Contents

Summary

Studies have been carried out which investigate specific benefits of using ICT in schools, and their findings contribute to the growing evidence that ICT can lead to school improvements. Key benefits include:

- improved pupil attainment
- greater levels of pupil and teacher motivation
- improved pupil behaviour
- better communication within, and between, schools
- more efficient administration and management
- improved home–school links

How schools can maximise the impact of ICT

- Ensure that ICT is used as part of a wider programme of school development, and not just used in isolation
- Ensure all teaching and administrative staff are competent in the use of ICT
- Allow staff and pupils to feed back their views on ICT provision to senior managers
- Ensure MIS is used to its full potential

What the research says about ICT and whole-school improvement

This report is based on an analysis of available research about ICT and whole-school improvement. It summarises the key findings and suggests resources for further reading.

The term 'whole-school improvement' is used in this briefing to describe the wide range of ways in which schools can progress and develop in order to raise standards, and the role that ICT can play in this process.

When considering the impact of ICT in education there often tends to be a focus on whether, and to what extent, ICT can raise pupil achievement; although this is an important aspect and a measure of a school's performance, there are many other factors which can reflect the extent to which a school is improving. The purpose of this briefing is to identify the ways in which ICT can assist with all of these factors, including:

- raising pupil motivation
- improving pupil behaviour
- enhancing communications both within and between schools
- enhancing assessment methods and their impact
- reducing teacher workload
- increasing efficiency in school management.

This briefing concentrates on the whole-school benefits of using ICT; the effects of using ICT in specific subjects, or through specific technologies, are the focus of other reports in this series.

To judge the impact of ICT on whole-school improvement, it is necessary to examine the available research evidence.

How can ICT help deliver whole-school improvement?

Becta
ICT Research

Key research evidence about ICT and whole-school improvement

On the basis of Becta's analysis, ICT can lead to improvements in the areas outlined below. Although these benefits are arranged according to the groups of individuals they affect most directly, all could be used as indicators of whole-school improvement (there are references for further reading supplied alongside some of the findings).

School-wide improvements

- The use of email and virtual messageboards leads to more efficient communication, both within and between institutions (Flecknoe, 2001)
- The use of the internet allows schools access to a wider range of resources (Harrison *et al.*, 2002)
- Administrative tasks can be completed more efficiently by teachers and support staff using ICT (Greene *et al.*, 2002)
- ICT aids the collection and analysis of pupil performance data, and leads to more effective target setting (Greene *et al.*, 2002; Becta, 2002)
- The use of laptops by pupils at home and school helps establish a positive school ethos (NFER, 2000)

About Becta's 'What the Research Says…' series

This series of briefing papers is designed in particular for teachers, ICT co-ordinators and school managers, in order to provide an initial idea of the available research evidence for the use of Information and Communications Technology (ICT) in schools and colleges. We welcome feedback and suggestions for further titles in the series (contact details can be found at the end of this briefing).

Improvements for pupils

- There is evidence of a positive relationship between ICT use and pupil achievement, most notably in Key Stage 2 English, and in science in Key Stages 3 and 4 (Harrison *et al.*, 2002)
- ICT leads to higher levels of motivation amongst pupils (Cox, 1997)
- Teachers have noted positive effects on behaviour, communication and process skills amongst pupils as a result of the use of ICT (Comber *et al.*, 2002)
- ICT allows for greater differentiation, with programmes tailored to individual pupils' needs (Comber *et al.*, 2002)
- Improved home–school links lead to higher levels of engagement with homework and schoolwork, and higher levels of self-esteem (Becta, 2002)

Improvements for teachers and school managers

- Issuing teachers with their own portable computers can result in an increase in their enthusiasm for their work (Becta, 1998)
- Teachers can use ICT to plan lessons more efficiently and more effectively (Becta, 2002)
- The use of PDAs (Personal Digital Assistants) allows senior managers to work and manage tasks with increased efficiency (Perry, 2003).
- The use of a Management Information System (MIS) gives school managers more control, with greater availability and accuracy of management information (Telem, 2001)

Improvements for parents

- Computerised data tracking systems allow data to be more easily shared with pupils and parents (Kington *et al.*, 2001)
- The use of laptops by pupils establishes more effective communication between home and school (Merchant and Monteith, 1997)
- Virtual message boards offer parents the chance to contribute to the school self-review process (Flecknoe, 2001)

Factors for Effective Use

- ICT is less effective when used in isolation to bring about school improvement, but can be more effective when used as part of a general programme of school development (NFER, 2000, Venezky and Davis, 2002)
- Staff ICT competence and support from ICT competent administration staff are critical in the process if ICT is to have a positive effect on school improvement (NFER, 2000; Venezky and Davis, 2002)
- ICT can assist with school improvement only if it is used in an appropriate way, and when new directions are carefully planned and prepared for (Notland *et al.*, 2001; Venezky and Davis, 2002)
- Staff and pupils should be allowed to feed back their views to senior managers regarding the provision of ICT, if that provision is to be made more effective in helping to bring about school improvement (Rudd, 2001).

