

PERSPECTIVES ON ICT4E IN THE DEVELOPING WORLD

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Introduction

The paper will attempt to present some practitioner perspectives, insights and experiences which the Global e-Schools and Communities Initiative (GeSCI) gained from its work in and with partner countries in three continents. The main issues related to Information Communications Technologies (ICTs) in education, as well as the insights provided on the challenges and lessons learned, are drawn from GeSCI's work in partner countries and from the literature.

Significant attention is being paid globally as to how ICTs might be used in schools, colleges and universities to facilitate teaching and learning as well as supporting continuing professional development of pre-service and in-service teachers, teacher educators and lecturers in technology use. ICT in education presents many poor countries with great opportunities, though at the same time presents considerable challenges with regard to infrastructure, cost, sustainability, optimal use and making teaching and learning meaningful for students.

The advancement of ICTs is often described as the third revolution in the dissemination of knowledge and in the enhancement of instruction.¹ This description clearly demonstrates the power and potential of these technologies. What is even more important is that because of the speed of innovation and change of new and emerging technologies, it is difficult to predict with any measure of certainty not only what technologies would be most suitable for the educational sector, but also what impact (whether constructive or disruptive) these new and sophisticated tools would have on bureaucratic and often archaic education systems in the developing world.

ICTs can be powerful enablers of development goals because their unique characteristics can and do radically improve communication and the exchange of information to strengthen and create new economic and social networks. However, the claims about what they can do in education are often blown up beyond proportion, and barriers to successful implementation and sustained use in constrained environments are seldom highlighted. There are hopes and claims that the use of technology will help developing countries to overcome the challenges they face in development, and particularly in the field of education and learning. In most developing countries, however, these are still just hopes and claims and are yet to be proven.

Today a key aspect of education is that students acquire the skills, expertise and knowledge which are most appropriate for the current milieu, normally referred to as the 21st century or the Information Age. Technological literacy is one of the required skills for the current milieu whether in a developed or developing country, but as rapid change is a characteristic of our time, the main skills are the higher-order ones: *the ability to learn how to learn* (i.e. to be a life-long learner), *the ability to reflect, to analyse, synthesise, to find solutions and to adapt*. These skills could well be acquired without ICTs, but ICTs, when used appropriately, lend themselves to the development of such skills.

There is still a lot to learn about ICTs and the ways in which they are and will be impacting on the educational processes and systems, and multi-faceted research initiatives will contribute to generating insights and evidence and stimulating discussions on these issues. ICTs offer great hope for improving access, quality and efficiency of education, but there is a need for policy makers to understand the key issues underlying the educational problems and to formulate sensible strategies using ICTs and other tools and mechanisms to overcome the problems.

What is the current situation in education in developing countries?

Although there has been considerable commitment and huge investments by national governments and their partners in the developing world to improve access, retention and the quality of education, the current state of education in most developing countries presents a rather bleak picture. Studies indicate that up to as many as 40 African countries may not achieve the Education for All (EFA) initiative's 2015 enrolment goals or the Millennium Development Goals (MDGs).

According to the UNESCO EFA Global Monitoring Report (2005) the greatest educational deprivation is found in sub-Saharan Africa (SSA) and South Asia. Around the world today, 115 million children between the ages of 6 - 11 are not in school and 150 million will drop out before they finish basic education. This means that they would not have acquired adequate levels of literacy, numeracy and life skills. It is reported that in Bangladesh just over half of children

¹The 1st being the invention of written language and the 2nd the development of movable text and books. From *The ICT in Education Toolkit for Policy Makers, Planners and Practitioners*, UNESCO Bangkok retrieved from <http://www.ictinedtoolkit.org/user/conceptblueprint.php> on 4 August 2006.

complete primary school, and a third of those who do, cannot read and write. 96% of out-of-school children live in developing countries and sub-Saharan Africa and South and West Asia together account for almost three quarters of unenrolled children. About 57% of such children are girls. These out-of-school children in developing countries are especially vulnerable to poverty, hunger, violence, exploitation and disease as not being in school contributes to future generations of people with limited life chances.

Most developing countries have made substantive investments and efforts to expand and improve primary education. It is well-known that secondary education has been the standard minimum level of education for many years in most developed and high-income countries, and is considered an important factor for economic development. Although developing countries strive to improve their socio-economic situation and subscribe to the notion of moving towards knowledge-based economies or societies, to a large extent they have failed, except for a few, to expand their secondary and higher education sectors significantly. To a certain extent donor policies contributed to this state of affairs.

