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An exploration of the use of ICT at the Millennium Primary School, Greenwich

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About the authors

Jonathan Priest, Senior Research Associate at the Curriculum, Education and Management (CEM) Centre, University of Durham, was the project leader and the principal author of this report.

Dr Robert Coe, Director of the Education Evaluation Group at the CEM Centre, University of Durham, oversaw the project management and contributed greatly to project design and implementation.

Barry Evershed and Nigel Bush, both retired primary headteachers, carried out the fieldwork at the Millennium Primary School (MPS), Greenwich.

Acknowledgements

The authors wish to express their thanks to:

- The staff and governors of the Millennium Primary School, Greenwich, for giving so freely of their time and making every effort to accommodate our requests.
- All the parents and pupils involved in completing questionnaires, especially those from the comparison school.
- The individuals interviewed from the local education authority (LEA), the Department for Education and Skills (DfES) and the managed service provider for providing so much useful information.

About the research

The research on which this report is based was conducted and written by Jonathan Priest, Dr Robert Coe, Barry Evershed and Nigel Bush from the Educational Evaluation Group, CEM Centre, University of Durham. It was undertaken between October 2002 and March 2003.

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Executive summary

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- This report sets out the findings of a study investigating the use of information and communication technology (ICT) and its impact following significant investment in the ICT infrastructure and provision at the Millennium Primary School (MPS), Greenwich. The investment in ICT was a result of a DfES-funded infrastructure project and one aim of this study was to investigate its effectiveness and outcomes.
- Research data was collected in the form of questionnaires, semi-structured interviews and lesson observations. Some secondary data was also studied. (A comparison school was identified for a comparative analysis of questionnaire responses.)
- Overall, the evidence collected in this study identified that the DfES-funded Millennium Primary School ICT infrastructure project was successfully implemented, meeting all of the aims laid out in the original DfES project brief.
- High-quality training enabled most staff to rapidly develop their knowledge and skills and respond successfully to the many challenges of such significant ICT provision.
- There was widespread acknowledgement that the ICT skills of both the staff and the pupils had increased.
- ICT, particularly the provision of laptop computers to each member of the teaching staff, improved teachers' planning and reduced unnecessary duplication.
- The combination of laptop computers and interactive whiteboards has made planning high-quality lessons in advance very much quicker and easier. However, the workload savings have been offset by increases in the time needed to keep ICT knowledge current.
- The combination of high-quality software and readily available hardware meant that the integration of ICT to enhance teaching across the curriculum, especially numeracy and literacy, was particularly successful.
- The pupils reported high levels of computer usage. In particular, the internet was used frequently by over 70 per cent of pupils, compared with only just over 20 per cent from the comparison school. Also the use of interactive whiteboards, digital cameras, databases and spreadsheets was extensive.
- Observations and interviews with teachers identified that ICT was proving to be a dynamic addition to existing teaching resources. In particular, the visual impact and dynamic aspects of the interactive whiteboard was extremely effective in engaging pupils with, and promoting interaction within, lessons.
- It was widely reported that ICT had improved pupils' motivation, concentration, confidence, self-esteem, communication skills and enthusiasm. In particular, pupils with special educational needs (SEN) had benefited.
- Tests introduced by Greenwich LEA to evaluate pupil ICT competencies revealed that 89 per cent of Millennium's Year 6 pupils were at National Curriculum Level 5, compared with only 11 per cent elsewhere in the authority.¹
- Similarly, the authority's ICT evaluation tool placed Millennium Primary School at 'Level 4', implying that effective strategies for promoting the ICT were in place and that ICT permeates all aspects of the school. Of 22 other schools assessed using the same tool, Millennium Primary School remains the only one judged to be at or above Level 4.
- The use of ICT to enhance home-school links was in its early stages. An interactive website and greater use of email are planned for the near future.
- Parents of pupils at Millennium School were extremely positive concerning the school's ICT provision and its impact on teaching and learning. Over 93 per cent felt the school had very good resources and over 81 per cent felt the school had really helped their child to use a computer. (The response of parents of pupils from the comparison school was 44 per cent and 54 per cent, respectively.)
- Forty-two per cent of Millennium parents believed ICT had made a significant contribution to their child's general educational progress, compared with only 13 per cent of parents from the comparison school.
- Similar levels of home computer ownership (81 per cent Millennium and 93 per cent comparator) and usage (between two and three hours) were reported in both schools. However, nearly twice as many Millennium parents (59 per cent compared to 33 per cent) reported that at least half the time their children spent on the computer was for schoolwork.
- The partnership with the managed service provider (MSP) required continual work by both parties. School staff were unfamiliar with the process of working with the MSP and this caused some initial frustration and a resetting of expectations. In hindsight the school felt that they would have benefited from a full-time, on-site, technician.
- In light of the end of DfES and LEA funding, real concerns were expressed about the future of the project and where new funding streams would be found.

¹ There are eight national curriculum levels that are often used as key stage attainment targets. If a child achieves the expected level in the national curriculum, it means they demonstrate knowledge and skills equivalent or slightly better than, most children of the same age.

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Introduction

This report represents a case study of the impact of significant investment in ICT at the Millennium Primary School, Greenwich. MPS is a pioneering new school, representing a practical demonstration of the Government's vision of the 'school of the future'. As a result of a DfES-funded infrastructure project carried out in partnership with the LEA, 'cutting edge' ICT was incorporated into the design of the school building. This project represents the Government's commitment to promote and develop schools with sophisticated ICT infrastructures to help improve standards and to encourage new ways of teaching and learning.

This case study explores the effects which the investment in ICT had and captures some of the key events that occurred. It provides information that will inform future development and practice. This report contributes, therefore, to the growing body of research evidence surrounding the impact of ICT and illustrates the potentially positive effects ICT can have on teaching, learning and management of our schools.

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1. Origin, aims and outline of the research

1.1 Origin

The Government is committed to promoting and developing schools with sophisticated ICT infrastructures to improve standards and to encourage new ways of teaching and learning.

Over recent years much progress has been made. Initiatives such as the ICT in Schools Programme, the National Grid for Learning (NGfL) and the Computers for Teachers (CFT) scheme have all contributed massively to the understanding of the effects of ICT on teaching and learning.

Many schools now have cutting edge ICT networks, connected to the internet via fast broadband connections. It is the Government's aim that all schools will benefit from such high levels of connectivity; however, there are still a large number of schools, especially primary schools, which have limited numbers of computers connected to the internet or do not yet have high-speed connections.

These schools face a number of challenges. The most significant, perhaps, being limited funding for expensive hardware and software despite significant funding being made available through mechanisms such as the Standards Fund. Moreover, lack of confidence and/or lack of skill amongst the school staff, particularly with regard to managing a network, also present significant challenges.

This report represents a case study of the impact of significant investment in ICT in one primary school in Greenwich, following a DfES-funded infrastructure project

MPS is a new school built at the heart of the pioneering Millennium Village, just south of London's Millennium Dome. It represents a practical demonstration of the Government's vision of the 'school of the future', bringing together an Early Years' Centre and a Health Centre and serving a newly emerging community.

Rather than populate the school with an entirely new cohort of children, it was decided to move an existing school into the new premises. A neighbouring school, Annandale Primary, was a successful community school but was in need of substantial funds to repair old buildings. After considerable consultation, the entire school was moved in February 2001, creating a partially filled school, awaiting influx from the new and growing Millennium Village community.

A key element of the 'future school' concept is the integration of cutting edge ICT into the very design of the building itself. Each classroom at MPS is equipped with multiple network points, an interactive whiteboard and other digital technologies such as digital cameras and web cameras. The building is designed to be light and airy to provide an optimum working environment; clever features such as automatic blinds on the windows, to reduce light levels on bright days, are commonplace.

Funding for the significant ICT infrastructure was secured through a partnership between the DfES and the Greenwich LEA.

