools in one cluster with a very low ethnic minority mix are also seeking to hold video conferences with other schools in order to ensure that multicultural issues are aired.

### Secondary schools

In all of the ICT Test Bed secondary schools, ICT enables planning to be much more public. Senior managers are able to keep staff informed during the management planning process and have better access to both short and medium-term planning at departmental or year group level.

Inter-departmental co-operation in secondary schools is much more variable and has proved unlikely to happen without leadership from the senior management team.

Most secondary schools have developed good email links and now have a culture in which staff utilise this means of communication readily and regularly. However, this is not universal: at least one ICT Test Bed secondary school still relies on paper communications which leads to delays in information transmission.

In one cluster the ICT Test Bed secondary school has given very strong leadership to the cluster as a whole. During the first year its headteacher chaired cluster meetings and took a lead in driving forward the planning process (the role of chair subsequently moved to a primary headteacher). A common network infrastructure has been developed in this cluster and, although sharing of some MIS facilities made the system too slow and had to be abandoned, work has continued to develop a shared VLE and make this accessible to children from their homes. Problems have been encountered (which will be discussed in the next section of this report) but this aspect of the cluster's work will be a particular focus of the evaluation in the final year of the project.

### Further education colleges

In FE colleges, tutors are often sole providers of a course which reduces the need to share teaching resources. In some ICT Test Bed course areas, however, there has been considerable sharing of skills and approaches to resource creation. In one college there is evidence of tutors from other course areas working in close proximity starting to use ICT for the first time as a result of seeing how it can be used.

In two clusters a corporate and co-ordinated approach has been taken to planning and resource creation/selection between ICT Test Bed schools with the support of the FE college, and this has been a useful lever for staff development. In one college, for example, a content development workshop has state-of-the-art IT equipment and is staffed by two content developers and a graphic designer. The aim is for teachers from the college and cluster schools to collaborate directly with e-learning developers, combining their knowledge of pedagogy and technology. The production of materials has proved time-consuming, however, and there is little evidence that much use has been made of them over time.

In another example, ICT has led to major savings in administrative time relating to setting up work placements in one of the colleges. The intention was to improve the operational communications with employers and partners working with the college's child care team (local schools, nurseries, elderly care homes, SureStart programmes, social services). Evidence from an action research study showed that in the first two terms there was a significant reduction in the administrative burden on the work placement officer and a significant cost saving in terms of telephone costs and employee time. The system required initial work to put it in place as some employers did not have an email facility, and some had email but their staff were not in the habit of checking it regularly. Significantly, some employers have now started to use email to contact the college.

The colleges have also started to use video conferencing more routinely. It is most valuable when there is real need. For example, in one college it was used for weekly teaching sessions with a class whose course tutor had emigrated to North America. The group was small (six) which helped to ensure good communications and email was used to follow up teaching sessions. Although this was an unusual situation, it provides an excellent example of the power of video conferencing to provide specialist teaching from a distance when no specialist teacher is available in the college.

## 7. Preliminary findings: Links with students' homes and the community

### 7.1 The vision of ICT in homes overcoming social disadvantage

#### All schools

This is the area of ICT Test Bed project work where progress has been slowest. In part, this reflects the complexities of putting home-school electronic links into place, and in part, the schools' natural inclination to focus energy initially on the embedding of ICT within all aspects of their own internal work.

Maturity modelling of the schools in the summer of 2005 showed that most institutions are working towards having websites that can at the very least be used to advertise the activities within the institution, that parental and community access to resources within the institutions is growing, and that while the use of electronic communication between the home and school is still in the emergent phase, some institutions are actively encouraging this form of communication.

The ICT Test Bed project set out to overcome disadvantage for children in areas of socio-economic deprivation. Prior to its launch there had been considerable interest among policy-makers in the possibility of overcoming social disadvantage by placing computers and appropriate electronic resources in students' homes (Hallgarten 2000; DfES 2002). The home-school links aspect of the project's work, therefore, had this as one of its aims.

