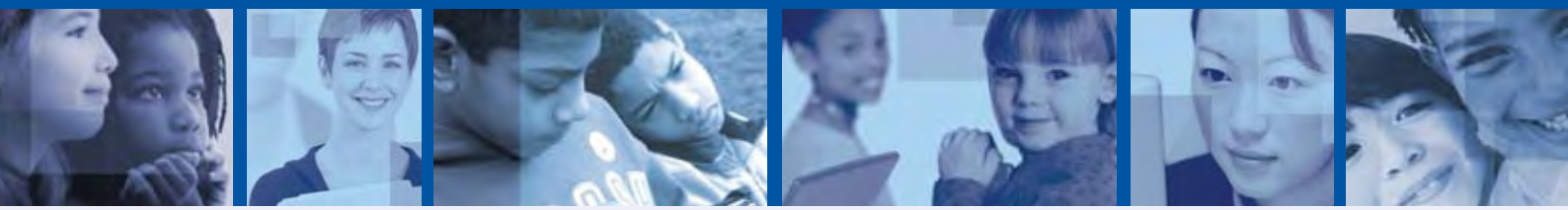
Evaluation

Evaluation of the ICT Test Bed project

FINAL REPORT
JUNE 2007

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,
Janis Jarvis
Cathy Lewin
Diane Mavers
Diane Saxon
Sue Sing
Stephen Steadman
Peter Twining
Derek Woodrow

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

Division of Psychology,
Nottingham Trent University

Becta

1. Introduction

Purposes of the report

This is the final report of the Evaluation of the ICT Test Bed project. It provides key evidence for policy-makers on the impact of providing very high levels of ICT to schools and FE colleges on: teaching and learning; leadership and management; workforce development; cross-cluster relationships; and home and community links.

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 focused on specific activities and tentative targets, but the outcomes of the 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 relative socio-economic disadvantage.

The ICT Test Bed project

The ICT Test Bed project (2002-06) was initiated 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 took a holistic approach to ICT implementation in three ICT Test Bed areas of relative socio-economic deprivation. A total of £34 million was invested over four years, which gave the 28 ICT Test Bed schools and three FE colleges access to very high levels of ICT hardware and appropriate software. The funding also provided for investment in staffing release and training support to make the most effective use of this investment. ICT Test Bed work 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.

All three ICT Test Bed local authorities have high concentrations of deprivation compared to the national average, though manifest in different ways *(see Technical Report 25: Cluster Contextual Data)*.

The three school clusters had slightly different compositions. The Greater London cluster comprised three secondary schools, each with one of their junior and infant feeder schools. The inner-city cluster in the Midlands comprised a secondary school with seven of its feeder primary schools. The rural cluster in the North of England comprised a secondary school with nine of its feeder primary schools.

The management structures for the clusters were set up by the local authorities. The style and structures of management set up in the three clusters were very different, in each case suiting the local authority's established patterns of relationships with its schools.

It was important that the project was mounted quickly to provide ample time to recognise the consequences in teaching and learning, so procurement of equipment was rapid. All the schools invested in presentational equipment from the start and wireless networks were installed or upgraded. One critical decision was to employ technicians to support the infrastructure and both the local authorities and schools appointed a co-ordinator with significant release time to support colleagues.

Three kinds of evidence

The report is based on three strands of evaluation:

Quantitative data:

- Benchmarking of changes in performance on national tests against matched comparator schools and national averages.
- Modelling of e-maturity to track institutional change over four years.
- Annual surveys of teacher, pupil and parent attitudes and working practices.

Qualitative data:

Site visits including classroom observations, interviews with local authority managers, headteachers, teachers, administrative staff, technicians and students, and document analysis.

Action research data:

During the project, more than 90 teachers and para-professionals from the ICT Test Bed project institutions completed 116 action research studies of their innovative work with ICT.

The final summative evaluation reports of all three strands, together with a number of more detailed evaluation reports from the four years of the project listed in Appendix A, are available on the ICT Test Bed Evaluation website [**www.evaluation.icttestbed.org.uk**].

2. Key findings

Learning and teaching

As technology was embedded, schools' national test outcomes improved beyond expectations.

The impact of ICT on attainment levels was greater for primary schools than for secondary schools.

Effective use of presentation technologies led to greater interaction between teachers and learners.

Effective use of ICT personalised learning by enabling greater learner choice within the curriculum, improved assessment for learning and more learner-directed teaching.