1.1.1 ICT investment

The funding provided by the DfES project enabled the school to open with the following:

- forty-seven desktop computers (including 3 in each classroom, 5 in the library, 10 in the ICT suite and 6 in offices) all with multi-media LCD monitors
- a scanner, digital (stills) camera, webcam and two printers (1 laser and 1 colour inkjet) for every classroom
- fifteen laptops on a trolley
- a laptop for every member of the teaching staff
- a server and cabling system, enabling network access from every desktop
- a broadband (2MB) connection to the internet
- a managed service contract
- three digital video cameras (digital camcorders).

In addition, further funding from the LEA enabled the purchase of interactive whiteboards and projectors for every classroom and the appointment of a non-teaching member of staff to manage local network issues, staff training and liaison with the managed service provider. The LEA also provided extensive staff training both before and after the school had opened.

The equipment was selected on the basis that it would provide the opportunity to raise achievement levels in ICT and across the curriculum, and to enable the evaluation of the managed service approach to ICT provision in a primary school.

At the time, (31st March 2001), the average primary school in England² had just over 20 computers per school of which, on average, only 12 were connected to the internet and 37 per cent were over three years old. By the following year (31st March 2002) the statistics indicate that only 59 per cent of computers in

² Statistics in Education (2002). Survey of Information and Communication Technology in Schools. A National Statistics Publication.

Origin, aims and outline of the study

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primary schools were networked and that the average school had 3.5 laptops, 1.8 digital cameras and 1.5 interactive whiteboards. Furthermore, only 44 per cent actually had any interactive whiteboards at all, and only 9 per cent of primary schools were connected to the internet by broadband.

In comparison to the above statistics, it was clear that MPS was extremely well resourced, even accounting for differences that could arise due to the different timings of the two studies. At the time of its opening, MPS was considered to be at the cutting edge in terms of its ICT infrastructure and equipment.

1.2 Aims

The principal aim of the research was to explore the impact of the significant ICT investment on the teaching, learning and management of the school, with a view to identifying the lessons learned and to making recommendations for the future. However, it must be noted that the much of the data collected was through interview and as such relies on the subjective perceptions of participants. Because of the timing of the research, no prior comparisons were possible to verify changes in practice that may have occurred. However, whilst the school cannot be described as 'typical', this report should be of interest to any school wishing to make a similar investment in ICT. In particular, this report will:

- consider how the ICT infrastructure project was implemented in the school in terms of the original objectives set out by the DfES
- identify how teachers responded to the resulting new challenges
- identify the perceived impact on teaching and learning across the curriculum
- identify the perceived benefits to pupils from significant exposure to, and use of, ICT
- identify aspects of the ICT investment that were thought to have yielded greatest benefit
- consider how the project has made an impact on school management and ethos
- consider the extent to which the ICT provision was seen as supporting and strengthening home-school-community links
- identify the aspects of the managed service agreement that were effective and those that were not
- consider the future sustainability of the project.

1.3 Outline of how the study was carried out

The research was commissioned by the British Educational Communications and Technology Agency (Becta) on behalf of the DfES and was conducted by a small team of researchers from the Educational Evaluation Group at Durham University's CEM Centre.

Data was collected during the autumn term of 2002, in the form of interviews, questionnaires, and observations, 18 months after MPS was opened. It was therefore not possible to collect baseline data or to select a well-matched control school, making it extremely difficult to disentangle the impact of the significant ICT investment from the impact of other initiatives that may also have had an effect on practice.

1.3.1 Interviews

Face-to-face, in-depth, semi-structured interviews were conducted with all the teaching staff, the senior management team (SMT) and the ICT Co-ordinator (12 in total). The interviews ranged from 30 to 60 minutes in length.

Telephone interviews were carried out with representatives of the LEA, DfES and the managed service provider (6 in total). These interviewees were nominated by the relevant contact in each organisation.

Five focus group interviews were held with groups of pupils. Four groups were selected from Years 1 to 4, whilst a fifth group was made up of pupils with special educational needs drawn from Years 5 and 6. Each group contained six pupils, with an approximately equal mix of boys and girls. Pupils were selected by the school to be representative of their group.

In addition, a further focus group interview was held with five members of the support staff to ensure that the views of all key individuals were taken into consideration.

All interviews were audio recorded and transcribed for subsequent analysis.

1.3.2 Questionnaires

Questionnaires were designed for parents and for pupils in Years 5 or 6 to complete, covering themes such as computer usage, attitudes towards ICT and perceptions of impact on teaching and learning. In order to provide a comparison for questionnaire data, it was possible to administer identical questionnaires to another school in Greenwich (selected for its similar catchment area by one of the LEA Advisers). However, no formal analysis was undertaken to ascertain the quality of its comparability.

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Completed questionnaires were received from 83 parents of MPS pupils and 28 parents of pupils from the comparison school. In the former, questionnaires were distributed and collected at a parents' evening, with additional copies sent home to those who had not attended the evening. In the latter they were sent home to all parents. These samples cannot really be considered as representative of the schools, given these low and differential response rates, and the overall sample sizes.

Questionnaires were also received from 39 MPS pupils and 52 pupils from the comparison school, all of them in Year 5 or 6. In the comparison school this represented all but one of the pupils in these year groups. In MPS it had been intended to get all Year 5 and 6 pupils to complete the questionnaire, but technical problems with the school's network prevented this.

1.3.3 Lesson observations

To supplement the interview and questionnaire data, a total of six lesson observations were also carried out across Key Stage 1 and Key Stage 2. Evidence from observations offers the potential to gain helpful insights into effective teaching and innovative practice and to support the conclusions reached from interviews and questionnaires.

1.4 Structure of this report

This report has been divided into 12 parts. Chapters 2 to 10 follow the aims identified above in Section 1.2. Chapter 11 summarises the main findings, whilst Chapter 12 makes a number of recommendations, informed by the conclusions of the study. Where relevant, quotations taken from the interview data, have been included.

2. Project implementation

The rationale for the ICT infrastructure project was:

- To promote and explore the use of innovative ICT in the classroom and its impact on pedagogy and achievement and to disseminate good practice to other institutions.
- To use the provided resources to raise achievement in ICT, through the use of ICT in the classroom.
- To encourage collaboration between the public and private sectors to provide ICT equipment and services in partnership with the school and Greenwich LEA, sharing costs and risks.

The evidence presented in this report clearly demonstrates that all three objectives were met and in most cases were surpassed. The project has been extremely successful at promoting innovative use of ICT and has clearly raised the ICT achievements of pupils across the school.

However, the initial implementation of the project was characterised by confusion and apprehension brought about, not least, by the last minute award of the managed service contract and confusion over the original project brief. In all the confusion, the situation was further compounded by poor communications between the managed service provider, the LEA and the school. There was a general feeling amongst school personnel that key decisions regarding the purchase of equipment had been taken out of their hands and that the school's view was not being valued.

The nitty-gritty of how things worked was not delivered, so when the equipment arrived, it was vaguely installed. There was no communication between who ordered it and who installed it or how to use it. So the continuum was wrong. There wasn't enough communication to the end user. (SMT)

The resulting lack of ownership by the school contributed significantly to the widespread feeling of apprehension amongst the staff at the outset of the project. Furthermore, the speed with which the network subsequently had to be installed and the lack of time for staff to familiarise themselves with the equipment and its likely benefits, left many staff feeling completely overpowered by the steep learning curve ahead of them.

It is possible that a more methodical implementation, perhaps with a phased approach for the different ICT, would have helped to reduce the initial confusion and apprehension.

However, it was clear that the school was extremely successful in implementing the project. A number of factors appear to have

New challenges

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contributed to this, not least the skills and enthusiasm of the ICT Co-ordinator, a strong senior management team who were committed to the project, and a highly developed team spirit and mutual support structure amongst the staff.

3. New challenges

3.1 Training

Although most staff were using ICT prior to the move to MPS, its use was limited by a lack of equipment and a lack of any real ICT focus. For many staff therefore, the move to MPS represented a real challenge and it was clear that there would be significant training requirements.