At the outset of the ICT Test Bed project, in the autumn of 2002, two of the three clusters aimed to establish electronic links between schools and students' homes, and make both information and learning resources accessible by parents and students from homes. The third cluster, perhaps because of the poor infrastructure available in a rural area, decided to adopt a more piecemeal approach to using ICT for home-school links, for example, including purchasing laptops to be loaned to children to take home. At the end of six months, one of the clusters had established that the cost of placing computers in students' homes would be well beyond their budget. This cluster had three secondary schools and it was a useful lesson that costs of placing computers in homes are related to school size.

In the second cluster the roll-out of computers into homes was well organised and efficient and initially created considerable excitement from children and goodwill from parents. Considerable resources of time and money have also been put into the development of a VLE to be accessible from both schools and homes. However, substantial difficulties have been encountered in providing homes with connectivity and the VLE is not yet established as a fully functioning resource for teaching and learning.

ICT Test Bed primary schools already have well-developed communication strategies with their parents which may reduce the perceived need for the new system. Several ICT Test Bed primary schools in the other two clusters developed the use of classroom and/or school-wide servers and procedures for storing files and electronic resources which provided staff and students with some of the same facilities as a VLE at a much lower cost.

This is an area of work which will be a focus for evaluation during the final year of the ICT Test Bed project.

## Further education colleges

External ICT linkage is strongest in the three FE colleges which have traditionally worked closely with the community through work placements of their students. They all have websites that provide information about the college, its courses and activities, as well as facilities for students to access the VLE from outside the college and download resources. Evidence from VLE logs and interviews with system administrators and staff showed that, by the autumn of 2005, there was regular use of the VLE in more than half of the ICT Test Bed curriculum areas and it was well integrated into the course structure/materials. Students interviewed in the summer of 2005 were able to talk in detail about how they used the particular system in their college. However, students' use of the VLE from home is less frequent than in college. Colleges see establishing links with parents as irrelevant to their business as their students are in the post-compulsory sector.

## 7.2 Linking homes and schools with ICT

### Primary schools

There is a surprisingly high level of access to ICT outside school, given the socio-economic profiles of the cluster localities. In the 2005 student survey, 89% of Key Stage 2 children said they had home access to ICT, and at least 61% said they had home access to the internet. All but one or two of the children in a sample interviewed had their own computers at home. These had generally not been supplied by the school but had been bought by the children's parents. In one cluster there was still some enthusiasm for taking home laptops from school, even though they were internet-disabled because teachers were anxious both about the importing of viruses and the dangers of pupils getting onto undesirable websites while at home. Generally, pupils are not expected to complete homework by computer and most homework is still handwritten.

Maturity modelling in the summer of 2005 showed that most primary schools are working towards having a website that can at the very least be used to advertise its activities. The emphasis, therefore, is on one-way transfer of information from school to home rather than on interactive communications between students and teacher.

Home internet use was reported by Key Stage 2 children to be lower than at school, possibly influenced by issues of access and parents' concerns over internet safety. Interestingly, home use of all ICT applications was far less than school use for the special school Key Stage 2 pupils, as in the findings from 2004. There remained in 2005 a significant positive correlation between levels of home and school use for some applications in both the special and mainstream Key Stage 2 responses.

Many of the Key Stage 2 children interviewed said that their parents were computer literate –one described his father as a 'computer expert', another that his mum was a 'computer whiz' – and so it was evident that many of them were well supported at home. This was confirmed by the 2005 student survey in which 87% of Key Stage 2 children said that expert help was available at home. This is an increase from 74% in 2004 and 54% in 2003. For some children this help was readily available on a needs basis (61% compared to 53% last year), but for others the expert was usually too busy to help (26% compared to 21% last year). Only six per cent said that there was no one at home who could help (7% in 2004) and a further eight per cent (unchanged from 2004) said that there was no computer at home.

Some pupils did have frustrations in sharing access with other members of the family: one pupil complained in interview that he was unable to get on his home computer because his older brother constantly uses it for IT: *"He's got a strong B and he's trying to get an A, so he's always on it, so I don't get to go on it now."*

Most of the pupils interviewed used their computers at home regularly and were able to try out other aspects of ICT.

