

'Education for ICT' to 'ICT for Education' A Case Study of North East African Schools

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Abstract- It has been established that information is a key factor for any development process. Information and Communication Technologies (ICTs) have increasingly become indispensable tools for development over the past few decades. Positive effects of ICTs have continually been noted in business, production, education, politics, governance, culture and other aspects of human life. In higher education, ICTs have great influence in teaching, learning, research and other scholarly and professional activities through improved communication and access to information. This review synthesizes the literature on uses of information and communications technology (ICT) in primary and secondary schools in North East Africa. It focuses on the role of ICT in improving the quality of learning and teaching in schools with reference to technologies appropriate for this context, and on the supporting and constraining factors. Key stakeholders and agents of change in ICT integration are identified, including national policymakers, school leaders and academics. The impact of prominent past and current international and local initiatives to use ICT in widening access and participation, and in improving quality of teaching and learning in schools is assessed. Pedagogical, social, logistical and technical issues arising as we move on to characterize local needs and the facilitating factors and constraints on technology use, in this developing context are explored. Teacher factors influencing classroom ICT use, impacts of teacher training and continuing professional development and teacher beliefs about ICT and cultures of teaching are focused. A review of implications for further development of educational uses of ICT is done and some suggestions for future research and professional development initiatives are suggested.

Index Terms: Information Poverty, ICT integration, Knowledge building, Education reforms, ICT for Education.

1 Introduction

ICT is not really about the computer, the Internet and telephone lines but they are about information and communication [9]. It is clear that one cause of low rural income can be blamed as "information poverty" – the lack of access to information and knowledge that could improve earnings potential [7]. ICT can facilitate direct interaction between government and the people, cutting out the need for mediators and achieving higher levels of trust, transparency and responsiveness as a result. The countries which are able to seize the opportunities in the field of ICT will be able to leapfrog into the future, even though they lack a developed communication infrastructure today. In fact, countries with little existing communications infrastructure have less need to deal with vested interests in old technologies and

can proceed directly to the use of wireless and fibre-optics technologies.

The key will be visionary leadership and the ability to mobilize nations around an attractive and realizable vision of their citizens' future [1].

ICT remains the tool for the future, which should be developed now. The basic goal is therefore, to improve and broaden equitable access to Information and Communications Technology as a means of creating new opportunities for socio-economic development.

2 Integrating ICT into schooling: Rhetoric and Reality

This review reveals that significant progress is being made in the endeavor to incorporate ICTs into schooling who generally now has clearly formulated policies and strategies in place to promote its use in schools. These policies are wide ranging but tend to focus on the curriculum and on professional development in particular. Encouragingly, there is growing awareness that *'providing equipment is insufficient to promote*

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educational change. Government is emphasizing development of teacher skills and pedagogy as the key to effectively implementing curricula, in using ICT for enhancing teaching and learning, and to raise the educational standards.

While the policies are highly ambitious, the limited evidence available of their implementation indicates that their status remains largely at the level of rhetoric in some countries and in some aspects. Equally ambitious aims of the wide variety of ICT initiatives are now in place to support teaching and learning in schools. These projects are funded through a myriad of public and private sources and partnerships including governments, commerce, philanthropic donors and other charities, educational institutions and NGO / development agencies. They are generally recently initiated, regionally bound and time limited. There are certainly some success stories, at least in terms of improved facilities; stakeholders have equipped schools with computers for teaching, learning and administration purposes and students are enthusiastic about using computers for learning despite the lack of equipment available. Access to ICT facilities in schools in North Eastern Africa is growing and connectivity is improving, especially in urban areas through wireless networks. There is also extensive use of mobile phone technology, and some countries are developing digital content for use across the curriculum. Nevertheless access and usage remain sporadic and the claims made in reports of impact upon teaching and learning is tricky to corroborate as evidence is often anecdotal.

As with ICT policies, a lack of tendency to systematically evaluate the outcomes makes it hard to assess their success, the situation needs to be redressed as new schemes are planned. Sustainability of schemes and potential for further rollout are also highly uncertain once funding runs out and deserves some attention; further support may be needed over the longer term, or ideally the principle of self-sustainability through development of local capacity will be addressed. Forward thinking in particular about the shelf life of equipment (especially refurbished machines) and building in financial support for technical assistance and maintenance and/or developing local technical expertise are needed too.

It is notable that most of the countries have a common feature in their ICT policies, curricula and initiatives in schools in the form of promotion of computer science or information technology as a discrete subject, examined by the national examination boards. This is reinforced by the lack of technology in classrooms and its concentration

instead in purpose-built computer labs (containing networked or stand-alone PCs), a model that countries like UK with high penetration of ICT in schools are now moving way from, especially as mobile or classroom-based technologies such as portable devices and interactive whiteboards increase in prevalence.

There is considerable interest in delivering educational ICT initiatives across Africa. African governments are eager to use ICTs so that they are at the forefront of technological change; donors and international agencies are eager to provide resources to help 'Bridge the Digital Divide'; the private sector is keen to invest where companies see potential market growth possibilities in the future; academics are interested in sharing the results of their research on the subject; and civil society organizations are willing to help and facilitate delivery of schemes on the ground. However, this multiplicity of interest shows that there is frequent duplication of effort, lessons are not sufficiently learnt and shared, and there is a wasteful lack of co-ordination in the activities that actually take place.