Evidence from interviews and observation indicates that considerable training, whether provided through NOF, the LEA and the ICT Co-ordinator, and to a lesser extent, the managed service provider and the London Institute of Education, enabled staff to develop high levels of skill and confidence in a relatively short period. Specifically, much training focused on the use of the interactive whiteboard and the laptop computer, as well as various software packages such as Microsoft Word and PowerPoint.

The quality of the training, especially that at the London Institute, was rated as extremely good and was highly valued by staff. Staff reported that a particular strength of the training was the inclusion of the support staff along with the teaching staff. They also felt that the training not only served to improve the knowledge and skills of those involved but also served to unite the staff and cement their commitment to the project.

I wasn't looking forward to going to the Institute and sitting by the computer all day, but it worked out a lot better than I anticipated and I came back from that feeling very positive. I think that was the turning point for me. (KS1 teacher)

In addition to the formal training, the school's strong team ethos and commitment to support each other clearly enabled the staff to share learning very effectively in less formal exchanges. Indeed, some staff, particularly foundation staff, reportedly learnt more through these less formal exchanges, as the training was more relevant to the more individualised teaching common in the foundation years. Moreover, the foundation staff felt that much of the formal training was not pitched at the correct level for them and therefore was not as effective as it could have been.

Clearly, the training provided to staff was at its most intense at the beginning of the project. As the newly developed ICT skills became embedded in teaching and learning and, due to external resource pressures, as the training provision was gradually reduced, a number of staff raised concerns about 'cruising' and lack of progression. Although the majority of staff recognised the costs associated with high quality, high quantity training and were

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aware that the volume of initial training could not be sustained, the reduction in training was perceived as a contributory factor in the lack of recent progress identified by some staff.

3.2 Planning, workload and administration

It was clear from the reports of those involved that the considerable ICT provision at MPS had, on the whole, a positive effect on teachers' planning, administration and workload. It was commonplace for teachers to indicate that the majority of their lesson planning, long-term planning and associated administration such as report writing, was now exclusively done on the computer.

Use of ICT for planning and administration was seen as reducing much of the unnecessary duplication associated with producing similar information from one year to the next. Moreover, plans and records could be shared between colleagues very easily as teaching groups moved from one teacher to another. In one particular case, the use of ICT to support planning was seen to greatly improve the communication between two job-share partners.

I now do all of my planning on the computer, which makes it very easy to share with my job-share partner. We email plans to each other, which makes sharing them so much better. I used to do it all by hand before and take it round to her house. It's so much better now. (Foundation teacher)

The evidence concerning the impact of ICT on teachers' workloads, however, was a little less clear. On one hand, teachers were able to identify savings in terms of administration and long-term planning. However, on the other hand, many teachers felt that individual lessons required more planning and that certainly keeping up to date with the latest hardware and software was a considerable increase in their workload.

There was some evidence to suggest that the true effect on workload might be down to the individuals' competence with ICT and their ability to integrate ICT into their everyday practice. There was certainly an indication that, for some staff, ICT had significantly reduced the time needed to prepare lessons.

3.3 Paperless systems

Surprisingly, given the positive impact ICT had on teachers' planning and administration, there was still a considerable reliance on paper-based systems. A number of reasons were put forward for this, including lack of confidence in the network, lack of software and poor external advice. There was also a feeling

amongst some staff that the school was being held back by outside agencies, who themselves were entrenched in paper-based systems.

In one particular case, real concern was expressed as to whether pupils' work stored electronically was sufficient evidence for Ofsted Inspectors. The fear was that if pupils' books looked empty it would be frowned upon by the inspection team.

However, some progress towards systems less reliant on paper was made. The computer network contained a shared work area for staff to share common documents and the use of the intranet was being encouraged for staff to share daily information.

Teaching and learning across the curriculum

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4. Teaching and learning across the curriculum

The significant investment in ICT has been seen to have a number of positive influences on teaching and learning across the whole curriculum. In particular, it was widely reported, by both teachers and pupils, that the combination of high-quality software and readily available hardware meant that the integration of ICT to enhance teaching across the curriculum, especially numeracy and literacy, had been particularly successful.

Figure 1 shows the frequency with which pupils reported using ICT across the curriculum. Interestingly, computers and ICT appear to have been more frequently used in maths and English lessons than in ICT lessons.

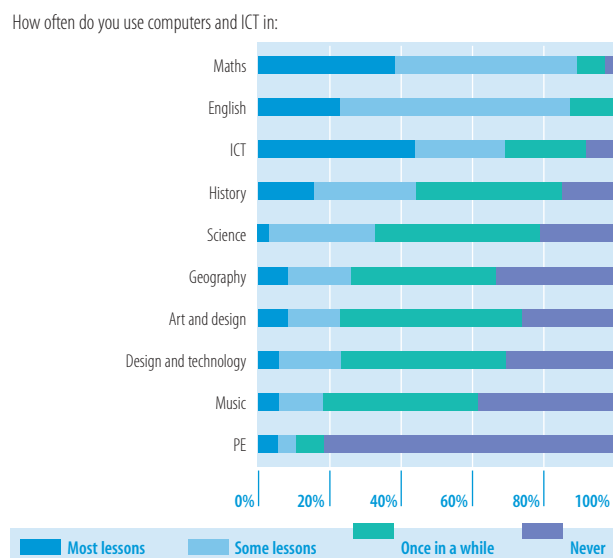


Figure 1. Millennium Primary School – pupil responses³

How often do you use computers and ICT in:

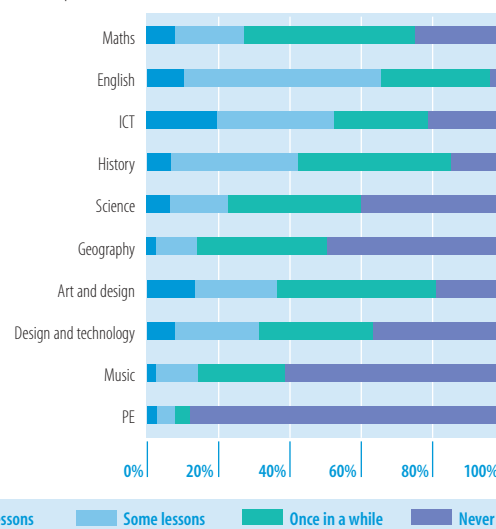


Figure 2. Comparison school – pupil responses⁴

Comparing Figure 1 with Figure 2, which shows the responses from the comparison school, it appears that, in nearly every subject, computers and ICT are reported to have been used more often at MPS. In particular, 38 per cent of MPS pupils reported having used ICT in most maths lessons compared with only 8 per cent of pupils in the comparison school.

A number of teachers reported making changes to their style of teaching in response to the availability of significant ICT. In particular, teachers were planning more interactive and creative opportunities for their pupils and were thinking more carefully about how ICT could support their teaching aims. In particular, the interactivity of the internet was used successfully to engage pupils' interest and enhance learning. Furthermore, the evidence from lesson observations suggests that, in many situations, this interactivity was considerably more effective at engaging pupils than a more traditional, book-based approach.

I suppose the ICT has changed my style of teaching in the sense that pretty much every lesson I do is a lot more interactive and creative than it would have been before. It means I am able to teach how I want to more often. (KS1 teacher)

One teacher went further and suggested that having to think about opportunities where ICT could be integrated into her teaching, was in itself improving the structure and quality of her lessons.

³ Based on the responses of 39 pupils from Years 5 and 6.

⁴ Based on the responses of 52 pupils from Years 5 and 6.

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Figure 3 shows pupil reports of the frequency with which they use different technology. It is clear to see that the internet closely followed by word processing are frequently used by the majority of pupils. (Note, for ease of interpretation, the original five-point scale has been collapsed to a three-point scale.)