UNESCO (2005) reports that in most developing countries a large proportion of primary-school graduates never make the transition to secondary education and even fewer make it to higher education. In sub-Saharan Africa only 55% of children attend primary school, and only 24% go on to secondary school. The situation is particularly bad for girls. Statistics indicate that barely half of girls in sub-Saharan Africa attend primary school, and only 17% are enrolled at the secondary level. The above suggests that, with a few exceptions, widespread access to higher education remains a privilege of developed country residents.

It is within this context that some of the issues, challenges and lessons learned will be explored.

What are the big/main issues with regard to ICTs in education?

There are many issues, questions, challenges and queries associated with the use of technologies and media in education. This paper will not deal with them all, but will only refer to those which have surfaced in GeSCI's work in partner countries and which are most often raised in the literature. These are the issues which need careful consideration and more research to ensure that the investment in and utilisation of ICTs lead to the desired results. These include the following:

The rush to adopt the new technologies in education

According to Christensen (1997) the world is experiencing the fastest adoption of a disruptive technology (internet) in human history. Milliron (2004) contends that the rush to infuse technology into education without critically and thoughtfully exploring all aspects is dangerous. It might be wise to pause and consider whether we are moving too fast with technologies which are largely untested in the educational arena having been designed for other purposes, and about which we are not sure that they will really significantly enhance learning achievement.

Developing countries often find themselves in situations where there is pressure to acquire and adopt new technologies because of the claims of what these technologies could do to aid and leapfrog their development, without really understanding the potential and reach of the technologies, or without having analysed their environments and contexts for appropriateness, applicability and impact.

Focus on technology

To a large extent discussions and planning for ICTs in education are driven by a technological imperative with little thought being given to the wider educational context within which the technology is to be used. The appropriateness of the technology for the purpose (one size does not fit all, just as one style of music does not satisfy all audiences) is often overlooked in the rush to acquire technology. Technology is not the answer, unless it reflects learners' needs and suits their environments. The use of technologies *per se* cannot make up for poor pedagogy and content. It is Prof. Chris Dede's view² that when you start with technology, it is a solution looking for a problem.

The "fire model" of educational technology

There seems to be a widespread notion that technologies can generate learning the way a fire generates warmth. This leads to lots of wasted money, with technologies put into schools but either unused or used poorly. For the new technologies to actually contribute to learning, much more thought needs to be put into issues of pedagogy, curriculum, professional development of teachers, software, maintenance, scheduling, and other issues. As Dede would say³, ICTs are less like fire and more like clothes - they make you warm when they fit well.

² In Pruitt, 2005.

³ In Warschauer, 2003.

Pfeffer and Sutton (2006) indicate that decision makers and managers often base their decisions on lots of things other than research and evidence. This is often true in the education sector and in particular when it comes to technology. The assumptions about ICTs that underpin interventions are rarely (adequately) examined and “dangerous half-truths” are uncritically accepted. There is the assumption that what works for some will work for all, resulting in developing countries simply “copying” the developed country approaches without critically looking at what works, why it works and whether and how it will work in their own contexts. We need a greater appreciation for negative evidence and begin with a focus on the problem (for example, the need to increase achievement, or access to instruction), and then search for relevant evidence from the literature and practitioner experience that can support the development of a variety of solutions to those problems.

Start with the learner

Students, even in developing countries, often have considerable skills in the manipulation of new technologies⁴, sometimes more so than their teachers. These skills, which the students are teaching themselves, are largely ignored and under-utilised in schools and curricula. Pedagogical strategies in formal schooling rarely take these skills into consideration. An excellent example of how pedagogy can be changed to meet the skills of students can be found in a small but well-known project in India. Dr. Sugata Mitra erected his first kiosk, containing a personal computer with an internet connection, in the middle of Delhi in 1999. Street children immediately took to the machines and, through their own curiosity and intelligence, learned to become proficient.⁵

ICTs provide more flexibility about how, what and where students learn. They can enable students to move on from being consumers of learning materials to become producers, collaborators, researchers and publishers. Mobile learning provides for more personalised learning and puts students more in control of the technologies than teachers (Stead, 2006)⁶. This has both potentially positive and harmful implications for educational institutions which need to be further explored.

⁴ In developing countries particularly with mobile phones.

⁵ Hole in the Wall Project.

⁶ From Becta ICT Research: Emerging Technologies for Learning (2006).

Technology and the traditional classroom

There is according to Stead (2006) an incorrect assumption about e-learning that it could become the solution to all learning problems, that teachers would become redundant and that everything could be “e-taught”. Ginoplous (2005) holds the view that technology and e-learning will not replace the traditional classroom, but have the potential to radically transform it. This means that technology is forcing educators to rethink the definitions of “school”, “classroom” and “student”. E-learning challenges traditional ways of doing things, creates new alliances, and interjects new ways of addressing old problems. It is not yet clear what the impact of incorporating ICTs into the pedagogical milieu of schooling will be, and in what ways (intended or otherwise) they will affect children's ways of thinking, the ways they construct knowledge, and what new forms of thinking and intelligence will be emerging as a result.

