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Summary

Research evidence about the impact of ICT in ITT includes the following key benefits

- improved communication between staff and students
- enhanced peer support
- extended links between campus and classroom.

How to maximise the impact of ICT in ITT

- teacher educators showcase ICT in their own teaching methods
- use ICT to provide communication links between students on teaching practice
- reduce computer-related anxieties by provision of appropriate training.

What the research says about ICT and initial teacher training

This report is based on an analysis of available research into the use of ICT within Initial Teacher Training (ITT). It summarises the key findings and suggests resources for further reading.

Developments within ITT over the last ten years have seen an increased emphasis on the role of in-school training and experience. ICT is recognised as an integral part of the ITT National Curriculum – students must demonstrate that they use ICT effectively in their teaching. Skills tests have also been introduced, requiring that students reach minimum standards of capability in ICT, literacy and numeracy before being awarded qualified teacher status.

This report's focus is on academic research studies, and the lessons that may be learned from their findings. It includes the findings of studies from other countries where it is felt they may have some applicability in the UK context.

The topic has been interpreted broadly. The various strands to the analysis that follows include:

- how teacher educators may exploit ICT
- the benefits for student teachers of ICT
- the use of ICT in the context of teaching practice
- how best to train both teacher educators and students to use ICT
- computer conferencing and its potential in ITT.

Key research evidence about ICT in ITT

On the basis of Becta's analysis, ICT can have positive effects in the areas outlined below (there are references for further reading supplied alongside the findings).

General benefits

- Video conferencing may improve communication between students on teaching practice in schools and university staff (Falconer & Benjamin 2002).
- Computer conferencing allows the establishment of communities of practice among student teachers (Clarke 2002).
- ICT provides enhanced opportunities for communication between the campus and the pupils and teachers in schools (Graham & Thornley 2000).
- Embedding ICT into ITT encourages the development of technology skills which can be drawn on by students when they become teachers (Graham & Thornley 2000).

Benefits for students

- There may be communication between university students and children and teachers in classrooms, which allows students to examine theoretical concepts and put their newly acquired knowledge in context (Graham & Thornley 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 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).

- Going beyond communication, the internet also enables forms of campus/classroom collaboration such as the tele-mentoring of school students by student teachers — an extended means of linking educational theory and practical outcome (Hewitt 2002).
- Using digital video to record observations of exemplary teaching can enhance the ability of students to identify, interpret and analyse effective practice (Beck et al. 2002).

Benefits for teacher educators

- Electronic portfolios provide an enjoyable and accurate method of assessment that serves to encourage and motivate students (Wright & Stallworth 2002).
- Using video conferencing to observe a student in the classroom and provide feedback can be less disruptive than supervising on site (Falconer & Benjamin 2002).
- Video conferencing allows frequent and timely face-to-face communication between student and supervisor, who can then provide appropriate support as it is needed (Falconer & Benjamin 2002).

Benefits specific to computer-mediated communication (CMC)

- Discussion groups provide a venue for reflection on practice (Clarke 2002).
- Feelings of isolation and pressure amongst students in schools can be reduced by participation in a discussion group (Clarke 2002).
- Participation in computer conferencing improves ICT skills and promotes general ICT awareness (Galanouli & Collins 2000).

- Online discussions tend to be characterised by a degree of participation and candidness rarely seen in the more intimidating environment of the classroom (Dutt-Doner & Powers 2000).
- Students may have the opportunity to access expertise from more experienced peers or subject experts for use in resolving classroom difficulties, resulting in increased confidence. There may even be online collaboration through the use of an online lesson-planning tool (Levin & Waugh 1998; Andrews 2002).

Factors for effective use

- Adequate access to ICT by students on teaching practice — it has been suggested, for example, that the provision of laptops means students are more likely to increase their awareness of available educational software, integrate technology in their teaching and disseminate their knowledge to colleagues (Anderson & Petch-Hogan 2001).
- For CMC to be effective, a structure is required, such as the establishment of explicit objectives for the discussion, and the posing of defined topics (Nonis et al. 2000). Reducing anonymity amongst participants by holding social events or introducing an element of video conferencing may also help to stimulate discussion (Galanouli & Collins 2000).
- Teacher educators, being role models for the integration of technology into classroom teaching, should demonstrate their own competency and willingness to use ICT in teaching (Yildirim 2000).
- Students' anxieties about using computers may be reduced by providing appropriate computer literacy training (Yildirim 2000).

ICT in ITT in practice

Research studies have demonstrated the potential of specific applications of ICT, including video conferencing, CMC and electronic portfolios. Effective course materials for implementing the ICT strand of ITT are also required, and Teach to the Future is an example of a free programme, initially aimed at schools, but since 2001 also implemented in the ITT sector. It is estimated that 15,000 people in ITT have now worked with it. Its aim is to give students the confidence and skills to integrate ICT into their teaching. Teach to the Future is currently being evaluated by a team at Exeter University; an interim report was

published in January (Tearle & Dillon 2003). Recommendations will not be made until the final report in July 2003, but take-up within the ITT sector is already significant, and early findings indicate that it is a flexible and relevant programme that meets the needs of its participants.