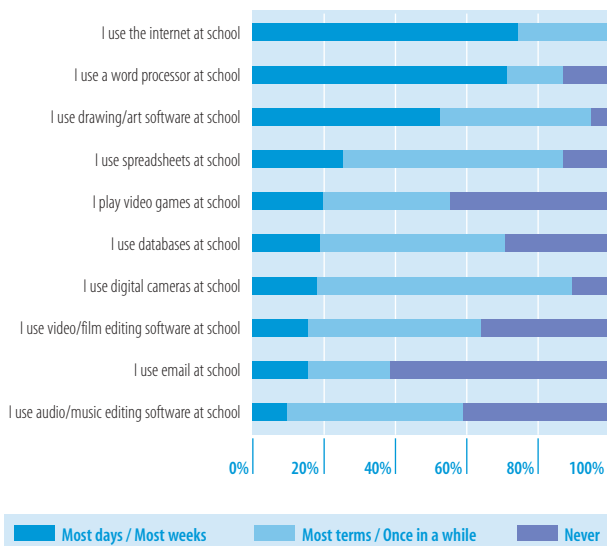


Figure 3. Millennium Primary School – pupil responses⁵

As before, comparing Figure 3 with Figure 4, the responses from the comparison school, it is encouraging to see that more MPS pupils report making frequent use of the entire range of technology on offer.

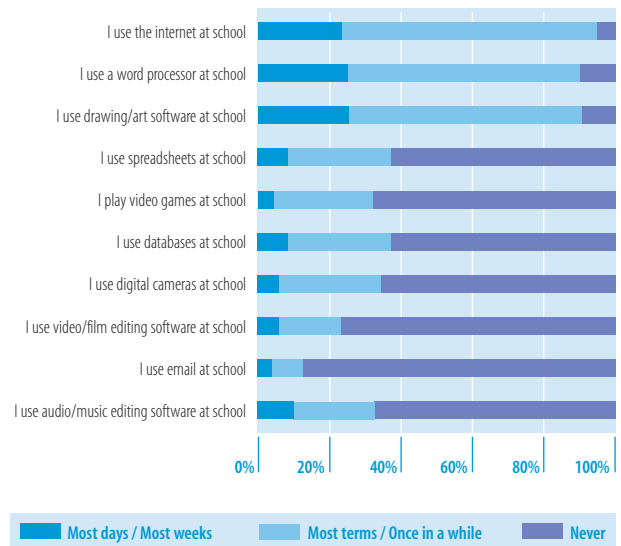


Figure 4. Comparison school – pupil responses⁶

A number of teachers made comments indicating how ICT was helping them to differentiate their teaching in response to the needs of their pupils. In particular, the internet was frequently used to allow the most able pupils to develop their skills and work independently.

For many teachers, the use of ICT in teaching across the curriculum had become second nature. Teachers saw ICT as just another tool which, when readily available and reliable, was easily incorporated into all aspects of teaching and learning.

Interestingly, a number of individuals felt that the full potential of the available ICT was yet to be realised, particularly at Key Stage 2 and in subjects such as music and science. Several reasons were put forward for this, including lack of confidence to take skill to the next level, lack of available time to explore relevant software and lack of continual training.

⁵ Based on the responses of 39 pupils from Years 5 and 6.

⁶ Based on the responses of 52 pupils from Years 5 and 6.

Benefits for pupils

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5. Benefits for pupils

Evidence from observations and the reports of pupils and teachers showed that a variety of hardware was being extensively used across all year groups. In most cases, pupils reported using computers and ICT at least every day, with many indicating that they were using computers twice a day. In particular, interactive whiteboards, digital cameras and scanners were mentioned; and pupils in Years 4, 5 and 6 used laptop computers and Tablet PCs regularly.

Pupils were also making extensive use of a variety of software, including, most notably, art and design packages and software to support presentations and mathematics. The use of ICT to produce visually high-quality work for presentation purposes was evident from all year groups. Interactive games featured very strongly in all the interviews and clearly contributed to the sense of fun and enjoyment that was widely reported. Moreover, amongst the older pupils, there was evidence to suggest that many of the games played were educational in nature and were highly rated by the pupils. Games were being used effectively to support pupils' learning and were proving to be a valuable and dynamic addition to existing resources.

As a result of such widespread use of ICT, it was widely reported by teachers that pupils' motivation, confidence, self-esteem and enthusiasm had improved. A number claimed that as a direct result of the ICT provision, the pupils were more fully engaged in their learning. It was certainly true that in the lessons observed, pupils' engagement, confidence, motivation and enthusiasm appeared to be extremely high and the substantial ICT may well have been at least partly responsible. In particular, the benefits were especially evident for pupils with special educational needs and those who have English as an additional language (EAL).

Figures 5 and 6 show the pupils' responses to a number of items that, at least in part, are associated with ICT confidence. As before, for ease of interpretation, the original five-point scale has been collapsed to a three-point scale. Clearly, for nearly every item, a greater proportion of MPS pupils are in agreement, suggesting a greater confidence with ICT than their counterparts in the comparison school.

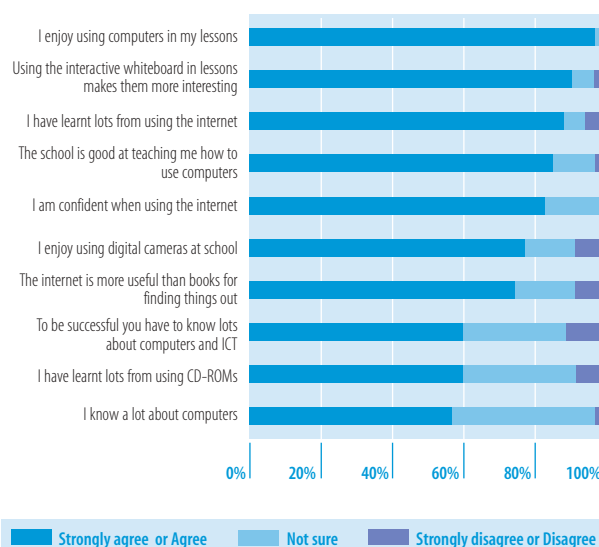


Figure 5. Millennium Primary School – pupil responses⁷

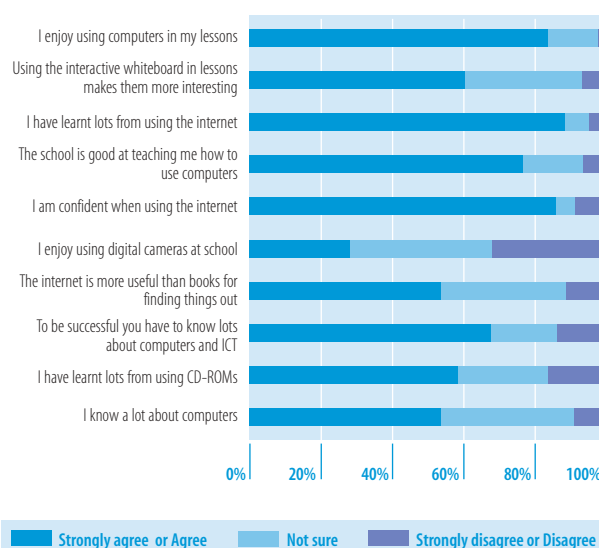


Figure 6. Comparison school – pupil responses⁸

Many pupils reported working on the computer as less threatening than working with a teacher directly. The suggestion was that these pupils preferred the non-judgemental environment created by the computer and that this in turn could reduce their stress levels, enabling them to attempt work that

⁷ Based on the responses of 39 pupils from Years 5 and 6.

⁸ Based on the responses of 52 pupils from Years 5 and 6.

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previously would have caused them some anxiety. In particular, a number of pupils felt that word-processing software had enabled them to write more creatively by improving their presentation and supporting their spelling and grammar.

The ICT provision was widely reported to have increased communication and co-operation between pupils. It was commonplace for children to help each other and in particular for more able pupils to support less able pupils. Indeed, the most knowledgeable pupils were given technical responsibilities and were able to carry out such tasks as changing printer cartridges and removing paper jams, as well as supporting their less able peers.