The use of ICT for whole-school improvement in practice

Becket Primary School in Worle, makes extensive use of ICT throughout the school, and the approach taken by Michael Moore, the school's headteacher and ICT co-ordinator, has resulted in greatly improved administrative efficiency and teacher effectiveness.

Wide access to ICT among the whole school community is actively promoted, and the school's website provides a useful channel of communication between the school and parents. Staff and parents can access 90 per cent of the school's publications via the website.

ICT is used extensively to support staff in carrying out administrative tasks. The school's meeting agendas and diaries are synchronised on palmtops and classroom PCs, report writing and assessments are completed electronically, and teachers can access all shared data via the network. QCA schemes of work are downloaded from the internet, and word processors are used to draft teachers' short- to medium-term plans.

The school's innovative and motivational approach has had a positive impact on the development and practice of the whole staff, and means that ICT underpins all aspects of school life in a coherent and natural way. The school was praised in its most recent Ofsted report for its effective management and teaching, and Michael's approach to the use of ICT earned him recognition in the Becta 2002 ICT in Practice Awards, where he was a winner in the primary management category.

More information about Becta's ICT in Practice Awards, including case studies of other winners and runners-up, can be found on the main Becta website:
http://www.becta.org.uk/corporate/

Explanation of findings

As with ICT more generally, direct causal effects are not always easily identifiable. Drawing clear conclusions on the effects of ICT from the range of research evidence and reports available can be problematic. There are a number of factors that limit effective comparisons, such as differences in sample sizes, methodologies and effects, and the extent and purpose of ICT use involved.

Notwithstanding these reservations, there are a number of specific uses and effects of ICT which the research has shown may contribute to whole-school improvement, and these are discussed below.

Raising pupil attainment

It is often difficult to establish hard evidence of improved pupil achievement as a result of using ICT. Isolating the impact of ICT from all other influences that can affect achievement can be problematic (Rudd, 2001). However, positive relationships between ICT use and pupil achievement have been found in specific subjects. Statistically significant gains in National Curriculum levels or GCSE grades were found in Key Stage 2 English, Key Stage 3 science, and in KS4 science. This relationship, though, was not found to be consistent, suggesting that the ways in which ICT is used, and not just the amount of use, have a significant effect on pupil attainment. (Harrison et al., 2002)

Increasing pupil motivation

Using ICT can result in pupils experiencing an increased commitment to the learning task, enhanced enjoyment and interest in their learning, and an enhanced sense of achievement and self-esteem. Many pupils perceive that ICT use at school enhances their learning potential, their achievement goals and their long-term college and job prospects (Cox, 1997).

The difficulties in establishing hard evidence of positive outcomes of the use of ICT have led to criticisms that studies in this area rely on anecdotal evidence, through reporting on teachers' and pupils' personal feelings about the value of ICT. It could be argued, however, that these perceptions of teachers and pupils are themselves important factors, as they will also have an impact on motivation and attitudes to learning. (Rudd, 2001)

Management Information Systems (MIS)

Management Information Systems (MIS) are computer systems which allow the integration of pupil and school data to assist in the day-to-day management of schools. MIS increase the availability and accuracy of management information. MIS also lead to improved monitoring, evaluation and feedback for staff and pupils. The use of MIS allows greater management control, and can lead to improved co-operation, teamwork and leadership in a school (Telem, 2001). However, many schools do not make full use of all the features MIS have to offer; senior managers require training to make more advanced use of these systems (Visscher et al., 2001).

ICT: a catalyst or a tool?

Although there is evidence to suggest that ICT can be used to aid the whole-school development process, it is argued that ICT cannot be used alone to raise standards. There can be no guarantees that simply investing in ICT resources and developing accompanying teacher and pupil skills will enhance the overall effectiveness of a school (Rudd, 2001). It is instead suggested that technology serves as an additional resource, or tool for school development, rather than as a catalyst for reform (NFER, 2000; Venezky and Davis, 2002). For ICT to have an effect on a school's development, it must be used as part of a wider programme of measures for school improvement, rather than being used in isolation.

In addition, the importance of human interaction must not be underestimated. Effective use of ICT must be accompanied by careful planning and sequencing; the role of the teacher therefore remains pivotal. Interaction between pupils, and between teachers and pupils, is a vital part of the process of learning through the use of ICT (Rudd, 2001).

Key areas for further research

Further research could include:

- studies which look at the wider agenda of whole-school improvement, and how ICT can contribute to this
- studies of the ways in which ICT can be used to bring about simultaneous school-wide improvements
- studies of the benefits of different types of ICT use, and not just the effects of the amount of ICT used in schools.

Current work in this area

The Becta ICT Test Bed project has provided high levels of ICT equipment and support to three clusters of primary and secondary schools and FE colleges in England. The project's aims include investigating the extent to which the use of ICT can lead to school improvement, the raising of standards, and improved leadership and management. This four-year project is due to end in August 2006, and the planned evaluation of the project is likely to provide a valuable contribution to this area of research.