More information on Teach to the Future can be found at: <http://www.intel.com/english/education/sections/section2/index.htm>

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.

Students' use of ICT during their school experience

One way of assessing the impact of the emphasis on ICT in the ITT National Curriculum is to look at the practices of student teachers during their school experience. A drawback to this is the variety of local factors that may influence students. One study which concentrated on the influence and behaviour of teacher-mentors found that they were frequent ICT users, and also often took active steps to support teaching with technology by students (Cuckle & Clarke 2002). Students did not necessarily follow suit, however, with other factors affecting their teaching practices, including lack of time, difficulties with access to computers, and a lack of active support and role models amongst other teachers.

An earlier survey of student teachers found differences in the use of ICT which were related to the subject being taught (Cuckle *et al.* 2000). Students of IT, maths, science, design and technology, geography, social science and music reported making greater use of ICT in the classroom, better access to computers and more existing use of ICT by practising teachers, by comparison with students of other subjects. This could be a function of there being more obvious uses for ICT in these subjects, some of which are relatively numeric, resulting in more demand for ICT resources by these departments. Consequently access to ICT is improved for the student, who also benefits from having role models available.

Peer support is important to the student in school, and if it is not available locally then CMC may represent a good alternative. It is notable that opportunities for students to communicate online, to share experiences and seek assistance seem to reduce stress and increase confidence (Clarke 2002; Galanouli &

Collins 2000). Access to supervisors is also valuable, and the experiments in video conferencing between university and school show the value of timely face-to-face communication in allowing the student to seek support and advice as needed, even if this may not be an approach available to many.

Overcoming barriers

There is a concern that if students become disillusioned by the potential of ICT during their school experience, then this may lead to a career-long negativity. The issue of access to ICT is one that may be expected to diminish as government funding for ICT in schools bears fruit. Another solution could be to supply student teachers with laptops, and a US study did find that students, so equipped, were more likely to increase their awareness of educational software, integrate ICT in their teaching, and share their experiences with colleagues (Anderson & Petch-Hogan 2001). However, a student with a laptop could still find their teaching plans handicapped by poor school infrastructure and a shortage of computers for pupil use — 'access' does not only mean teacher access. The only complete solution is a steady improvement in ICT infrastructure throughout schools, but the ICT facilities that students find available are not yet of a uniformly high quality.

While problems of access should reduce in time, there are also grounds for optimism concerning the availability of positive role models. Teachers now entering the profession have completed ITT courses where they must show a capability to teach using ICT, and they have also passed an ICT skills test. As the proportion of practitioners trained under these conditions increases, so should the likelihood that new entrants find support amongst peers in the use of ICT, to back up the initial enthusiasm and confidence that they have.

Key areas for further research

- Are there certain course activities which have a demonstrable impact on students' eventual use of ICT in teaching?
- Do today's new ITT students already have extensive ICT skills?
- Is it possible to demonstrate practical outcomes as a result of student teachers' participation in online discussions?
- The use of digital video in reviewing effective classroom practice.

About the research literature

ICT in ITT is a broad area of study, composed of several sub themes as reported above. Investigations into students' ICT abilities and anxieties are common, but are losing their currency in a time where people grow up with computers and can be expected to arrive at their ITT institution already in possession of advanced ICT skills. Learning to incorporate ICT in teaching is a fresh challenge though, accentuated by the extra difficulties of doing this in a school environment where computer facilities may be poorer than those at university. Researchers have endeavoured to discover what affects a student's propensity to teach with ICT once outside the ITT institution. Studies are overwhelmingly qualitative in nature.

Key questions for teacher educators

- Could collaborative links be established between students and school pupils based on CMC?
- Is best practice in the use of ICT embodied in the teaching of ITT students?
- What quality of access to ICT will students experience during their school experience, and would they benefit from being equipped with a laptop?
- What is the extent of home computer ownership amongst students?

Bibliography and further reading

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

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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 advisers
- 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:

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

Alternatively, send an email to:

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

This briefing and others in the 'What the Research Says' series can be found on the Becta Research website at: <http://www.becta.org.uk/research/>

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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.

About the ICT in Schools Programme

The ICT in Schools Programme is the Government's key initiative to stimulate and support the use of information and communications technology (ICT) to improve standards and to encourage new ways of teaching and learning. The enormous potential of ICT means that for the first time it is becoming possible for each child to be educated in a way and at a pace which suits them, recognising that each is different, with different abilities, interests and needs. 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 is provided in the paper *Transforming the way we learn*, available at: <http://www.dfes.gov.uk/ictfutures>

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