Technology facilitated more effective assessment for learning by making it easier for learners to be more involved in target-setting and for teachers to give individualised feedback.

The use of electronic registration improved attendance levels in some schools by three to four per cent, while behaviour management systems were perceived to have a positive impact on both behaviour and attendance, prerequisites for effective learning.

To enable learners to get the maximum learning benefit from using the internet, internet protocols that safeguarded learners' welfare without being overly prohibitive were required.

Some changes to teaching and learning strategies were inhibited by tensions between the priorities of different government policies and agencies with regard to ICT.

Leadership and management

Institutions that were more e-mature improved their performance levels significantly more quickly than those which were not. However, there was a dip in performance until the ICT became embedded and staff developed the requisite skills.

Managing the implementation of large amounts of ICT required a strong vision, an extended planning phase, staged investment and support throughout.

Schools needed to build sustainability – of both resources and pedagogic change – into their change management strategies from the start.

Ready access to databases, which enable better analysis of data, made assessment and planning more systematic. However, there was a need to ensure that the amount of analysis required was not over-burdensome.

Management information systems (MIS) enabled leaders to better identify the particular needs of their school community through improved data analysis.

Workforce development

The involvement of ICT changed the working practices of teachers and extended the roles of administrative staff and technicians.

Well co-ordinated and sustained professional development opportunities were important in developing ICT skills and confidence of all staff and embedding the use of ICT. Informal, on-the-job training was very effective when supported by in-school champions.

Where new technologies were introduced into all of a school's classrooms at the same time, a culture of sharing and mutual support developed as the whole staff faced the task of embedding the technology into their pedagogy. Collective need led to collective solutions being found and shared.

Access to reliable technology and daily use led to rapid improvements in teachers' skills and improved management of workloads.

Shared server areas and virtual learning environments made it easier for teachers to find, store, share, create and reuse resources and lesson plans. This ensured long-term value from the initial high investment by the workforce.

Cross-institution links

Effective cross-institution collaboration required a common purpose and leadership from the top. Plenty of time for staff to meet and establish trust needed to be built into the process, with roles and responsibilities clearly identified. This was especially important in the cross-sectoral collaboration.

Home and community links

The majority of students in ICT Test Bed schools, as in other schools, now have access to computers at home. Loaning ICT equipment to learners helps to bridge the digital divide.

ICT made it much easier to share assessment information with parents via school websites or learning platforms.

Schools slowly increased their use of email – and, in some cases, text messages – to communicate with parents, enabling them to respond to parental enquiries more rapidly. However, establishing a two-way dialogue with parents was more challenging.

Increasing home access to ICT and the internet was operationally difficult for schools. It was very time-consuming and required careful planning.

3. Learning and teaching

Once technology was embedded, schools' and colleges' national test outcomes improved beyond expectation.

All graphs in this section show statistically significant differences in rates of change in performance.

At Key Stage 1

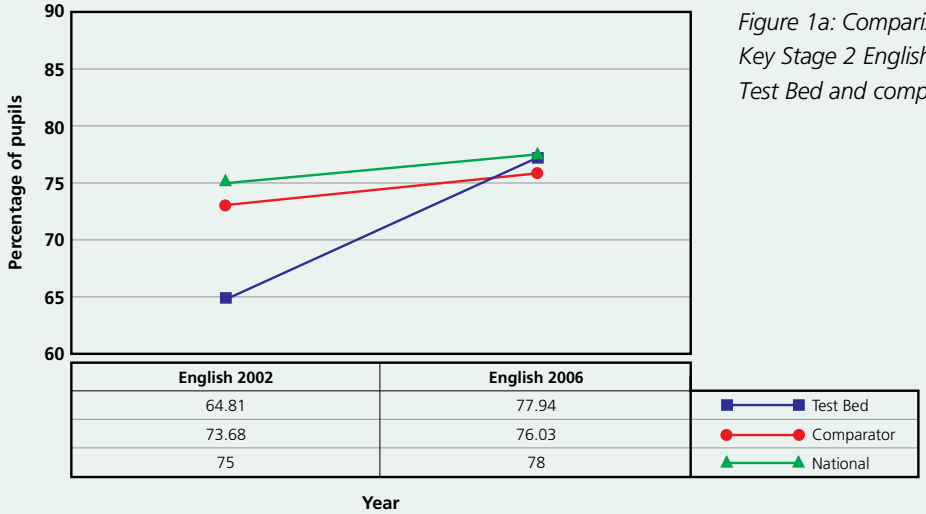
Whether a school was a Test Bed school or a matched comparator was not found to be a predictor of performance. Performance on the Key Stage 1 reading test shows growth at the national average, with all schools, including the Test Bed schools, performing significantly better for Key Stage 1 reading in 2006 in comparison to 2003. However, comparisons between the Test Bed and comparator schools revealed no significant differences for any of the tests, indicating that, at Key Stage 1, Test Bed and comparator schools were performing in a similar manner. Although not statistically significant, in 2006 both the Test Bed and comparator schools demonstrated a decline in performance from the start of the project – in line with the national trend – for the mathematics test and for average point scores (APS) per institution.