Across all year groups, the ICT competencies of the pupils observed were extremely high. In one particular lesson, Year 4 pupils were seen to be carrying out complex internet searches using skills listed in the school's Year 6 ICT targets. Indeed, further supporting evidence came from Greenwich LEA's Year 6 ICT test. At the time of writing this report (Spring 2003), pupils in 42 schools, including MPS, had completed the LEA's 2002 ICT test. Table 1 below shows the results.

		Percentage of pupils	
		LEA	Millennium
Level	No Score	9%	0%
	Level 3	20%	0%
	Level 4	60%	11%
	Level 5	11%	89%

Table 1. Results of the Year 6 ICT test

With 89 per cent of Millennium pupils achieving Level 5 compared with only 11 per cent of pupils in the LEA as a whole, the evidence is very compelling, however caution must be applied as the statistics do not account for any general range of pupil ability that may exist between schools.

The children here are so much more competent than other schools I've worked in, I've been amazed at just what they can do. (SEN teacher)

Further evidence was obtained from the pupil questionnaire. Figures 7 and 8 show how easy or hard pupils reported to have found using the various technologies. Although the graphs are similar, there is a clear tendency for a greater proportion of MPS pupils to find the various technologies easy or very easy. In particular, MPS pupils found using spreadsheets (85 per cent versus 67 per cent) and email (76 per cent versus 41 per cent) noticeably easier than their counterparts in the comparison school.

⁹ Based on the responses of 39 pupils from Years 5 and 6.

¹⁰ Based on the responses of 52 pupils from Years 5 and 6.

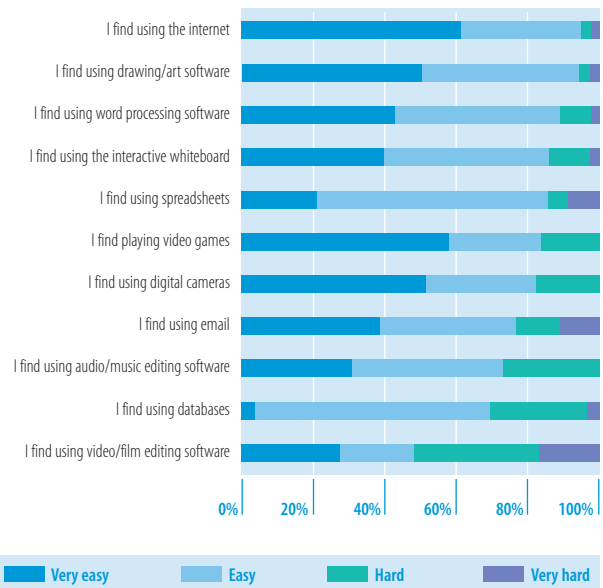


Figure 7. Millennium Primary School – pupil responses⁹

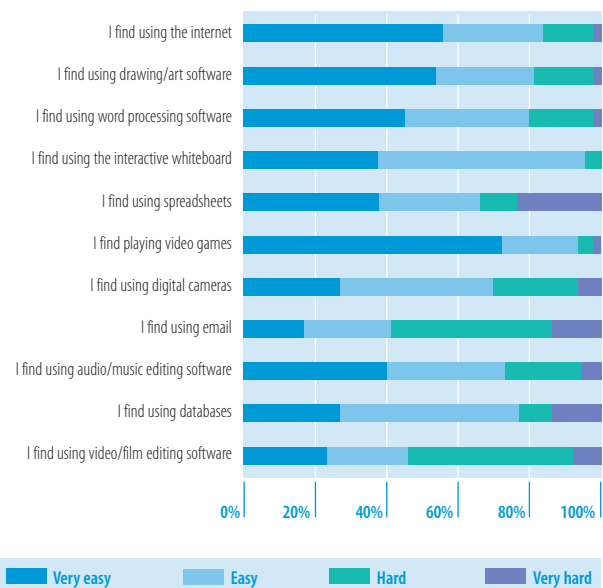


Figure 8. Comparison school – pupil responses¹⁰

Significant aspects of ICT investment

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Although it is impossible to say whether there had been any effect on the school's standard assessment test (SAT) results, there was a widespread feeling amongst the staff that improvements in motivation, confidence, self-esteem, communication and co-operation all contributed to improved learning.

Many teachers reported on how keen the pupils were to use the computer both within lesson time and outside of lesson time. One teacher used timers within the classroom to make sure that all pupils had a fair turn on the computers and to avoid the common moans that were often a result of the pupils having to share the computers. However, evidence from the pupils suggested that the lack of sufficient computers was the cause of much frustration.

A number of teachers reported improvements in the pupils' behaviour as a result of working with ICT. In particular, teachers reported the use of the interactive whiteboard for whole-class teaching to increase pupils' attention and reduce much of the usual fidgeting during 'carpet sessions'. These findings were further supported by lesson observations.

6. Significant aspects of ICT investment

By far the most significant aspect of the ICT investment, in terms of impact on existing practice was the interactive whiteboard in every classroom. The evidence suggests that the boards made teaching more visual and learning more interactive, in turn encouraging greater participation from the pupils, improving their motivation and concentration.

There's no doubt about it, the interactive whiteboard does capture every child's attention. As soon as it is switched on you've got them. It doesn't matter whether it's literacy or numeracy, or whatever it is, you know, they've got their hands up wanting to come up and have a try. Even the children who are not quite sure what they're doing, they just want to get up there and have a go. (KS1 teacher)

In particular, the strong visual nature of the boards was seen as particularly effective at encouraging pupils with SEN, who perhaps prefer a more multi-sensory approach.

On a more practical level, the interactive whiteboard was seen to have many advantages over traditional boards. The ability to move objects around with the touch of a finger, to be able to print the contents of the board, to be able to easily bring back existing work or just the fact that there was unlimited space available and nothing had to be 'rubbed out', were all seen by teachers as particular strengths. There was clear evidence of teachers saving entire whiteboard lessons for future use. Nearly all teachers reported that in the long run, the ability to save and edit lessons would reduce preparation time and save unnecessary duplication.

A number of teachers indicated that the interactive nature of the board was freeing them from the time-consuming task of making resources, such as number cards, again reducing their preparation time and reducing duplication.

The impact of the interactive whiteboard was further enhanced by the availability of laptops, which meant that lessons could be produced away from the classroom in school time – or at home in the teacher's own time – ready for subsequent use with the whiteboard.

Interactive whiteboards and laptops make lesson planning in advance very easy. Things can be specifically prepared beforehand which means that the lessons have more focus. It's very efficient because you just load up your pages on the interactive whiteboard and you're ready to go. Lessons are sleeker. (SMT)

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Indeed, the laptop provided to every teacher was seen as a significant factor in the success of the project. The majority of teachers interviewed clearly indicated that their laptop was not only enabling them to create more interactive, ICT-focused lessons, but was also supporting many of the administrative tasks mentioned in Section 3.2 such as report writing and long-term plans.

7. School management and ethos

It was clear that the significant ICT provided as part of the project was only one of a number of initiatives being implemented within the school. The senior management, and in particular the Headteacher, had worked extremely hard to develop a school which, as an active learning community, was able to meet the diverse needs of the new community it served. It was clear from school visits that the development of spiritual and emotional intelligence lay at the heart of this. As such, the impact of ICT on the school's original ethos has been minimal. Indeed, there was evidence to suggest that the ICT was viewed as a useful addition to that which the school offers, but that it was by no means the most important thing.

That said, it was clear that ICT did permeate all aspects of the school, and that effective strategies for promoting ICT across the whole school were in place. Indeed, the LEA's own evaluation tool placed MPS at Level 4 on a five-point scale for assessing the extent to which ICT was integrated effectively into a school's practices. Of the 22 other local schools classified using the same tool, MPS was the only one at or above Level 4.

Table 2 shows the levels achieved for the individual factors that contribute to the overall score. Much of the justification for these levels can be found in this report. In particular, the co-ordination of ICT at the subject level had, until recently, been the responsibility of the ICT Co-ordinator, who, through additional funding from the LEA, was freed from teaching duties. However, now that this funding has ceased, subject leaders will need to take a more active role and, while this is being encouraged, their involvement remains a considerable challenge.