*"I've got a computer in my bedroom and I get to use it all the time and I like the CDs Microsoft Media."*

*"I go on the internet and then I go on games."*

*"I think the best thing on a computer is MSN."*

*"I write stories on mine, it isn't connected to the internet."*

The 2005 survey of students showed that help at school was unsurprisingly more readily available to Key Stage 2 special school pupils than to the main sample, while help at home was more readily available to the main sample. This reflected the marginally higher home ICT use by mainstream pupils compared to special needs pupils. Generally, Key Stage 2 students' perceptions of the help available to them at school and at home were more positive than in 2004.

In one cluster the children were enthusiastic about home computers supplied by ICT Test Bed but there was evidence of some disappointment with regard to connectivity and hence available resources: *"The school gave us like a computer, and then two years later they gave us the internet."* One child said: *"I always go on because we got a free CD with it, it's called Switch On, it's got all these games with it, I always go on that."* Another added that *"some parts of that CD don't work"* while other children said that they *"write stories or make pictures and bring them into school and show the teacher"*. At the time of the research, connectivity (described by one child as *"free for a year"*) had been or was planned to be made available to families of this age group (Year 5). In practice, there was disparity in that some already had home access to the internet and others still could not get online.

There was awareness by the pupils of security and safety issues. The children spoke about the need for logging on with passwords and being protected from inappropriate messages.

Some primary teachers have given children technologies such as talking books and digital cameras to take home to collect images and make tape recordings, and report that this has a very beneficial impact on increased parental participation in their children's learning. In the same cluster, the college has developed access courses for parents of nursery and primary children and this has acted as a stepping stone for drawing them back into formal education, with the likelihood of benefits for their children.

### Parents' perceptions<sup>6</sup>

The return rate for the survey of parents in 2005 was disappointing but around 540 completed questionnaires were received from parents of children attending primary schools (75%). The responses were drawn from parents across each of the primary year groups.

Parents appear to be very satisfied with the computing facilities available at school; 80% of respondents said they had visited the school and seen what is available.

The percentage of ICT Test Bed parents indicating that they have a computer at home has increased steadily over the three years from 79% in 2003, to 85% in 2004 and 92% in 2005. A large number (90%) of parents said they possessed either a desktop or laptop computer and a printer, and at least half of the homes also had internet access. Around half also had a games console. Technologies such as webcams were found less frequently. The location of the facilities in the home was split between public spaces (living room) and more private spaces (a bedroom). Interestingly, there was a definite trend for parents to make more use of computers in the living room, and for children to use computers in bedrooms. While this trend was apparent in 2003, it had become more apparent in 2004 due to the general increase in levels of computer use, and has remained so in 2005.

Parents reported a degree of monitoring of their child's use of the computer at home, with very few parents stating that they did no monitoring. There is an inverse relationship between monitoring and concern over home computer use. Those parents who have chosen to monitor, or be involved in their child's computer use, express few concerns over that computer use. It is the parents who do not monitor, possibly because they lack technical skills, who express concerns about possible negative impacts of technology on their children. There is clearly a need for support of these parents to allay their fears. For those parents that did express some degree of concern, their major worry was over the websites that children were browsing, followed by the amount of time that the children spent using a computer.

Parental knowledge of ICT was reported as mixed, although competency levels have increased this year. Self-reports showed competence varied from very ICT competent parents to those parents who had not used a computer before. Most of the latter said they felt it was important for them to learn. It is interesting to note that qualitative data from teacher interviews suggested that giving primary pupils laptops to take home has led to increased interest by parents in developing their ICT skills.

<sup>6</sup>These questionnaires were not issued to parents of students in FE.

The most frequent parental uses of computers either at home or in the workplace were reported to be word processing, surfing the internet and emailing. Cost and time were both cited as barriers to internet use. Many parents confirmed that they help their children with ICT; of these, a third said they supported their child in using a range of programs, but – with an interestingly different approach – a third said they encouraged their child to work independently. Making internet access cheaper or free would encourage more parents to use the internet more often, but time is also a major factor.

Parents reported that schools mainly communicated with them by sending letters home with pupils, and that the alternative to this was normally telephoning. Emailing and providing access to progress reports on the web were the least used options, though both of these showed some increase from levels recorded in 2004. However, parents overall seemed satisfied by the schools' efforts to keep them informed.