At Key Stage 2

At the start of the Test Bed project in 2002, the Test Bed primary schools were performing less well than matched comparator schools on a range of key performance measures: Key Stage 2 English, mathematics, science and the APS per institution. They were also underperforming compared to the national average on all of the four measures, with English and mathematics being of particular concern.

While collectively the Test Bed and comparator schools have shown improvements in English between 2002 and 2006, the rate of improvement for Test Bed schools was higher than for the comparator schools; indeed, the Test Bed schools outperformed the comparators in 2006 (Figure 1a). Of critical significance is the fact that the Test Bed schools are now at or above the national average (78 per cent) for English.

Key Stage 2 English 2002-2006

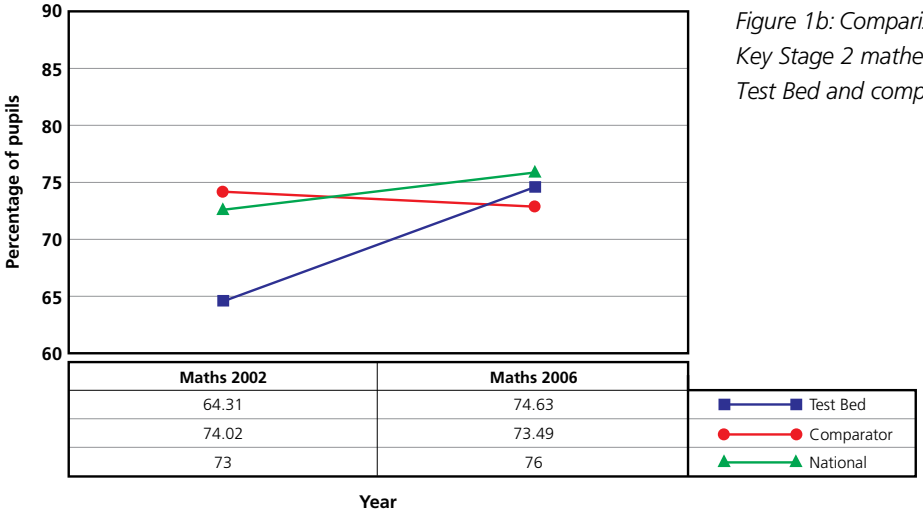


English 2002	English 2006
64.81	77.94
73.68	76.03
75	78

Figure 1a: Comparison of performance on Key Stage 2 English – national average, Test Bed and comparator schools 2002-06

Comparator schools made little or no progress in the Key Stage 2 mathematics tests or in overall APS per school over the four years of the project (Figures 1b and 1c). However, Test Bed schools did record improvements and these were particularly strong in mathematics. On both Key Stage 2 and APS scores, the Test Bed schools turned from being underperforming schools to matching or bettering the national average (mathematics national average 2006: 76 per cent; APS: 27.5).

