

What do we know about the effective uses of information and communication technologies in education in developing countries?

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Executive Summary

infoDev maintains a series of *Knowledge Maps* that attempt to document what is known -- and what isn't -- about ICT use in education. These *Knowledge Maps* reveal that, despite a decade of large investment in ICTs to benefit education in OECD countries, and increasing use of ICTs in education in developing countries, important gaps remain in our knowledge. In addition, there appears to be a dearth of useful resources attempting to translate what is known to work and not work in this field for policymakers and donor staff working on education issues in developing countries, especially those issues related to Education For All and other education-related Millennium Development Goals. A lack of reliable data related to the impact of ICTs on learning and achievement in developing countries, as well as a lack of useful indicators and methodologies to measure such impact, hampers policy guidance in this area. A mismatch also exists between methods used to measure the effects of ICT use in education in developing countries, and type of learning styles and practices that the introduction of ICTs are meant to promote, or at least facilitate.

Despite a lack of reliable impact evidence, recent *infoDev* surveys of World Bank support for ICT components in projects in its education portfolio, and country-level surveys sponsored by *infoDev* of ICT use in education in Africa and the Caribbean, document tremendous growth in the use of – and demand for – ICTs in the education sector. This mismatch between weak evidence and growing use raises many questions about the nature of ICT-related investments in the education sector in developing countries.

Please note: The findings, interpretations and conclusions expressed herein are entirely those of the author and do not necessarily reflect the view of *infoDev*, the Donors of *infoDev*, the International Bank for Reconstruction and Development/The World Bank and its affiliated organizations, the Board of Executive Directors of the World Bank or the governments they represent. The World Bank cannot guarantee the accuracy of the data included in this work.

What do we know about the effective uses of information and communication technologies in education in developing countries?

infoDev maintains a series of “Knowledge Maps” outlining what is known—and what isn’t—about the use of information and communication technologies (ICTs) in education. These knowledge maps reveal that, despite a decade of large investment in ICTs to benefit education in OECD countries, and increasing use of ICTs in education in developing countries, important gaps remain in our knowledge. In addition, there appears to be a dearth of useful resources for policymakers and donor staff working on education issues in developing countries, identifying what is known to work—and not work—in this field, especially in support of Education For All (EFA) and other education-related Millennium Development Goals (MDGs). [see Trucano 2005]

The knowledge maps, which are used to help guide discussions between donors and governments exploring the use of ICTs in the education sector, investigate ten topics (impact of ICTs on learning and achievement; monitoring and evaluation; equity issues; costs; current projects and practices; specific ICT tools; teaching and ICTs; content and curriculum; policy issues; and school-level issues). The key findings are divided into four major themes:

Key Findings: Impact

- The impact of ICT use on learning outcomes is unclear, and open to much debate.
- Widely accepted, standard methodologies and indicators to assess impact of ICTs in education do not exist.
- A disconnect is apparent between the rationales most often presented to advance the use of ICTs in education (to introduce new teaching and learning practices and to foster ‘21st century thinking and learning skills’) and their actual implementation (predominantly for use in computer literacy and dissemination of learning materials).

Key Findings: Costs

- Very little useful data exists on the cost of ICT in education initiatives, especially related to Total Cost of Ownership and guidance on how to conduct cost assessments.

Key Findings: Current implementation of ICT in education

- Interest in and use of ICTs in education appear to be growing, even in the most challenging environments in developing countries.

Key Findings: Policy: Lessons learned and best practices

- Best practices and lessons learned are emerging in a number of areas, but with few exceptions, they have not been widely disseminated nor packaged into formats easily accessible to policy makers in developing countries, and have not been explicitly examined in the context of the education-related MDGs.

While much of the rhetoric about (and rationale for) using ICTs in education has focused on the potential for changing the teaching-learning paradigm, in practice, ICTs are most often used in education in less developed countries (LDCs) to support

existing teaching and learning practices with new (and, it should be noted, often quite expensive) tools. While impact on student achievement is still a matter of reasonable debate, a consensus seems to have formed that the introduction and use of ICTs in education can help promote and enable educational reform, and that ICT is a useful tool to both motivate learning and promote greater efficiencies in education systems and practices.

Surveys of ICT use in education in developing countries: What is actually happening?

