



**DEEP IMPACT: an investigation
of the use of information and
communication technologies
for teacher education in
the global south**

*by Jenny Leach
with Atef Ahmed, Shumi Makalima and Tom Power*

DEEP IMPACT: an investigation of the use of information and communication technologies for teacher education in the global south

Executive Summary

The scale of the demand and need for primary school teachers if the Millennium Development Goal of Universal Basic Education (UBE) is to be achieved far outstrips existing provision. The countries of sub-Saharan Africa face particular challenges: over 40 million children of primary school age are without school experience and the numbers are growing. The Digital Education Enhancement Project (DEEP) is an applied research project exploring the ways in which information and communications technology (ICT) can improve access to, and the quality of, teacher education in the global south.* It is focused upon three key research questions:

- What is the impact of ICT use on the pedagogic knowledge and practice of teachers and the communities in which they live and work?
- What is the impact of ICT-enhanced teaching on student achievement and motivation?
- How can teacher education and training be developed to ensure that teachers have the capacity to exploit the potential for ICT?

There is a dearth of research on the application of ICT to teaching and learning in developing country contexts, specifically in the key areas of literacy, numeracy and science at the primary level. In addition there are currently few, if any, examples of planned investigations into how mobile technologies can be used to support teacher education in sub-Saharan Africa. The project's aim is to inform policy makers, educational researchers and others interested in ways in which new forms of technology can enhance teachers' capabilities and improve knowledge and professionalism in the global south.

DEEP was funded by the UK Department for International Development (DFID) and co-ordinated by the Open University (UK), with the University of Fort Hare (UFH), South Africa and the Programme, Planning and Monitoring Unit (PPMU), Egypt. The research was carried out in 12 primary schools in Egypt and 12 in South Africa with 48 teachers (two per school) and involved over 2,000 primary school students. Teachers worked in pairs to implement and evaluate a short, curriculum-focused, school-based professional development programme, using a range of new technologies including hand-held computers. Activities focused on the teaching of literacy, numeracy and science. ICT was used in some significant ways by schools as a whole, as well as many of the communities in which project teachers lived and worked.

The following headline findings are suggested by this study:

- All project teachers in both contexts quickly developed confidence in using desktop/lap-top and hand-held computers for a range of purposes.
- Development of basic computer skills was largely unproblematic.
- The majority learnt to use a variety of digital softwares and other peripherals in a short time frame.
- Frequency and type of use of these softwares and peripherals varied considerably within and between contexts.

ICT use enhanced teachers' professional knowledge and capability by:

- extending subject knowledge;
- enabling planning and preparation for teaching to be more efficient;
- developing the range of teachers' existing pedagogic practices.

All teachers introduced ICT into planned lessons with their classes and there was wide-ranging evidence of positive outcomes.

The majority of teachers were highly motivated to succeed in using ICT for their own and for their students' learning despite numerous challenges:

- Where technical support was scarce, teachers worked to solve the problems.
- Security issues were successfully and pragmatically addressed in a variety of ways relevant to context.

The nature of the uses of ICT varied according to context, particularly with respect to:

- teacher access to adjacent technologies;
- geographical location;
- local educational and cultural practices;
- home language;
- teachers subject specialisms.

ICT facilitated new forms of teacher-to-teacher co-operation.

* The 'global south' encompasses the following countries: Africa, Latin America, the Middle East, the Caribbean, Asia and the Pacific.

There was no significant correlation between teachers' prior use of ICT and the ICT-enhanced classroom practices they developed during the programme:

- Some of the most sustained, and effective practice was developed by teachers with no previous experience of ICT and/or no prior experience of using ICT for teaching.

There were more women participants than men; successful outcomes were equally visible for both men and women.

Students in both contexts quickly developed confidence in using desktop/lap-top and hand-held computers for a range of purposes:

- Development of basic computer skills was unproblematic.
- The majority learnt to use a variety of digital softwares and other peripherals (e.g. Word, Calculator, Powerpoint, Internet, E-mail, games, scanner, printer, photocopier, camera) in a short time frame.

Students used ICT to carry out a range of literacy, numeracy and scientific activities and there were the following outcomes:

- Students showed high levels of motivation in using ICT both within and out of lessons.
- A range of achievements, including improvements in literacy and science learning, were reported by teachers, school principals, parents – and students themselves.
- Increase in school attendance was also evident in both country contexts.

The majority of teachers reported using the hand-held computers on a regular basis for a variety of functions, including classroom activities:

- the hand-held's small size and weight meant teachers could have the device with them wherever and whenever they wished, facilitating 'anywhere, anytime professional learning'.

Where mother-tongue interfaces or software were not available this limited the effective uses of ICT for both personal and professional purposes.