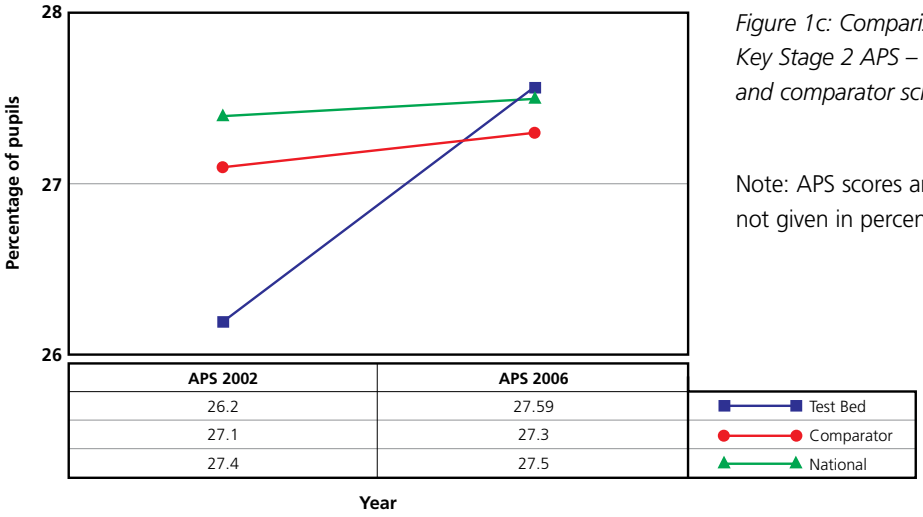
Key Stage 2 Mathematics 2002-2006



Maths 2002	Maths 2006
64.31	74.63
74.02	73.49
73	76

Figure 1b: Comparison of performance on Key Stage 2 mathematics – national average, Test Bed and comparator schools 2002-06

Key Stage 2 Average Point Score 2002-2006



APS 2002	APS 2006
26.2	27.59
27.1	27.3
27.4	27.5

Figure 1c: Comparison of performance on Key Stage 2 APS – national average, Test Bed and comparator schools 2002-06

Note: APS scores are, by definition, not given in percentages

The final Key Stage 2 measure investigated was that of science. Nationally, there was a one per cent decline in science scores between 2002 and 2006. The comparator schools also showed a decline in performance but this was more pronounced than the national figures.

The Test Bed schools, on the other hand, showed improved performance in science over the lifetime of the project; from a very poor base, they are now performing at the 2006 national average of 85 per cent (Figure 1d).

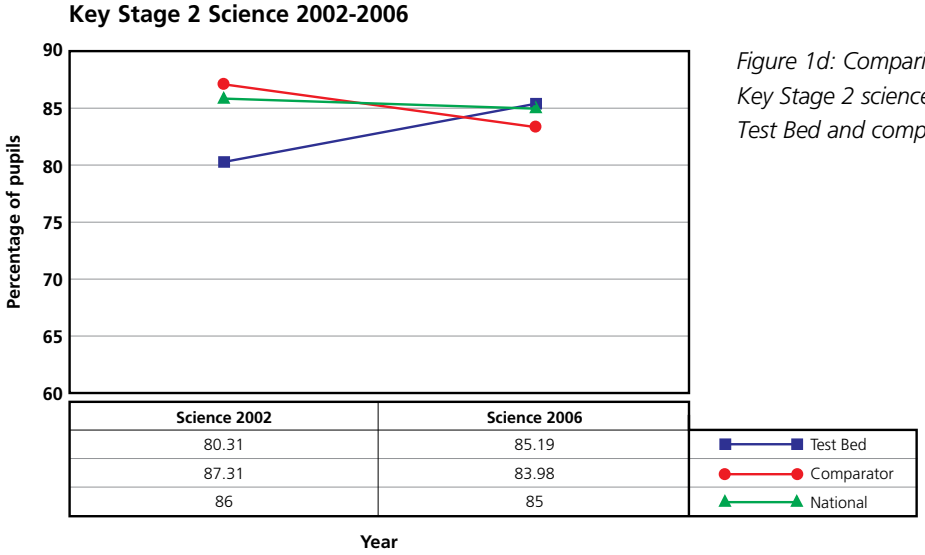


Figure 1d: Comparison of performance on Key Stage 2 science – national average, Test Bed and comparator schools 2002-06

In summary, at Key Stage 2 there is clear evidence of differential performance gains by the Test Bed schools compared to comparator schools. As the project reaches its conclusion, the Test Bed schools are now performing at or above the national average.

In two schools which were the focus of a particular qualitative study, the Key Stage 2 boys have been much more highly motivated to take pride in their writing and expend effort on it than when they worked solely with books. As a result, boys' achievement levels in writing have greatly improved: in 2006, five boys out of nine exceeded expectations and the contextual value added (CVA) score for boys was 100.0, compared with 99.1 in 2004 and 99.3 in 2005. CVA scores for girls over the same period were 100.2 in 2004, 100.4 in 2005 and 100.5 in 2006, so the rate of improvement for boys was greater than for girls – an extremely important gain in relation to national trends.

At Key Stage 3

In contrast to the Key Stage 2 data, no significant differences were found at Key Stage 3 between the performance of the Test Bed and comparator schools for any year of the project. Performance at Key Stage 3 was not mediated by school involvement in the Test Bed project.