Research teams supported by *infoDev* and coordinated by the Commonwealth of Learning (COL) and others are seeking to document the major developments in each country in Africa [see Farrell *et al* 2007a, 2007b, 2007c] and the Caribbean [see Gaible 2007] related to technology use in education in order to create the first consolidated look at this fast-changing sector in these regions and provide preliminary answers to three broad questions:

- How are ICTs currently being used in the education sector, and what are the strategies and policies related to this use?
- What are the common challenges and constraints faced by countries in this area?
- What is actually happening on the ground, and to what extent are donors involved?

infoDev and its partners hope that release of the results from these surveys, and related monitoring and evaluation studies of key initiatives like NEPAD e-Schools, is a first step in a larger, on-going, systematic, coordinated initiative to track developments in technology use in the education sector to help inform a wide variety of stakeholders interested in the topic as they seek solutions to larger, more fundamental educational and development challenges in the years ahead.

Key findings

- *ICT use in schools in Africa and the Caribbean is growing rapidly (from an admittedly low base).*
This growth is largely the result of 'bottom up' initiatives, often facilitated by civil society organizations. Barriers to use include high costs (especially of connectivity), poor infrastructure, insufficient human resource capacity, high costs, a variety of disincentives for use, and inadequate or insufficient policy frameworks.
- *The process of adoption and diffusion of ICT in education in Africa is in transition, and widely variable.*
A marked shift seems to be emerging from a decade of experimentation in the form of donor-supported, NGO-led, small-scale, pilot projects towards a new phase of systemic integration informed by national government policies and multi-stakeholder-led implementation processes. "This shift from projects to policies, and the more systematic development that that implies, would not be possible without the growing commitment to ICT in education on the part of government leaders across the continent". [Farrell/Isaacs 2007]
- *ICT use in education in the Caribbean, and the context of its use, varies only within a limited range.*
ICT use in schools in the region is primarily centred around basic ICT literacy instruction and computer use.

Planning for ICT use in education in developing countries A way forward for policymakers

As an aid to education policymakers in developing countries under tremendous pressure -- from parents, from vendors, from business, from technology advocates -- to provide schools with a variety of ICTs, *infoDev*, UNESCO and others partners have developed and utilized an ICT-in-Education Toolkit as part of policy consultations in 26 countries. [see Haddad 2007] Feedback from Toolkit users consistently states that provisioning ICTs for use in schools, no matter how hard and expensive initially, is the easiest and cheapest element in a series of policy choices that ultimately *could* make ICT use sustainable and/or beneficial for learners. Indeed, the appropriate and effective integration of ICTs in schools to impact teaching and learning practices is much more complicated. The proliferation of ICT use outside the school – especially the growing use of mobile phones – has yet to impact in any meaningful way the use of ICTs within formal education systems. To help guide policy choices around technology use and choice in education in developing countries, a more robust set of shared indicators and evaluation methodologies must be developed and tested in real-world circumstances. As discussed in *infoDev's Monitoring and Evaluation of ICT in Education Projects: A Handbook for Developing Countries*, "evidence to date suggests that policymakers and project leaders should think in terms of combinations of input factors that can work together to influence impact. Coordinating the introduction of computers with national policies and programs related to changes in curriculum, pedagogy, assessment, and teacher training is more likely to result in greater learning and other outcomes." [Wagner 2005]

The process of integrating ICTs into educational systems and activities can be – and typically is -- arbitrary, *ad hoc* and disjointed, as evidenced through recent *infoDev* surveys of ICT use in education in the 75 developing countries. [Farrell *et al* 2007a, 2007b, 2007c, Trucano 2007] Such *adhoc* results often results in ineffective, unsustainable and wasteful investments. On the other hand, a comprehensive set of analytical, diagnostic and planning tools, such as those promoted through the *ICT-in-Education Toolkit*, can "force a certain discipline on the process. The use of tools does not make policy formulation 'scientific' and 'rational'. Nor will it replace the political/organizational nature of policy formulation." [Haddad 2007]

That said, it is clear that current tools available to help aid policymakers make informed decisions about technology choices for schools are quite primitive. Reasonable minds can argue over what is meant by 'impact' and 'performance', but substituting belief for scientific inquiry doesn't seem to be a particularly responsible course of action. The power of ICTs as enablers of change -- for good, as well as for bad -- is undeniable. However, the use of ICTs in education in many developing countries, especially the "poorest of the poor," is associated with high cost and potential failure. Simply wishing away the existing local political economy of the way technology is implemented and supported in schools doesn't mean that it actually goes away. With more rigorous analysis and evidence of impact, and better decision tools, developing country policy makers – and their partners in the international community – can make wiser and more sustainable choices in deploying ICT to enhance access to, and quality of, education at all levels.

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