Existing cost analyses of ICT use for teacher education in developing contexts are likely to be inflated because they are based on outmoded forms and uses of ICT:

- They should take account of a range of important factors including the significant recent development in cost-effective, powerful mobile technologies.

Educational uses of ICT must be strongly grounded in educational and pedagogic principles, employ quality resources and ensure that professional support is paramount.

Teachers' evaluations of the programme were positive and attrition was low: only one school failed to complete. Within both countries there has already been an active commitment to build on the research: the approach has been welcomed as offering potential for widening opportunities for continuing professional development, as well as laying a strong basis for innovative strategies to address the challenge of poverty. A key lesson from the study is that investment in high-quality programme design and implementation is necessary to realize the potential of new modes of teacher education using ICT.

Outcomes of the study suggest that teacher development should not be isolated from student- and curriculum- focused ICT developments. Forms of ICT, software and associated training should be primarily determined by the purposes and context of use: this means they must be strongly focused on schools and classroom practice. School-based professional development uniquely permits ICT to simultaneously provide the medium, context and content for: teachers' personal and professional development; new and improved curriculum, school and classroom practices; student learning and activity. DEEP provides evidence that teachers and students can quickly develop a range of ICT skills in the process of using digital technologies for curriculum purposes, providing collaborative and peer learning approaches are exploited. This approach challenges conventional views of ICT teacher training (i.e. off-site courses focusing discrete IT skills), as well as more conventional views of ICT provision in schools (i.e. desktop computer suites for the development of individual students' IT skills).

The findings also suggest that such training could be developed to encompass the educational needs of rural communities more broadly. ICT innovations could be looked at holistically, not just in relation to schools and their teachers but also to the needs of communities more widely. Such approaches would help ensure a range of additional benefits such as strong learner support networks, multi-use of costly equipment, consistency in approach to childhood and adult literacy and cross-cutting delivery across the range of Millennium Development Goals.

The study also offers some new parameters around which different models could develop in the future, for example: competition 'bidding in' by schools for a project placement, thus creating a sense of ownership and responsibility; self-help

DEEP IMPACT: an investigation of the use of information and communication technologies for teacher education in the global south

approaches to 'technical' support; partnerships between educational institutions, crossing national and international boundaries; multi-use of ICT ensuring full exploitation of provision; self-monitoring procedures to ensure security; and private sponsorship of ICT.

Key policy implications raised by the study:

- Policy planning for the development of national systems of teacher education should explicitly recognise the increasingly important role of ICT and its potential for increasing access and improving quality.
- ICT policy and practice must be closely matched to local contexts and needs, with a particular focus on classroom relevance and learner achievement.
- The potential of new, mobile technologies needs further investigation in a wider range of contexts and purposes.
- Further evidence is urgently required as to the way in which new forms of technologies, particularly mobile technologies, can impact on the logistics/costs of ICT provision for teacher education.

In addition to these broad policy implications, the study suggests a number of key principles that determine the quality of ICT-enhanced school-based teacher education in developing contexts:

- personal access to ICT;
- ICT appropriate to local setting and conditions;
- opportunity to integrate ICT activity into daily routines and practices;
- use of ICT-supported peer and team learning;
- focus on ICT for curriculum and classroom purposes, not skills;
- availability of relevant content in an appropriate language medium;
- provision of local, national and international professional e-networks;
- assessment practices relevant to ICT-enhanced learning;
- user evaluations of the relevance of ICT hardware, software and related curriculum uses for learning;
- strong vision of the potential of ICT for learning from national ministries and educational policy makers;
- visible political determination to plan for ICT access by schools and their communities, ensuring synergy across and between adjacent services (e.g. education, healthcare, agriculture);
- research and development that strengthen exemplification of the way ICT can be effectively used by teachers and students, in order that evidence, rather than rhetoric, becomes the authority.

The research study shows that new digital technologies are appropriate for use in the African context. They have the potential to revolutionise the quality of training when carefully integrated within programmes that are pedagogically strong and well supported.

Teachers and schools in poor environments can benefit from the many advantages that ICT is currently affording richer peers, whilst leap-frogging expensive mistakes made in more developed countries. Mobile digital devices, that have to date been largely aimed at the business market, could be exploited by teachers and students for a range of professional and learning experiences. Teachers, together with parents, governors, school principals and community members, have reported that the use of new technologies had positive effects on areas central to Universal Basic Education (UBE), including attendance, motivation and the quality of student learning.

Most significant of all, perhaps, the study suggests that the use of ICT in some of the poorest parts of the world, if well planned and implemented, could have a significant impact on the self-image, confidence and professionalism of teachers. In this sense ICT offers the potential to redefine and enhance the status of teachers within communities and more broadly across the societies they serve.

This study concludes that teachers and schools in poor environments can benefit from the many advantages that ICT is currently affording richer peers, whilst leap-frogging expensive mistakes made by more developed countries.