At GCSE

Both the Test Bed and comparator schools made significant gains in APS between 2003 and 2005, but there was a plateauing of achievement in Year Four. There was no difference between the Test Bed and comparator schools on rate of change in APS scores between 2002 and 2006.

In 2006, there were differences highlighted between Test Bed and comparator schools for the proportion of students achieving five or more A*-C grades (including English and mathematics). Significantly more Test Bed pupils (mean = 38.80 per cent) achieved five or more A*-C grades (including English and mathematics) in Test Bed schools than in comparator schools (Figure 2a). Given that this is a new measure of attainment introduced in 2006, it is interesting to note that the Test Bed schools are performing well on the traditional subjects as well as on the newer applied subjects.

GCSE Grades A*-C (including English and mathematics) 2006

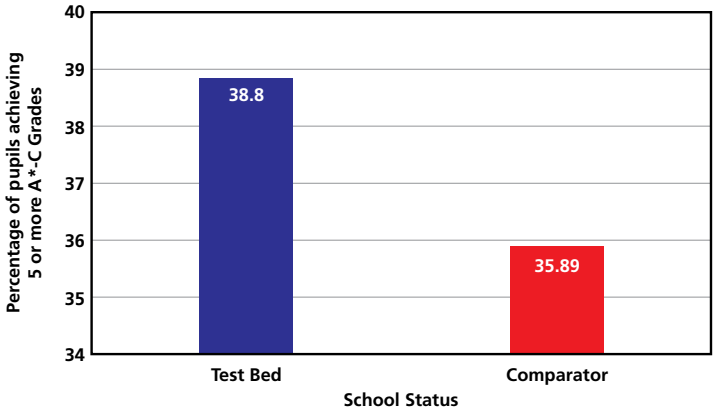
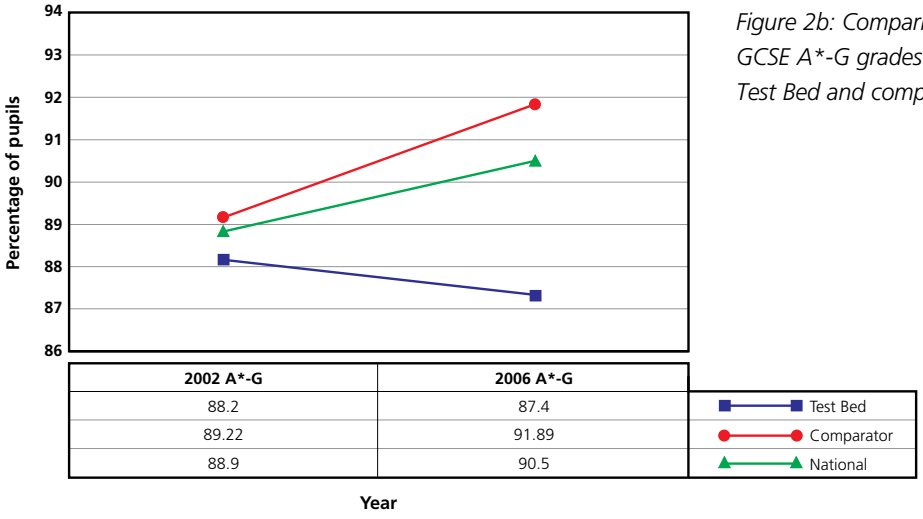


Figure 2a: Comparison of proportion of GCSE students gaining five or more A-C grades (including English and mathematics) 2006*

Differences between the Test Bed and comparator schools were also found for the number of students achieving five or more A*-G grades, with comparator schools scoring significantly higher in 2006 than Test Bed schools (mean = 87 per cent Test Bed and 92 per cent comparator) (Figure 2b).

GCSE Grades A*-G 2002-2006



2002 A*-G	2006 A*-G
88.2	87.4
89.22	91.89
88.9	90.5

Figure 2b: Comparison of performance on GCSE A-G grades – national average, Test Bed and comparator schools 2002-06*