### Secondary schools

The 2005 questionnaire survey showed a big increase in home internet use by secondary students compared with 2003 (48% reported daily internet use from home in 2005, compared to 37% in 2003). Some 90% of students have access to a computer at home, but 62% reported not having facilities to access their work at school from home. Only 21% reported being able to access their school email from home, although this had increased from 6% in 2003.

Support from school for ICT use in the home remained low although there had been some improvements compared with 2003 and 2004. The majority of students reported not being able to use school software at home (65% compared to 73% in 2003), not having ICT provision for use in the home (71% compared to 80% in 2003), and not being able to access the school network from home to download work completed at school (62% compared to 74% in 2003). The story was more positive for provision of access to their school emails from home (55% compared to 32% in 2003) and access to the school website from home (77% compared to 52% in 2003).

In interviews in one cluster, secondary students said they were pleased to have received a home ICT Test Bed computer but were frustrated that connectivity had been so heavily delayed (*"like a year"; "they have taken so long"*) with the consequence that those without a home ISP were unable to "link it up with the school". Disparities in internet access were evident across the secondary groups in one cluster. One student commented: *"I have one of my own and the school's, and when I want to go on the internet I use my Dad's and every time I just want to do work I use my own."* Another uses the internet to revise (Bitesize). The students also saw a potential benefit of connectivity as being able to access web information for research in subjects across the curriculum, and that this was *"really boring before"* (that is, when it had to be done with books).

In the 2005 student survey few secondary students, across all three clusters, reported that schools provide support for ICT in the home environment. Outside access, from the home and other environments such as the public library, to institutional websites was the one facility available to students but they reported that this often related to general information rather than curriculum materials. As with primary schools, the links appear to be one way, passing information from school to home, rather than two-way and interactive.

As with primary students, an encouraging finding in 2005 was that secondary students reported an increased level of help at home in using computers. In 2004, the majority of secondary students reported that there was someone who could help at home, but that they were usually busy; in 2005 the most frequent response was that there was usually someone who could help at home, with substantial decreases in those reporting that no help was available to them.

Secondary students reported that the main barriers to ICT use at home were the cost of computer hardware and software as well as internet access. Time constraints and the students' own computer skills were lesser concerns. In general, secondary students reported fewer problems with barriers to ICT use than FE students.

## All schools

There is evidence that, despite considerable expenditure on placing computers in homes in two of the clusters and a high level of motivation on the part of many teachers and school leaders, interactive links between home and school have not been achieved. However, at the end of the third year of the project, it is beginning to appear that an endeavour of this kind may be beyond the capacity of schools. The vision is a good one, which clearly has the potential to provide students in areas of socio-economic disadvantage with a powerful educational resource, but it seems likely that the lesson learnt from the ICT Test Bed project is that another way needs to be found to put this into place. The barriers are high and beyond the control of schools:

- Purchasing and distributing computers into homes is a major undertaking which imposes an impossible workload on teachers or school administrative staff alongside a full-time job.
- Providing technical support in the home and the recall/redistribution of machines when families move out of the area is a heavy additional workload for schools.
- The costs of connectivity for every home are high and cannot be borne by schools.
- There may not be adequate network infrastructure available to make home connections possible, if the locality has been judged by commercial providers as unlikely to provide a commercially viable market.
- Many homes will not have telephone landlines because many families now rely on mobile telephones, and there are likely to be technical problems in connecting some homes by telephone and others by cable.
- The costs for schools of licences for software to use on home computers are unacceptably high.

## Further education colleges

The 2005 ICT Test Bed student survey showed that use of the internet at home and college was the dominant application for FE students, followed by use of email. At college, 31% recorded daily internet use and 20% daily email use. At home, 55% recorded daily internet use and 52% daily email use. Overall, FE students reported an increase in use of ICT at home compared with 2004. This was confirmed in interviews in which most, but not all, of the sample had computers at home and were regular users of the internet in their leisure activities. However, access could be a problem: one student commented that although she had a computer at home, she couldn't get on the computer *"because of her children"*. Students reported that they used their home computers for email and leisure activities but also to help with their courses. Several students said they didn't have some of the specialist software they needed at college so did their work at home where they had the software.