7.1 Dissemination of good practice

Much of the good practice developed at the school has been disseminated through the 'beacon' status of the school. In addition, local leadership groups, the LEA, the managed service provider and various educational conferences, have also been used as avenues for dissemination of good practice.

As knowledge of the project has spread, and as more primary schools have become interested in installing large amounts of ICT, the school has begun to receive telephone calls asking for advice and support.

School management and ethos

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Categories	Factors	Level	Description
Management	Headteacher	4	There is a clear vision of where the benefits of technology will lead. Management team supports ICT across the whole curriculum. The ICTCo is a member of the senior management team.
	ICT co-ordinator	5	ICTCo inspires all staff to use new technologies confidently in ways which enhance learning.
	Subject co-ordinator	2	Subject co-ordinator relies heavily on ICTCo to identify and provide ICT opportunities in the subject.
	Class teacher	4	Teacher has a clear understanding of teaching of ICT and uses a greater range of ICT tools including internet and email for supporting other subjects. Lessons are carefully planned to enhance the development of pupils' capability.
	Support staff	4	All classroom assistants able to undertake a range of technical tasks and support a range of software use in the classroom.
Curriculum development	ICT policy	4	Policy matches practice and is reviewed and updated regularly.
	Monitoring	4	ICTCo has regular release time to observe and support colleagues teaching. Formal system of feedback in place. Subject co-ordinators monitor ICT within their subject.
	Action planning	5	New and emerging technologies are the main focus of action planning.
	Continuing professional development	5	School delivers own training for wider community, including making courses available online. ICT CPD sessions mainly address issues arising from new technologies.
Teaching and learning	Teaching and learning styles	4	Problem solving and questioning are learning approaches that are supported increasingly by the use of ICT.
	ICT capability	5	Pupils have the capability, and the opportunity, to use ICT at any point in their learning.
	Assessment and record-keeping	4	ICT records are used to inform development and planning within the school.
	Use of ICT for curriculum administration	5	School making more use of web-based systems to communicate with others.
Resources	Technical support	3	Formal report system used effectively. Identified staff can diagnose severity of problems and identify appropriate course of action.
	Funding	3	Funding is allocated from a variety of sources. Ongoing costs are considered and targets are set for future years.
	Equipment	4	Good pupil computer ratio. Open access to equipment is promoted. Autonomous use by pupils is encouraged.
School and community links	Closer community	4	The closer community is an active part of school life and their involvement is well-established.
	Wider community	5	The school is established within the wider community and attracts new partnerships through its exemplary use of ICT.

Table 2. An excerpt from the LEA's ICT evaluation tool

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8. Home-school-community links

Considering that the school was only opened 18 months prior to this study and that the Greenwich Village community had not yet filled out, the school had made a substantial contribution to developing positive home-school links and ICT had played a part in that.

Digital cameras had been used extensively to record the pupils' learning and to display their work around the school for the parents and the wider community to see. For anyone visiting the school, it was quite striking to see the quality and variety of the work displayed within the foyer and surrounding corridors.

At the time of writing, parents are very much involved in running a toy library for early years learners. This scheme aims to loan out toys, for a small fee, to families within the school community. Parents have actively used computers to administer the scheme, which in turn has promoted their interest in ICT and has encouraged some to pursue this further by joining the Early Years' Parent Group. The group meets every Monday afternoon and aims to equip parents with basic computer skills to enhance their learning and also to place them in a better position to support their children.

In addition to supporting parents at school, a number of computers were given to families of children in Key Stage 2 who were identified as not having a computer at home. Unfortunately the computers did not have internet access as they were of an older design. However, for a number of families the provision clearly sparked an interest in ICT as their computers were returned to school after they had purchased higher specification replacements.

8.1 Parental questionnaire

Parents of pupils at MPS and at the comparison school were asked a series of questions relating to their attitude towards computer provision at the respective school. It is clear from these data that differences exist, although these differences are hard to interpret, given the differential response rates for parents in the two schools. However, some of the differences are large enough to be beyond what could be readily explained as a result of sampling bias. Moreover, some of the data (for example, Table 3, below) suggest that the two samples of parents were actually well matched in many ways and hence do provide a valid comparison.

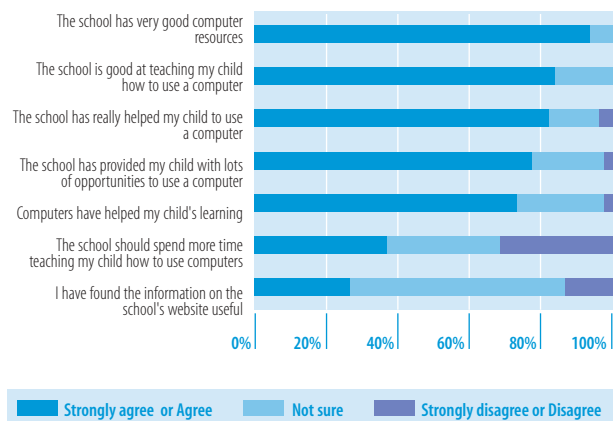


Figure 9. Millennium Primary School – parental responses¹¹

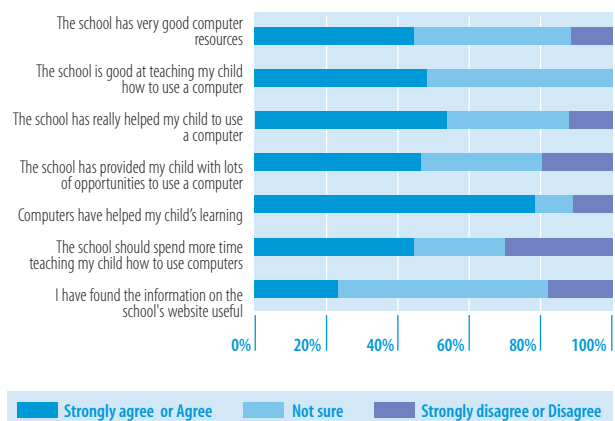


Figure 10. Comparison school – parental responses¹²

Figures 9 and 10 summarise the responses for MPS and the comparison school. A much greater proportion of MPS parents agreed with all but one of the positively worded statements. In particular, over 93 per cent of MPS parents were in agreement with the statement 'The school has very good computer resources' compared to just over 44 per cent of the comparison group. Similarly, over 83 per cent of MPS parents were in agreement with the statement 'The school is good at teaching my child how to use a computer' compared with just over 48 per cent of the comparison group.

¹¹ Based on the responses of 83 parents.

¹² Based on the responses of 28 parents.

Home-school-community links

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Parents of MPS pupils seemed to be very aware of the high level of resources and the many opportunities that the school provided for their children to develop their computer skills. Moreover, on average, there was a greater perception amongst MPS parents that the school was good at teaching their child how to use computers.

Figures 11 and 12 further support this conclusion and clearly demonstrate that a high percentage (42 per cent) of MPS parents believed that ICT had made a significant contribution to their child's general educational progress. A similarly high percentage (38 per cent) were also very satisfied with the role the school had in equipping their children with adequate ICT skills.