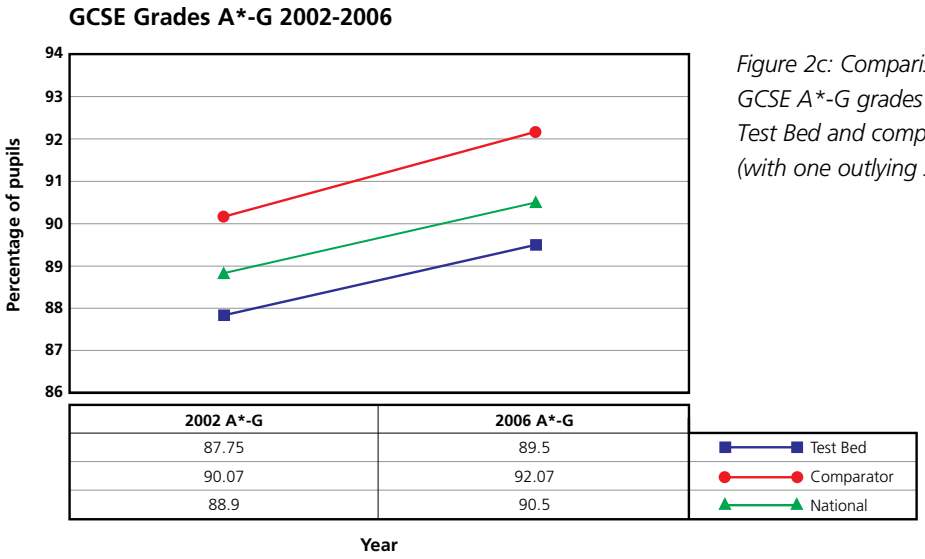


Figure 2c: Comparison of performance on GCSE A-G grades – national average, Test Bed and comparator schools 2002-06 (with one outlying school removed)*

It should be noted that in 2006 the pattern of results across ICT Test Bed and comparator schools is very similar, except for one ICT Test Bed school which shows a decline in performance having had significant changes in management during the project. As the ICT Test Bed sample contains only five schools, in contrast to a sample of 20 comparator schools, such a school will have a significant impact on the collective data, skewing the distribution and means as is the case here. Figure 2c shows the same A*-G data as Figure 2b, with the one outlying school removed, indicating that, without this school, the performance of Test Bed schools was improving at or above the national average, as was the performance of the comparator schools.

At post-16

No comparisons of rate of change were possible as the DfES altered the way the scores are calculated in 2006. However, the data suggests little change for APS per student or APS per examination entry for either group over the four years of the project. In 2006, using the new metric, APS per student is higher for comparator than Test Bed students but the APS per exam entry did not differ. This mean that students in Test Bed schools were achieving the same APS per exam as students in comparator schools, although the latter were studying a greater number of A-levels.

The impact of ICT on attainment levels was greater for primary schools than secondary schools.

Although differential progress across the three sectors (primary, secondary and FE) was difficult to assess given the disparity in sample size, the data on attainment suggests greater gains at Key Stage 2 than at GCSE level. The evaluation noted that in primary schools, although there is a well-defined curriculum, there was more scope for managing this curriculum in relation to ICT because of the flexible timetabling and planning which derives from having one teacher and one class. Integrated project work across the curriculum was a real possibility, involving more writing through the medium of ICT with its constant grammar and spelling checks and more readily available redrafting procedures.

The traditional timetable and room-changing structure in secondary schools inhibits the use of ICT. This is exacerbated by the curriculum in secondary schools, which is largely determined by external authorities, examination boards and central strategy creators. The impact of technology on these matters is reduced by the need for national regulatory frameworks and procedures to cater for schools in which the technology is limited. Some secondary schools have tentatively experimented with different timetable structures or suspending timetables for short periods of time, but the changes have generally not been consistent or sustained.

Project work, whether integrated or within a single subject, is greatly enhanced by the use of ICT and gives students a greater element of choice. While it is common in Key Stage 2 and evident in some Key Stage 4 subjects, it is much less utilised in Key Stage 3 where subject integration is rare and study periods tend to be short. Current proposals to reduce the amount of course work in Key Stage 4 are likely have a negative impact on the significant use of ICT at this stage.

Effective use of presentation technologies leads to greater interaction between teachers and learners.

Presentation technologies were introduced in all ICT Test Bed classrooms. These included interactive whiteboards, visualisers and graphics tablets (used in conjunction with computers and data projection onto large screens). The presentation technologies had a positive impact on classroom practices and learner experiences owing to their visual nature, structure, clarity, instant feedback, immediacy, relevance, pupil engagement and involvement, and pace. They not only provide a wider variety of stimuli but present a text which is easy to change (by student suggestion or by varying explorative data in a graph) and annotate (by highlighting parts of speech, for instance).

The presentation of learner-created content is immediate, and easily saved for later use.

'Drag and drop' allows young pupils to create their own organisation of objects for number activities.