In survey responses, as with secondary students, significant relationships were found between use of applications at home and at college, with the exception of the use of email where no relationship was found between home and college use. The figures for daily email use at home and at college were 55% and 20% respectively. There seem to be a number of reasons for this, for example, the college not providing students with a college email address and barring access to other email systems such as Hotmail, as well discouraging the use of email in learning support centres.

Interestingly, students indicated both a decrease in use of ICT at college (by 13% from 38% in the second year to 25% in the third year) and an increase in daily use of ICT at home to 56%. This may indicate a trend towards a different pattern of use. For example, it may be that now they are able to access materials on the VLE from home, some students prefer that option to accessing them in college. Use of computers in a public library has altered very little from previous years.

In terms of receiving college help to use ICT in the home environment, the majority of ICT Test Bed students reported not being able to use college software at home (73%), not having ICT equipment such as laptop computers for use in the home (82%), and not being able to access their college emails from home (55%). This reflects interview data from staff and students as colleges are not providing students with laptops and cannot afford the software licences for installation on home computers.

In interviews, however, increasing numbers of students said they were using their home computers to access learning materials from the college using the VLE or websites created by their tutors. *“Having stuff on the VLE is helpful. We can revise for tests. If we miss a class, we can get the notes easily. There are videos of class demonstrations.”* Some tutors have created assessments for the students to do on the VLE. Students said they liked these as it helped them revise by giving them an idea of how much they knew and what they still had to learn.

In the 2005 survey, 63% of ICT Test Bed students indicated that they could access the college website from home, an increase of 11% from 2004, and this appears to reflect the increased use in VLEs reported in interviews and student logs. However, 75% reported not being able to access college computers and copy files to their home computer electronically which appears to contradict this interpretation.

It was clear in interviews that the ability to access materials from outside college has helped specific groups of students such as NVQ plumbing students who are mainly self-employed and sometimes cannot get into college if they have a job to do. Another student had a long stay in hospital but was able to continue with her course by accessing the course materials from the hospital.

To realise these gains, learners are not only being expected to learn new ICT skills but are being asked to work in different ways. Many students have a traditional view of education and may find it difficult to interact effectively with resources like a VLE. In general, though, students are appreciative of being able to access their course materials online. They now have the opportunity to take more responsibility for their own learning and even to take control of the learning. On the other hand, a VLE can be merely a way of presenting documents; the tutor controls what is there and when the learners can access it. Learners then have little or no additional responsibility for their learning and may even have less independence than with traditional methods.

A very small minority expressed a general reluctance to use ICT and these tended to be more mature students, female students and students for whom English is not their mother tongue. More mature learners have generally used ICT less than younger learners, and language problems can make using ICT more difficult for some learners.

In the 2005 student survey, the main barriers to ICT use at home for FE students, like secondary students, were costs of computer hardware and software as well as internet access. FE students generally felt there were more barriers to internet use at home than secondary students, for example, 57% said that lack of time was a problem and 47% felt that they lacked adequate computer skills. However, it was encouraging that 53% of FE students said there was usually someone available who could help them at home, compared to around 33% in 2004.

## 8. Preliminary findings: Technological functionality and maturity

### 8.1 Technological maturity

Technology itself is integral to all the work of the ICT Test Bed project and hence is not one of its specified themes. However, because of its central role, the evaluation has monitored the development of technological maturity, in the schools and colleges, as a sixth strand.

On average the ICT Test Bed institutions are now judged to be at level 4, which is approaching the highest level of maturity expected by the panel of experts who helped to develop the model. This reflects not only the levels of equipment but also the extent to which they are fully embedded. There is, inevitably, some unevenness between individual schools and colleges, but overall progress has been excellent. It should be noted, however, that the level of maturity of ICT links between institutions and homes and/or the community is lower.

Investment in technology was greatest in the first year of the project and this was reflected in very rapid gains in maturity between 2002 and 2003 across all the institutions, but particularly in nursery and primary schools. Gains have been more evenly spread over the three years in the secondary schools and FE colleges.