The power of ICTs lends itself to distance learning not only at tertiary level and for adults, but also for school students. It is foreseen that the ways in which young people will learn in the future will be significantly different from those which prevail currently in most schools (Duke, 2002). ICTs offer new notions of lifelong learning and learning societies, and the old notions of ivory tower institutions and closed formal schooling are losing their validity. Education systems and schools must take cognizance of this and the growing insistence on shifting the emphasis from teaching to learning and from institutional to lifelong and life-wide learning. It is necessary to explore how ICTs can complement and enhance other pedagogical strategies and in which situations which mode of learning (e-learning or classroom learning) would be more effective. According to Siemens⁷ the appropriate learning objectives, circumstances and budgets will determine the mode.

If these issues are not critically examined and addressed Ginoplous (2005) might be justified in asking the question: “Will our bricks and mortar school buildings become the knowledge jail cells of tomorrow?”

⁷ <http://www.elearnspace.org>

Technology and teachers

ICTs have brought new possibilities into the education sector, but, at the same time, they have placed more demands on teachers. Knowledge is expanding rapidly, and much of it is available to teachers and students at the same time. This puts an unavoidable burden on teachers to continue updating their knowledge and exposing themselves to modern channels of information. Most teachers find this uncomfortable. Teachers now have to learn how to cope with the new technologies in their classrooms, how to compete with students in accessing the enormous body of information (particularly via the Internet), and how to use the hardware and software to enhance the teaching and learning process. Most often students are more advanced in and adept at using the new technologies than their teachers.

Technology and content

A major issue in developing countries is content for ICT-based learning. E-learning is evolving rapidly and there is a variety of vendors, advocacy and support groups entering the market with new products and services every day. It is therefore important to ensure that the content made available to schools has been scrutinized and evaluated against a set of criteria to ensure that they are culturally relevant and support and further the curricular goals and objectives of a country, and would provide a good return on investment. It is expensive and time consuming to produce quality, relevant and appropriate content. The lack of culturally-appropriate educational content, particularly for developing countries, poses challenges. Cultural differences affect learners' ability to fully understand and benefit from the lessons and their intended learning outcomes. It is therefore clear that content produced in one context cannot be adopted without some modification into another context.

The deployment of ICTs as electronic textbooks or babysitters does not harness the power of the medium. Furthermore, books and other learning materials should not be abandoned in favour of the new technologies. Just like computers, books, maps, paint brushes, microscopes, and other non-technological tools are valuable real world tools that enhance and stimulate learning. Multiple resources, whether technological or non-technological, must still be used to address multiple learning styles and curricular goals.

Technology and available resources

ICT costs are still too high for immediate and widespread use in least developed countries. Given existing resource constraints and lack of adequate supporting technical, commercial and human

infrastructure, widespread, ubiquitous uses of ICTs in education are not believed to be currently possible in most LDCs. For cost reasons alone, UNESCO has concluded that, in many countries it is probably unrealistic to consider deploying computers in primary schools. At secondary level, where there may be strong curricular arguments for some investment, this is likely to make for significant increases in total educational expenditure if it is to allow students more than rare and occasional access to computers.⁸

Lessons learned

Over the past three years GeSCI's work with and in its partner countries have often brought to the fore more questions than answers. However, a number of significant lessons have emerged or are emerging. Some of these include:

- *Confusion and ambiguity about ICTs in education.* Even in developed countries not enough is known about the efficacy of the new technologies for enhancing the quality and efficiency of learning. This situation is much more pronounced in developing countries resulting in unrealistic expectations about what ICTs can do. ICTs are neither a “quick-fix” nor a panacea for educational challenges or shortcomings.
- *Sustainable partnerships.* According to Tim Unwin⁹ partnerships are particularly salient in the ICT4E context because of the complexity of the processes to integrate ICTs appropriately into education systems, the costs associated with ICT implementation and the central role of the private sector in ICT. However, such partnerships are often poorly thought through and not properly utilised and leveraged. For partnerships to succeed a balanced demand and supply agenda and building sustainability in from the start are required. Considerable time is required to build collaboration and a working spirit of trust among the partners, who bring varying interests, viewpoints and resources to the table. It requires good will, flexibility and dedication of the partners to ensure agreement and progress. ICT training and equipment costs are high (primarily for initial outlay, maintenance and replacement). Therefore, the investments made must be strategic after careful analysis and planning, finding creative ways of financing, and creating networks and synergies.
- *Coherent national policy on ICT4E.* International case studies on ICT integration, supported by GeSCI's experiences in its partner countries, indicate the necessity of a