Data for creating graphs can be changed and the effects explored.

In primary classrooms, the technology is also used to rerun group discussion to the whole class, encouraging peer comment.

Microscope images can be presented to the whole class, enabling all to engage in analysis of the objects.

For many secondary teachers, the presentation technologies did indeed change their practice from a didactic approach to a more interactional one asking more questions and more able to focus on learners' knowledge. This stopped short of passing control to the pupil but did increase pupil involvement and pupil impact on the lesson. For some secondary teachers, presentational technologies essentially provide a more efficient method of presenting notes and apparent practice changed little, and while this did not make full use of the resource, it was nevertheless still beneficial for the learners.

Effective use of ICT personalised learning by enabling greater learner choice within the curriculum, improved assessment for learning and more learner-directed teaching.

In maturity modelling analysis of the Key Stage 2 and GCSE data only, schools showing greater maturity in promoting personalisation (through regular and frequent use of ICT by staff and students) also did well on key predictors of institutional performance. Furthermore, analyses conducted to investigate the development of this kind of personalised, ICT-rich learning found that, at secondary and FE level, it correlated strongly with good physical resources, human resources and skills, indicating the embedded nature of this pedagogy which the ICT Test Bed schools were rapidly developing.

Schools used ICT to provide pupils:

- with opportunities to follow their current interests or needs within the boundaries of the necessary curriculum and to provide scope for more in-depth learning activities
- with a sense of control, involvement and choice in their learning, and ICT also helped to provide the learners with some awareness of personal cognitive understanding
- with a clear sense of their achievements and an involvement in making and reaching targets through access to their assessment profile and its meaning.

Where they have been established, the learning platforms offer potential for learners being involved in choosing more of their learning paths, but this has yet to be fully realised in schools.

The use of the display technologies enabled pupils to visualise material that would be more difficult to access in traditional formats. Many staff focused on the development of truly interactive resources for the interactive whiteboards rather than simply presenting text. Visualisers provided a valuable means of creating a communal focus for the analysis of students' work. The use of digital still and video cameras was particularly extensive in the early years. They served to bring images of pupils' homes into the classroom. They were also considered useful for recording pupils' work for assessment purposes and demonstrating their achievements; they also provided evidence which could be transmitted should a child change school.

Pupils with special educational needs (SEN) were recorded on video giving explanations of problematic concepts, and these were used with other pupils and played back for the SEN pupils to self-assess and improve.

Technology enables English for speakers of other languages (ESOL) and SEN learners to have greater access to the curriculum.

Videoing role-play in reception helps the teacher to analyse the pupils' behaviour, and can help the pupils themselves to learn to review what they have done, enabling them to study how they spoke and acted. This encouraged a high degree of self-criticism and self-learning as well as giving them experience of how to deal with peer comment.

Video recording of rehearsals for school plays enabled the actors to see themselves and improve their performance.

A pupil with behavioural difficulties was provided with a digital video reference by her classmates when she changed schools.

Foundation stage teachers were able to video a record of children's activity as confirmation of their baseline assessments.

Incorporating the teacher's voice in animations or pupil photographs on websites made visual resources more personal.

Young children took digital cameras home and brought pictures back for discussion, enhancing the sense of home-school collaboration.

Students could video their work as a record of their achievements.

Providing clips of student work enabled teachers to agree on assessment criteria, and enabled students to understand them.

Digital videos of geography field trips allows for later analysis by individual students, even those who had missed the trip.

Digital video was also used to prepare students and parents for school trips.

One area in which pupils can gain a measure of control over their work programme is where they are engaged in project work. Learners often created presentations, developing research skills as well as ICT and verbal presentational skills. ICT enabled pupils to have greater choices about how to present their work and what learning activities to undertake. For example, as well as using word-processing and presentation software, they were easily able to publish their ideas using animation, short films and photography.

In addition to its impact on plenary sessions starting and ending lessons, group and individual work was also supported by the availability of computers in a number of ways. The use of individual skill training programmes on a group rotational basis provided regular re-enforcement. The variation in information available from the internet allows for more student selection of materials, for example, when working on biographies they can choose their own subject. The use of 'track changes' facilities on word-processing programs allowed the teacher to correct and comment on students' writing and provide a clear outline of the drafting process. The preparation of group presentations gives purpose to project work and increases self-esteem in the production of shared exhibits.

Technology facilitates more effective assessment for learning by making it easier for learners to be more involved in target-setting and for teachers to give individualised feedback.