Most of the equipment has now been in place for at least three years and planning for sustainability is a big issue. The three FE colleges have policies for upgrading ICT equipment on a regular basis and in most cases the ICT Test Bed equipment is seen as an addition to stock and included in the upgrading cycles. The updating of equipment is much more of a challenge for primary schools for whom the ICT Test Bed funding was well beyond what they could normally expect to maintain. Secondary schools are also facing a major challenge as equipment begins to wear out or become outdated. However, during the life of the project many other schools have acquired similar high levels of equipment and expectations have risen generally across the education system. How the schools and colleges deal with issues of sustainability will be a focus for the evaluation during the final year of the ICT Test Bed project.

### 8.2 Satisfaction with hardware and applications and value for money

#### Primary schools

Interviews with ICT, literacy and numeracy co-ordinators in primary schools during the spring of 2005 suggested that almost all the investment in hardware has been justified.

Interactive whiteboards or visualisers are in daily use with computers and data projectors in all primary classrooms and on the whole have functioned well and fulfilled expectations. They are generally easy to use.

The use of electronic slates or tablets for control of the laptop managing the display on large screens is patchy and variable. This is one of the pieces of equipment which has not proved technically robust, but it also seems that teachers and pupils can work very interactively with computers, large screens and visualisers alone; it should not be assumed that these technologies are less valuable than an interactive whiteboard if they are not used in conjunction with an electronic slate.



There is a general appreciation that the use of computers for lesson planning and display means that the amount of photocopying has notably decreased.

There is strong evidence of regular and effective use of sets of laptops, stored in movable trolleys, by pupils in the upper Key Stage 2 classes, and of frequent group use of desktop machines in other classes in ICT Test Bed primary schools. Some laptops have been allocated to Key Stage 2 students over a long period of time and have functioned well with almost no damage resulting from transporting them between school and home. By the third year of use, however, batteries were no longer maintaining their charge reliably, leading to frustration on occasions when work was lost.

Laptops purchased for teachers have not always been sufficiently powerful and, where this is the case, the incentive to take them home is reduced. Support staff tend to feel less need to take laptops home. Memory sticks have proved extremely useful for transferring work between home and school and are very popular because of their light weight and portability. They are widely used by both teachers and support staff.

Electronic voting equipment, which allows pupils to record their responses to questions, is either very popular with teachers (and pupils), and hence found to be very valuable, or is thought to be rather trivial and not worth the effort, but this appears to relate to teachers' pedagogic style rather than to the functionality of the system. It generally works well.

Digital cameras and video cameras are loaned to Key Stage 1 pupils on a rota basis to take home and to bring back images for discussion. They are easy to use and highly motivating for pupils. They have proved easy to transport and are robust.

## Secondary schools

Interviews with heads of department in secondary schools confirmed that much of the ICT hardware purchased by the project had met expectations. Faults in equipment probably arose from the timetable which necessitates short teaching periods, frequent student movement and multiple changes in users of any single piece of equipment each day. Nevertheless, given the system as it is, there are lessons to be learnt for other schools making similar high levels of investment in ICT.

Equipment which is permanently installed or which is common to all classrooms, such as the interactive whiteboards or large screens with visualisers, has been most effectively embedded and had the most impact on students' learning.

Whole-class display equipment is noted as facilitating activities that could not otherwise be easily replicated such as:

- interactive simulations
- demonstration of features in spreadsheets
- presentation of intricate diagrams such as maps or spreadsheets
- sharing of an artefact such as a motherboard or digital microscope with the class using the visualiser (zooming in on tiny details)
- sharing involvement in computer-controlled laser cutters, sewing machines and 'cooking tunnels' which speed up processes.

Not all wireless networks were adequate when first installed, as they were still at a relatively early stage in development when the ICT Test Bed project started work. They have since been upgraded and now have greatly improved functionality. Key issues which the colleges have needed to address have included the number and location of user access points and the wireless standards of the system.