⁸ infoDev Knowledge Map: *ICTs in Education: Costs*

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coherent national policy on ICT in education as a catalyst for successful ICT integration and capacity building. Only a systemic and systematic approach can ensure that educational goals are met in the best possible way.¹⁰

- *An enabling environment* that encourages and supports the integration of ICTs into the education system is needed. Governments must demonstrate political will and must champion the integration of ICTs to improve education and training in line with national development goals and frameworks. Important components for the creation of an enabling environment are leadership and effective management at all levels.
- *Champions*. For change in the use of ICTs to occur successfully, specially selected leaders or educators or champions, who are respected by their peers, need to be selected and trained in the use of ICTs and the benefits to learning. Champions can be principals, teachers, educational administrators or lecturers but they must have a passion for learning and a preference for using technology to achieve improved learning outcomes. Their task is to train their colleagues and applaud their colleague's efforts in finding effective ways of using ICTs in local school/institutional contexts. The role of respected educators cannot be underestimated in the change process. Champions will need strong support and adequate resources to complete their mission within a wider plan that is consistent with national planning.¹¹
- *Focus on learning and student achievement*. The emphasis should not be on the technologies themselves, but how the technologies can be used to achieve educational goals to improve learning and teaching. We must not begin with ICT *solutions* and search for educational and instructional *problems* that can be solved by those solutions, but rather with what would improve learning and learning outcomes.
- *Keep ICT use simple, expectations modest and provide on-going support*. Countries often invest in more sophisticated and expensive technology than is really required for the learning objectives to be achieved. In this way much money is wasted as less expensive and less sophisticated technology could have achieved the same purpose and could have freed up some funds for other critical needs. There is often limited understanding of the technology and what requirements would be to operate and utilise it effectively, leading to unrealistic expectations and as a result disappointment. The support required to optimally utilise the technology (training, costs, maintenance, fees,

¹⁰ For more information access the list of ICT4E policies and plans worldwide <http://www.gesci.org/integration-of-icts-into-teaching-and-learning.html>

¹¹ White, G. (2006): *Innovating with Technology: The Challenge to Educational Policy, Leadership and Management*.

etc.) are usually underestimated leading to unsustainable investments.

- *Build organisational and institutional capacities* to effectively deal with the complexities of integrating and implementing ICTs. The introduction of ICTs demands a tremendous amount of physical and organisational restructuring - for administrators, teachers, and students. Roles and responsibilities of various units/departments within Ministries of Education are affected by the introduction of ICTs into the system. New systems, procedures and structures are required. Teachers must be empowered sufficiently to use ICTs confidently in the classroom. Schools must determine their educational goals and the ways technology can help them realize such goals. Teachers need high quality professional development and access to on-site technical assistance. They must be offered the flexibility, support, resources, and time to carry out the changes required.
- *Context and need.* Developing countries must learn from the experiences of others, but must use technology to respond to their own needs, and not just follow the trends in developed countries. In this regard India can lead the way as it has developed many innovative approaches, practices and lessons to offer to other developing countries facing similar constraints and challenges.
- *Institutional arrangements for ICT4E.*¹² Within Ministries of Education in developing countries it is usually the “traditional” Informational Technology or IT unit which has been tasked with leading ICT4E initiatives. The effective integration of ICTs is compromised by this practice because the traditional IT unit’s principle role is focused on infrastructure provision to support the productivity of the Ministry. These units are meant to acquire, install, service and maintain the Ministry’s IT or ICT infrastructure in support of the Ministry’s day to day activities. Their role is essentially one of institutional support akin to the finance or administration units. They are often staffed with technicians, programmers, engineers or computer scientists who do not understand or are ill trained or prepared to undertake policy and strategic planning involving both technology and educational issues dealing with learning and teaching. In addition, these units are usually generally under staffed. Ministries of Education in developing countries need to reconsider how they institutionally position the responsibility for ICTs in Education as the ICT in Education unit’s roles relate directly to improvement of teaching and learning using ICTs and the skills mix required differs substantially from that of a traditional IT unit providing infrastructural systems support.

¹² Twinomugisha, Alex: *Institutional Management of ICT4E Programs*.

In conclusion

ICT can play a major role in creating a new and improved model of teaching and learning in developing countries where education can happen anytime, anywhere in country efforts to improve the quality of educational provision and to provide access to more students and to higher levels of education. To achieve this vision, however, they will have to harness ICT to revitalize schools and other educational institutions to transform them into dynamic, collaborative and innovative learning institutions where students can become more motivated, inquisitive and creative learners and as a result student achievement is substantially increased.

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