Strategic Leadership of ICT (SLICT)

This national training programme helps headteachers focus on their strategic role in leading and managing their school more effectively using ICT. It has been developed jointly by Becta and the National College for School Leadership (NCSL). [http://www.ncsl.org.uk/index.cfm?pageID=slict]

Key questions for schools

- To what extent is the use of ICT integrated into a wider programme for whole-school improvement?
- If a Management Information System is used, are all the benefits of this system utilised?
- Are all teaching and support staff confident and competent in the use of ICT for a wide range of tasks?
- Are staff and pupils given the opportunity to feed back their views on ICT provision to senior management?

Bibliography and further reading

The research referred to in this briefing represents a selection from the rapidly growing field of research related to ICT, and should not be regarded as a definitive list of the 'most important' research in this area.

BECTA, 1998. *Multimedia portables for teachers pilot project report*. Becta. http://www.becta.org.uk/research

BECTA, 2002. *ICT supporting teaching: Developing effective practice*. Becta. http://www.becta.org.uk/research

BECTA, 2003. *What the research says about strategic leadership and management of ICT in schools*. Becta. http://www.becta.org.uk/research

BECTA, 2003. *What the research says about ICT and motivation*. Becta. http://www.becta.org.uk/research

COMBER, C., *et al.*, 2002. *ImpaCT2: learning at home and school: case studies.* ICT in Schools Research and Evaluation Series, No. 8, DfES/Becta. http://www.becta.org.uk/page_documents/research/ImpaCT2_strand_2_report.pdf

COX, M. J., 1997. *Effects of information technology on students' motivation: final report*. NCET.

FLECKNOE, M., 2001. *The use of virtual classrooms for school improvement*. Paper presented at BELMAS annual conference, Newport Pagnell (October 2001) http://www.leeds.ac.uk/educol/documents/00001900.htm

GREENE, K., LEE, B., SPRINGALL, E., BEMROSE, R., 2002. *Administrative support staff in schools : ways forward*. DfES Research Report RR331. DfES.

HARRISON, C., *et al.*, 2002. *ImpaCT2: The impact of information and communication technologies on pupil attainment*. ICT in Schools Research and Evaluation Series, No. 7, DfES/Becta. http://www.becta.org.uk/page_documents/research/ImpaCT2_strand1_report.pdf

KINGTON, A., HARRIS, S., LEE, B., 2001. Information and communications technology and whole school improvement: case studies of organisational change. *Education-Line September 2001*, pp. 1-16. http://www.leeds.ac.uk/educol/documents/00001905.htm

LEASK, M., 2001. ICT and whole school improvement. *National Foundation for Educational Research (NFER) OECD/CERI programme.*

MERCHANT, G., MONTEITH, M. 1997. Laptop as messenger: An exploration of the role of portables in home-school liaison. *Reading*, 31 (2), pp.22-25.

NFER, 2000. Case study of ICT and school improvement at Littlejohn school, England. *National Foundation for Educational Research (NFER) OECD/CERI programme*

NOTLAND, M., JOHANNESEN, J., VAVIK, L., 2001. A case study of ICT and school improvement. *National Foundation for Educational Research (NFER) OECD/CERI ICT programme.*

PERRY, D., 2003. *Handheld computers (PDAs) in schools*. Becta. http://www.becta.org.uk/research/reports/docs/handhelds.pdf

RUDD, P., 2001. *School improvement through ICT: the case of England*. Paper presented at the CIDREE seminar: the use of ICT in supporting effective learning and teaching. Scottish education and teaching technology show SECC (20 September 2001).

TELEM, M., 2001. Computerization of school administration: impact on the principal's role – a case study. *Computers in education*, **37**, pp. 345-362.

VENEZKY, R.L., DAVIS, C., 2002. *Quo Vademus? The transformation of schooling in a networked world*. OECD/CERI, ((Version 8c) 6 March 2002), pp. 1-55.

VISSCHER, A., WILD, P., FUNG., A., 2001. *Information technology in Educational Management: synthesis of experience, research and future perspectives on computer-assisted school information systems*. Kluwer Academic Publishers. ISBN 0792370740.

Becta's ICT Research Network

If you're 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 and professional practice.

Membership is free and is open to:
- teachers
- ICT co-ordinators
- ICT advisors
- school managers
- researchers
- policy makers
- research sponsors
- industry.

The Network provides them with an opportunity to:
- exchange information on current research
- develop partnerships
- discuss priorities for further investigation
- focus research on issues of importance to practitioners and policy makers.

They can do this via:
- an email discussion list
- publications
- conferences and events.

More information on Becta's ICT Research Network can be found at: **www.becta.org.uk/research/ictrn**

Alternatively, email: ictrn@becta.org.uk or write to: Michael Harris, ICT Research Network, Becta, Millburn Hill Road, Science Park, Coventry CV4 7JJ.

www.becta.org.uk/research

Becta

ICT Research