Class sets of laptops have generally only been found valuable in secondary schools when they were departmentally owned so that teachers could be sure of their availability and reliability. However, even in these circumstances, the time taken to distribute them and for students to log on has made them much less useful than in primary schools. Passing equipment from one student to another several times during the day, necessitating frequent log-ins, is reported to be inherently problematic, particularly in leading to confusion over passwords. The effective use of laptops is also utterly dependent on adequate wireless networking. Whereas staggered log-ins is possible in primary schools and FE colleges, in secondary schools all students need to log on at the same time to make full use of a short teaching period. In areas of school buildings where wireless networks were inadequate, both teachers and students quickly lost interest in using laptops. As laptops have aged it has become increasingly difficult to maintain the charge in their batteries and this has become a serious problem in some schools, particularly when they are shared between multiple users.

Peripheral equipment proved to vary in its value:

- Memory sticks were seen as extremely valuable by both teachers and students.
- Electronic voting systems are easy to use and highly valued by some teachers, although not all.
- Interactive slates proved difficult to use, partly because they are not robust and partly because, like laptops, they do not respond well to being passed frequently between multiple users.
- Video conferencing appears to be functioning well, but only began to be used in the third year of the project when teachers had established competence and confidence with other equipment and felt ready for something perceived as more peripheral to students' needs.
- Specialist equipment which is very subject related has generally functioned well.
- Although systems are generally becoming more robust, staff are still finding technical reliability and network reliability to be an issue. (It has taken time to recover from early problems with wireless networks, as outlined above.)

Important successes:

- Good technical support services were the key to a successful institutional system.
- As with primary teachers, laptops for staff are well appreciated and almost universally used, provided their specification is right for the user.
- Provision of remote access to the school intranet or VLE is highly valued by secondary teachers where this is made available.

### **Further education colleges**

Interviews with course leaders confirmed that by the spring of 2005 all three ICT Test Bed colleges had much improved hardware resources both for staff and student use. The interactive whiteboard was recognised as a major innovation which generally functioned well.

As in secondary schools, not all wireless networks were adequate when first installed. They have since been upgraded and now have greatly improved functionality. The number and location of user access points and the wireless standards of the system are critical to good connectivity.

Banks of laptops, installed on trolleys for easy movement between rooms, did not always function well in the first year because of poor functionality of wireless networks. This has to be understood as an inevitable consequence of introducing very widespread use of a technology that was still not well established in 2003. In all the colleges these problems have now been largely solved by upgrading the wireless network and developing the practice of staggered log-ins which are feasible within the longer teaching periods which are normal in FE colleges. Initially, some laptops did not have the right specification to function adequately with wireless networks and it has only been possible to overcome this problem partially, pending upgrading of the equipment at some stage in the future. By the third year of the project laptop batteries were beginning to be unreliable in holding their charge, causing considerable frustration for students.

Nearly all staff in ICT Test Bed areas have laptops for their personal use, although these are now two years old and some staff are having problems with reliability, with outdated network cards and with running new software applications.

The power and functionality of the MIS has been considerably improved in all three ICT Test Bed colleges, bringing them into line with best practice in the sector.

ICT Test Bed has enabled all three colleges to make considerable progress with establishing and embedding the use of a VLE. In two colleges, the VLE that was in use at the start of the project, although initially upgraded with ICT Test Bed funding, was found inadequate for needs and has been abandoned. In both cases, these have been replaced with an open source system, with the result that losses have been mainly in staff time and motivation rather than additional expenditure.

It is important to note that use of VLEs has been much more successful in the FE colleges than in the secondary schools in ICT Test Bed. This seems to be largely related to the longer tradition of VLE use in FE, resulting from a strong policy drive for more online courses and e-learning dating back to 2000, and major spending on the establishment of online resources. By comparison, schools have seen online materials as a resource to be used mainly in the school within National Curriculum courses, and this has not provided the same need to establish a VLE. All three ICT Test Bed colleges already had VLEs in place, although not functioning well, when the project started in the spring of 2003, whereas this was not the case in any of the secondary schools. Hence, the greater success results from greater maturity of the innovation and a better fit with the colleges' core business.

### 8.3 Technical support

Teachers and support staff have become much more confident with technology and are able to deal with minor technical failures.

However, institution-wide system failure has a devastating impact when it occurs in ICT-rich schools and colleges because teaching and learning are much more ICT-dependent.

Therefore, in all the ICT Test Bed schools and colleges, good technical support, available in-house to provide rapid help when system failure occurs, has proved to be essential and would appear to have been implemented in all the institutions.