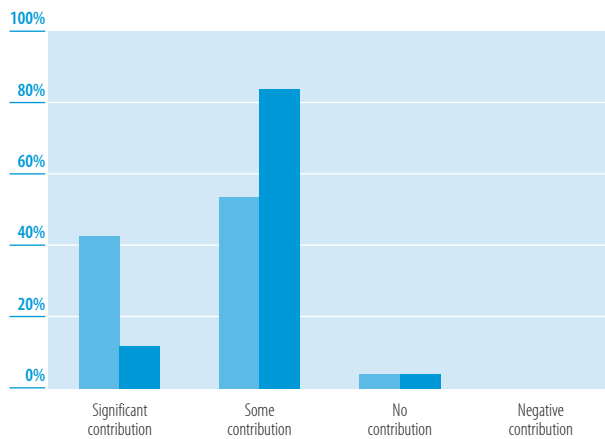


Figure 11. What contribution has ICT made to your child's general educational progress?¹³

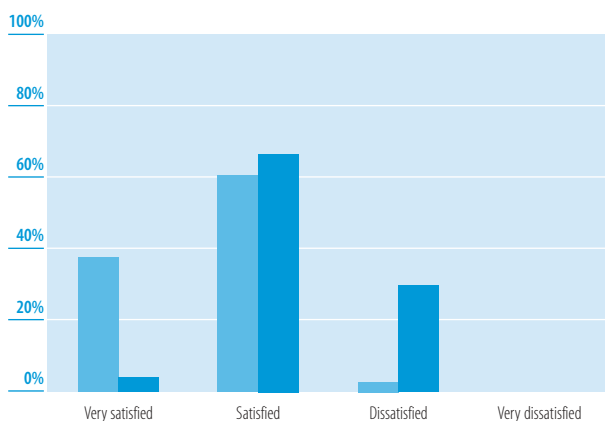


Figure 12. How satisfied are you with the job the school is doing to equip your child with the ICT skills needed in today's society?¹⁴

¹³ Based on the responses of 83 parents from MPS and 28 from the comparison school.

¹⁴ Based on the responses of 83 parents from MPS and 28 from the comparison school.

Table 3, below, shows a summary of additional information from the parental questionnaires. Where similar questions were asked of pupils, the corresponding figures appear in brackets.

	School	
	MPS	Comparison
Percentage with a computer at home	81% (91)	93% (90)
Percentage with two or more computers at home <small>(Given they have at least one home computer)</small>	22% (33)	23% (21)
Percentage with a computer for pupil's sole use	16% (63)	12% (32)
Average hours per week spent on the computer by the pupil	2.10 (2.44)	2.42 (2.95)
Percentage spending at least half this time doing school work	59% (88)	33% (73)
Percentage of pupils using the internet at home	35% (79)	35% (74)
Percentage of pupils sharing activities with parents	59% (61)	56% (79)
Percentage of pupils encouraged to use computer by school	24% (76)	15% (69)
Does the school make its ICT facilities available to parents?	45% 'Yes'	4% 'Yes'
If 'No' would you like to use the facilities	49% 'Yes'	48% 'Yes'
Has the school ever used email to contact you?	4% 'Yes'	4% 'Yes'
Have you ever used email to contact the school?	8% 'Yes'	0%
Do you feel part of the wider school community?	21% 'Very much so' 48% 'In a way' 31% 'No, not really'	16% 'Very much so' 52% 'In a way' 32% 'No, not really'

Table 3. Parental responses (where similar questions were asked of pupils, the corresponding figures are shown in brackets)

Very similar levels of home computer ownership were reported. Likewise, pupils appear to be spending similar amounts of time on the computer. It is interesting to note, however, that noticeably more pupils from MPS appear to be spending at least half this time doing school work as against entertainment. There are also some interesting differences – and similarities – between responses from parents and from pupils to similar questions.

Almost half (45 per cent) of Millennium parents reported that the school made its ICT facilities available to parents, compared with just 4 per cent of parents from the comparison school. Nationally, 5 per cent of schools make their ICT facilities available to pupils outside of school hours and just 2 per cent make their facilities

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available to the wider community¹⁵. This was very encouraging but demonstrates that the school was still not reaching its entire population. Clearly, there was a desire to use the facilities, with almost half of those parents who believed that the facilities were not available expressing a wish to have access to them.

Considering the high computer ownership and the availability of computers in the school, it is perhaps a little surprising that greater use has not been made of email as a means of parent-school communication. Indeed many parents felt that they lacked important information regarding what their children were doing at school, and felt that more support for home-based ICT activities was needed.

However, it would appear that the school has only recently been connected to the London Greenwich Grid for Learning and that greater opportunities will result from the planned website improvements. The new site will aim to be fully interactive, with regular updates for parents who, for whatever reason, find it difficult to get to the school. Email links will be included to make communication with the school very easy and pupils will have web space in which to publish their work.

9. The managed service provider

The evidence suggests that the partnership with the managed service provider (MSP) required continual work from both parties. As indicated earlier, the contract to provide and support the school network was awarded only two weeks before the school opened, resulting in extremely tight deadlines to get the network installed and working efficiently. The MSP worked hard to achieve this ambitious timescale but, not surprisingly, issues arose and there were times when the partnership between the school and the managed service was problematic.

The majority of communication between the school and the managed service occurred when technical problems arose. Under these circumstances, a clear and accurate description of the problem was required by the managed service provider in order for a solution to be formulated. Initially, given the staff's lack of experience and technical expertise, this presented problems. However, the ICT Co-ordinator worked hard to overcome these difficulties and devised a system of logging problems and reporting them clearly to the MSP. A member of the school's support staff was also given additional training to act as a link between the school and the managed service provider. Now, all technical problems go through this member of staff. However, an increasing number are being sorted out locally as the expertise of the staff develops. This is seen as a positive step and will help to make the school more self sufficient in the future.

*I've stopped ringing the call centre now. We have a support assistant who logs the problems. It's a system that the ICT Co-ordinator set up and it's much better. So the frustration of trying to get hold of the MSP has been taken away from me.
(KS1 teacher)*

These procedures have clearly helped improve communication. However, the lack of a full-time, on-site, school technician was held to be a significant barrier to the smooth running of the network. In addition, there was still a strong feeling within the school that the MSP needed to develop a better understanding of the day-to-day difficulties faced in order better to support the school. A much stronger opinion was expressed by the senior management team, who felt that many of the problems with the MSP arose because of their lack of understanding of the way the school staff wished to use the ICT.

¹⁵ Statistics in Education (2002). Survey of Information and Communication Technology in Schools. A National Statistics Publication.

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Having come from an environment of classroom based stand-alone PCs, many teachers found the managed service environment extremely difficult. In particular, many teachers found the inability to install software as needed very frustrating. In one particular case, the inability to install the desired programs on to the interactive whiteboard resulted in the teacher connecting a laptop directly to the whiteboard and bypassing the network entirely. Indeed, a number of other instances were recounted where, in order to avoid difficulties, the network was bypassed completely, resulting in considerable inconvenience and frustration. Many felt that the problems with managed services, particularly the loss of local control and technical problems, were so significant that other network set-ups, such as peer-to-peer networking, might be more viable. This demonstrates a need to train staff to use a computer network effectively and to make sure they understand the implications and the risks of adding software locally. For example, viruses are now mainly introduced to school networks when a laptop is connected that has been used at home or has had new software loaded on it from an unknown source.

10. Sustainability

Both the Headteacher and the ICT Co-ordinator resigned before Christmas 2002 to take up positions elsewhere at the start of the spring term. As key individuals who, at least in part, were responsible for the successful implementation and development of the ICT infrastructure project, their departure was a source of considerable concern.

In the short-term, the Deputy Headteacher took on the role of ICT Co-ordinator and became the main contact between the MSP and the DfES. A support assistant was trained to look after the local management of the network and day-to-day technical problems; particular ICT projects, such as the school's website, were given to specific class teachers. However, these changes placed already busy staff under considerable additional pressure and a number of concerns were raised.

In addition to staff changes, the funding provided by the LEA that enabled the ICT Co-ordinator to be released from teaching responsibilities was withdrawn. This meant that subject leaders had to be encouraged to take full responsibility for the promotion and development of ICT within their own curriculum areas, instead of relying on the ICT Co-ordinator as previously.

The lack of future funding was raised as a long-term concern for the project. Many staff felt that the school was already falling behind in terms of its equipment and that the cutting edge nature of the project had gone. It was clear that further funding from the DfES was not available and that therefore the school would need to develop its own exit strategy.

Although the LEA and the school had worked hard to find additional funds to keep the project alive, very little progress had been made. There was a genuine fear that the school would continue to fall further behind and that the expertise the staff had developed would be lost.