The ease with which targets can be displayed, responded to and then saved led to more use of target-setting at the beginning of lessons and to following this through coherently in subsequent lessons. Linking exemplar student responses into planning aided consistency in assessment by the teachers by establishing agreed criteria for success. It also provided scaffolding for students responding to tasks by helping them to assess what was required and to recognise what a good answer looked like. By focusing on the learners' outputs, the assessment activity was immediately made personal and relevant.

The 'track changes' facility in word processors was used by teachers for commenting on individual learners' work and then for learners to make improvements. The software automatically used different colours for each, providing a clear record of the whole process of learners' writing, teachers' comments and learners' revisions.

In secondary schools, new assessment programmes enabled teachers to build a set of targets against which students could record their achievements and indicate the evidence for this. This was done at any time in or out of class. Targets were reviewed by the teacher and comments added, providing each student with an ongoing assessment against the year's targets.

The use of electronic registration improved attendance levels in some schools by three to four per cent, while behaviour management systems were perceived to have a positive impact on both behaviour and attendance, prerequisites for effective learning.

The ready access to assessment and attendance information and behavioural records was particularly invaluable to those engaged in managing pastoral support. ICT enabled student attendance and subject avoidance to be monitored more carefully, leading to improved attendance and punctuality, which were perceived to be positive consequences of electronic registration.

In primary schools, electronic registration enabled rapid contact with parents in the case of unauthorised absence, leading to better safeguarding of children and some schools reported an increase in attendance of three to four per cent.

In secondary schools, the use of lesson-by-lesson registration helped to track student attendance and identify 'subject avoidance' more carefully.

Behaviour management systems ensured that the same information is readily available to all pastoral managers, although clear protocols are required if the appropriate data is to be gathered at the time of the event. It enabled a more consistent approach to rewards and punishments, and enabled managers to recognise more readily persistent misbehaviour or growing trends in the patterns of behaviour. Action to obtain parental support could be taken quickly since the evidence was clearly presented to parents. Students also recognised that their absences were acted upon earlier by the relevant managers, and in a more consistent way, which informed them of what to expect.

To enable learners to obtain the maximum learning benefit from using the internet, internet protocols that safeguard learners' welfare without being overly prohibitive are required.

Proper safeguards against viruses, unwanted emails and pop-ups are essential for schools. There were, however, some problems arising from overzealous blocking of sites, thereby inhibiting access to useful learning provision, a feature also found by Underwood et al (2004). Policy action is needed to provide schools with safeguards against the perceived risks of litigation and advice to help them avoid developing a risk-averse culture of internet use.

The internet gives teachers access to information so much more quickly and easily that finding lesson content is no longer a problem; the main focus is now on the presentation and organisation of the information. For learners, the ability to 'free range' the resources they want from the internet provides a wider source than classroom reference texts. Researching material for projects on the internet is one of the major uses of ICT by students.

Some changes to teaching and learning strategies were inhibited by tensions between the priorities of different government policies and agencies with regard to ICT.

Teachers' concerns about some Ofsted inspection comments prompted the evaluators to examine inspection reports on 11 ICT Test Bed schools during 2005-06, and to carry out detailed analysis of the reports on two schools which had achieved remarkable gains in attainment in writing at Key Stage 2 through the use of ICT.

There was a pattern of inspectors disregarding the use of ICT as an integral part of learning across the curriculum and, in some cases, not accepting evidence presented through ICT. Clearly, in ICT-rich schools ICT is no longer 'merely' a curriculum subject but a vehicle for learning across the whole curriculum and this needs to be built into inspection criteria.

The DfES National Strategies were not seen by teachers or curriculum co-ordinators as being in the forefront of ICT development in their respective subjects. This is almost certainly because national policies and regulatory structures need to cater for the schools without a strong ICT base. This led, of course, to teachers augmenting suggested strategies to take full advantage of the ICT resources for supporting learning. The recent involvement of the strategy teams in leading the Primary Schools Whiteboard Expansion Project is a move towards rectifying this.

This sense of national programmes not making full use of ICT was strengthened by the nature of standard tests in avoiding assessing learning through the use of ICT. Assessment practices, particularly the requirement to complete all examinations in handwriting, are not aligned with schools' increasing use of ICT for students' writing, despite the clear benefits of writing on a computer in improving spelling and composition skills and motivating underachieving boys to engage in writing with enthusiasm.

Becta

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

Email: research@becta.org.uk.
URL: http://www.becta.org.uk