When classroom ICT use is dependent on the institution's intranet, teachers' control is reduced, but the trade-off is well worth it for the increased access to resources. One problem is lack of flexibility to install new software quickly because it is going onto a network rather than stand-alone workstations. It is not unusual for system-wide innovation to cause an initial disruption to networked services while incompatibilities and interferences are sorted out; sometimes the need to guard against this happening when technicians are already working under pressure leads to a delay in installing new software as quickly as individual teachers might like. Once again, the key to maximising the benefits of an ICT-enhanced school or college lies in a sufficiency of good technical support.

## Appendix 1

This section of the report presents two successful models of leadership and management to maximise the effective use of high levels of investment in ICT. Other colleges might like to adopt and customise one or other of these models to their own needs and traditions. The key message here is that no one model is generalisable across all colleges; but much can be learnt from the experience of these two ICT Test Bed institutions.

In Table 5, the two models have been given 'key descriptor' labels used by the ICT Test Bed managers in interview, and further explained below. Each of the approaches is more complex than may at first be apparent, but the power of any model is in simplification of complexity to enable clarity of analysis. The subsequent sections of the report fill out the detail of the work through description and analysis of particular aspects.

	College A	College B
Key descriptor	The 'franchise' model	The 'empowerment' model
Size and location	Large, single campus, inner city	Small, single campus, rural
Catchment	Culturally diverse, dominated by white working class families	Mono-ethnic, high proportion of unemployed adults with low levels of education
College leadership when ICT Test Bed began	Stable and established	Stable and established
Project manager	Experienced project manager employed specially for the job	Experienced member of the senior management team given the role
Stability of project manager	Change of project manager after one year – a second experienced project manager employed for the job	Stable throughout
Stability of staffing	Stable, with a fair balance of full-time and part-time staff	Stable, with few part-timers, but some vacant posts due to skill shortages
Relative importance of ICT Test Bed in the college	Used as a key initiative to upgrade ICT systems and establish shared ICT resources	Used as a key initiative for curriculum renewal and staff development
Leadership style	Oversight of 'a programme of networked projects'. Liaising with curriculum teams, with good access to senior managers. Developing strategies to deal with problems as/when they occur.	Hands-on leadership with ownership of decision-making devolved. Strong interpersonal links with staff at all levels. The small size of the college is a factor enabling this.
Project manager's access to staff	Difficult to set up meetings with staff	Easy to set up meetings with staff
ICT Test Bed committees and their function group	The ICT Test Bed committee has been merged with the ILCT strategic group to become the college's main ICT steering group	The ICT Test Bed group (subgroup of the ILT committee), representative of all college groups, meets regularly
Provision of technical support	Technical support provided by existing IT service. Made possible because ICT Test Bed funded an upgrade to the system, making it more reliable which reduced the demand for technical support.	The special needs of the ICT Test Bed project catered for by additional staffing and integration with existing services. Support reported by staff to be 'fabulous'.

	College A	College B
Strategies adopted for staff development	(1) In year one, formal training for specific technologies from internal and external providers.	(1) In year one, training programme over a term for staff across cluster (with options).
	(2) Extensive in-house training in basic IT skills, interactive whiteboards and the VLE.	(2) ICT Test Bed staff asked to provide sessions in college's annual training days.
	(3) Training weeks twice a year contain ICT Test Bed events.	(3) In year three, ICT Test Bed staff provide training for other staff and act as mentors to other course teams.
	(4) ICT Test Bed staff now train other staff.	
	(5) Project manager found a more person-centred approach needed than in commercial organisations. Need to find ways of involving staff in planning and change.	
Working relationship with the cluster of schools and LA	Agreed with LA Test Bed manager and heads of schools to host content development workshop at college. Ongoing activity in support of schools.	Active leadership; regular contacts with headteachers and LA Test Bed manager; college provision of CPD and technical support to cluster.

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Millburn Hill Road  
Science Park  
Coventry  
CV4 7JJ  
Tel: 024 7641 6994  
Fax: 024 7641 1418

Email: [research@becta.org.uk](mailto:research@becta.org.uk)  
URL: <http://www.becta.org.uk>