11. Synthesis and summary

This study set out to explore the impact of significant ICT provision on virtually every aspect of Millennium Primary School, Greenwich. As such, a vast amount of data was collected and has been summarised in the report. Given the qualitative nature of much of that data, it is impossible to summarise the impact of the project in a neat phrase or meaningful summary statistic. Likewise, in the absence of baseline tests, well-matched control groups and a strong evaluation design, it is impossible to be sure that any impact is the result of the significant ICT provision and not one of the many other initiatives running concurrently. That said however, the study does present evidence that is suggestive of some quite significant changes in practice as a result of the ICT provision.

Due to the rapidly changing nature of new technologies in education, current research is not wholly conclusive about the specific impact of various ICT on learning and teaching. Partly this results from the diversity of the available technology, its organisation and management and methods of instruction, and partly because of the speed with which technology is developing and new opportunities arise. Indeed, if we take 'impact' as the effect on pupils' learning across the curriculum as measured by improvements in their SAT results, then this study found no clear evidence of a positive effect¹⁶. What does appear to be clearer from the interview data and the LEA's Year 6 ICT test is that significant ICT provision means that ICT skills are learnt. High levels of ICT skill and competence were widely reported amongst staff and pupils alike with 89 per cent of Millennium pupils achieving National Curriculum Level 5 or above. However, the question as to whether this level of skill and competence has an impact on other subjects across the curriculum remains unanswered.

Clearly, pupils enjoyed using ICT. For many, the opportunity to learn through interactive games brought an essential element of fun and enjoyment into the learning process. For others, computers provided a 'safe' environment in which to take risks without fear or ridicule. The highly visual nature of the medium certainly appeared to capture their interest and imagination. It was widely reported that pupils' motivation, concentration, confidence, self-esteem, and enthusiasm had all increased as a result of the project. Furthermore, it was widely believed that these qualities were essential for effective learning to take place.

Likewise, there was clear evidence to indicate that the skills and competencies of the staff had improved as a result of the project.

Through high-quality training, and a well-developed network for disseminating good practice internally, staff rapidly overcame their initial fears and were soon able to use ICT in imaginative and creative ways across the curriculum. In particular, ICT was used to enhance the teaching of literacy and numeracy, with the interactive whiteboard playing a key role. Furthermore, the combination of the interactive whiteboard and the laptop computer was seen as particularly effective in reducing the time needed to prepare some lessons.

Most staff were using ICT effectively to enhance their planning and administration. Such tasks as lesson planning, long-term planning and pupil reports were regularly completed with the aid of a computer. Furthermore, file sharing was enhanced by central storage on the network and 'cut and paste' facilities were responsible for the reduction in duplication of effort.

As a new school, serving at least in part a new community, the school is now well placed to use ICT to enhance home-school links. Greater use of email and an interactive website will be at the heart of future home-school developments and should address the concerns of some parents who felt they would like to know more about what their children were doing in school. The school has made considerable progress towards making its resources available to the community with 45 per cent of parents indicating that the school's facilities were available, compared with only 2 per cent of primary schools nationally who report to have facilities for community use.

The managed service provider was seen to be the source of many problems. The combination of poor communication (a consequence of the lack of a full-time, on-site technician) and the loss of local control (a consequence of remote management) was chiefly responsible. Technical problems were also a source of considerable frustration, often resulting in the network being bypassed or whole lessons being abandoned. Interestingly, however, the pupils reported very few technical problems and when they did arise, the evidence suggests that they had well-developed coping strategies and that the disruption to their learning was minimal.

Clearly, the project has made an impact on the school in a variety of ways and a number of lessons have been learnt. Assessing the success of such a project is problematic because of the number of contextual issues that exist and because difficulties will always occur in concluding that improvements were specifically or indirectly the result of the greater investment in, and use of, ICT.

¹⁶ SAT test data was examined as part of the broader data collection process, however no conclusions can be drawn because no detailed baseline information was available to adequately explore links between ICT and SAT score improvements over time.

Recommendations

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Moreover, in a study of this type, meanings of 'success' will inevitably remain contentious and open to subjective interpretations that relate to individuals' specific concerns and areas of interest. However, the evidence presented must speak for itself and what is clear is that there are lessons that have been learnt. The following section presents a number of recommendations that should assist other schools that are considering similar projects.

12. Recommendations

A number of recommendations arise from the evidence presented in this report. Informed by the benefit of hindsight, many should help other schools avoid potential problems when embarking on similar projects, whilst others, arising from the school's own successful practices should suggest positive ways forward.

- Ensure that the school and the LEA have a clear project brief, which is shared with all members of staff and sets out realistic project expectations.
- Ensure that all staff are included in early consultations concerning equipment levels and specifications.
- Ensure that the managed service provision is finalised in good time to allow staff to familiarise themselves with the equipment provided and the service to be offered.
- Ensure that all staff know what equipment is available and what the likely benefits of using it are.
- Ensure that all staff receive appropriate high-quality training. Although expensive, it is a basic requirement of all staff.
- Special provision should be made to train support staff, who, for a variety of reasons, might not be able to attend staff training after school.
- All staff, including support staff, need to be given laptops to practice their skills outside of school hours and to enhance planning.
- Teaching staff need to recognise the skills that their support staff possess and ensure that they are deployed appropriately.
- Non-contact time must be provided for formal training but also for staff to get together informally to share skills and knowledge.
- Training needs to be well targeted, both in terms of the prior knowledge and skills of the staff and, perhaps more importantly, their key stage or curriculum requirements. In particular, training for foundation teachers needs to be carefully structured and should include non-computer-based ICT.
- ICT training needs to be at the heart of teachers' continuing professional development. Training must be viewed as ongoing and not a one-off activity.
- Training must encompass basic problem solving and procedures for backing up work.

An exploration of the use of ICT at Millennium Primary School, Greenwich.

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- To develop their paperless systems, schools need to be given high quality external support.
- Schools should establish appropriate expectations of the role of the managed service provider as early as possible in their relationship. Both parties need to develop an understanding of the different environments in which they work.
- If schools are to support a server network, serious consideration needs to be given to employing a full-time, on-site, technician. In the absence of a full-time technician, alternatives to a server network should be considered.
- Subject leaders need external support and guidance to develop effective strategies to integrate ICT into their curriculum areas.
- Teachers' laptops must function as stand-alone machines but equally need to be compatible with the school network.
- Where possible, pupils should be involved in the running and management of the network.

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About Becta

Becta is the Government's lead agency for information and communications technology (ICT) in education and supports UK Government, national organisations, schools and colleges in the use and development of ICT in education to raise standards, widen access, improve skills and encourage effective management.

Findings from Becta's research activities and reports published on behalf of the DfES are targeted at all those interested in educational research. The Becta research web site also provides a gateway to organisations, publications, websites and databases in the field of ICT in education.

<http://www.becta.org.uk/research/>

For those interested in research on the use of ICT in education, you can join Becta's ICT Research Network. The ICT Research Network seeks to encourage the exchange of information in order to inform the national agenda. More information can be found at:

<http://www.becta.org.uk/research/ictrn>.

Alternatively, e-mail ictrn@becta.org.uk or write to:

Michael Harris, ICT Research Network, Becta, Millburn Hill Road, Science Park, Coventry CV4 7JJ

About the DfES ICT in Schools Programme

The ICT in Schools programme (formerly the NGfL programme) is the Government's key initiative for improving ICT provision in schools, developing a wide range of digital resources for teaching and learning and equipping teachers to be effective users of ICT. The programme underpins the Government's vision for transforming education. Evaluation is being undertaken using a variety of techniques, both qualitative and quantitative, and both at a national and local level.

The challenge over the next four years will be to successfully embed ICT in every facet of teaching and learning where it can directly impact on raising standards of attainment. A vision for the future of ICT in schools can be found in the paper – Fulfilling the Potential – Transforming Teaching and Learning through ICT in Schools, available on the DfES ICT in Schools website.

<http://www.dfes.gov.uk/ictinschools/publications>