In recent years, a more optimistic picture has emerged, with many new national initiatives for training teachers and grappling with curriculum and education reform issues indicates that this is the most successful partnership model (Hawkins 2002). However a call for "*joined-up thinking*", namely a comprehensive framework across the African Community at least, for both development of ICT use in schools and for large-scale professional development – whereby experience is shared both between and within nations should be taken to heart. This would undoubtedly be far more cost-efficient and effective in exploiting the potential that partnerships between governments, the private sector, civil society, academic institutions and global organizations can provide. Moreover, formal evaluation of new policies and the aims and impacts of investments and initiatives is often lacking and needs to be culturally embedded so that lessons are learned and again wisdom is accumulated, offering a much firmer foundation for future strategy and investment by both governments and donors.

3 Barriers to developing ICT use in the North East African context

A number of important physical, cultural, socioeconomic and pedagogical factors are hindering the use of ICT by teachers and students,

particularly in rural schools. These include lack of electricity and frequent power outages, poor technology infrastructure, over-crowded computer labs, low bandwidth, high costs of (mainly satellite) internet connectivity, software licenses, equipment maintenance, insufficient and inappropriate software. Non-competitive telecommunications policies and regulations may impede connectivity and sustainability (Hawkins 2002). Geographic and demographic factors include population density and dispersion, linguistic and political factors. Wider socioeconomic factors such as extreme poverty and increasing HIV/AIDS levels exacerbate the situation and also political will is needed to alleviate the situation through further *"joined-up thinking"* in terms of devising an integrated framework to improve standards of living, education and health provision, along with ICT infrastructure enhancement.

Further challenges to be faced include the optional status of ICT within the curriculum, and a universal emphasis on teaching basic skills for software use and information gathering. Changing this culture towards the use of ICT as a tool to support and enhance subject learning using active knowledge building approaches is a key message for policymakers. It is crucial for technologies, including print media, audio, video, computers and portable devices, the internet to integrate a range of appropriate software across the curriculum. While school leaders are important agents of change, negative attitudes among school leaders towards computers and internet obstruct prioritization of ICT integration.

Anecdotal evidence suggests a lack of 'technology' leadership to oversee the institutionalization of ICT integration. In order to address these multi-faceted challenges, *schools may have to develop capacity of its leaders to guide effective and more holistic integration of ICT*. The lack of contextually appropriate course content for either teachers or learners also needs to be addressed and the potentiality for creating and integrating locally produced or adapted digital open educational resources is currently being explored.

Finally, having ICT-literate and confident teachers is clearly a prerequisite for integrating any form of ICT into schooling. Until recent time, training opportunities have remained limited in availability and inconsistent in quality, and teachers' ICT proficiency and potential knowledge for supporting teaching and learning have thus remained limited too. Lack of teacher time to get to grip with new technologies is another obstacle, linked to the

growing shortage of qualified teachers. The COL (2004) report pointed out that the prohibitively high cost of training teachers to use ICT and the shortage of public funds to devote to this are fundamental challenges to be overcome before ICT capacity building can become a reality in African education. ICT in primary and pre-primary education is currently only taught in a few schools which have ICT facilities.

The situation has since become even more acute in the face of the recent economic downturn globally and increasingly large school classes as countries respond to the Millennium development goals concerning universal primary education. The consequences of this and the designation of ICT as a discrete subject include a lack of subject teachers trained to integrate ICT into learning in their respective areas. Once more, *integrated initiatives are needed, with participation from multiple players in each country including Ministries of Education for provision of a policy framework, curriculum and software developers and teacher training colleges*.

4 Teacher Education and Development

Considerable encouragement can be drawn from the recognition of the need for teacher education within recent policy changes. The capacity of teachers to use ICT for teaching and learning through both in-service and pre-service programmes is being encouraged. Long experience in many Northern and Southern country contexts indicates that when a government (or anyone else) provides new technology equipment in schools it is likely to remain idle or used poorly unless teachers are cognizant about what they can do with it, and a short induction from its supplier is far from adequate to realize pedagogical potential. It is strongly hoped that fuller awareness of the needs of teachers encountering new digital tools will shortly be realized; in particular new initiatives need to take heed of what has been trialed before, including in other country contexts.

Identifying the characteristics of apparently successful teacher training and development programmes, it is evident that infusing technology into an entire teacher education programme using blended solutions (rather than "bolting it on") is must. A model interactive pedagogical approach including employing hands-on workshop to develop awareness of the potential of ICT; offer ongoing, collaborative and active learning opportunities for teachers has to be deployed.

5 Enabling environment for ICT

Creating an enabling environment for ICT in education is the prime concern. The relative price of capital to the poor should be reduced by improving access to training, extending the electricity grid to the low-income areas and by granting selective and temporary subsidies to poor users. Fostering competition in the telecommunication sector reduces communication costs and this improves physical access to ICTs by the poor. Providing schools with technology infrastructure and a considerable number of teachers with ICT basic skills, and technical personnel to manage the laboratories would go a long way in creating an enabling environment for ICT education.

6 Redefinition of ICT skills

ICT skills focus on computer Science, robotics and engineering and many more disciplines; yet there is room for "soft skills" and interdisciplinary approaches such as finance, information systems, telecommunications, e-commerce, ICT management, database administration, etc. Females are more attracted to disciplines where there is application of technology rather than technical bits. Dennis emphasized the growing demand for "hybrids", a cadre of information systems professionals with knowledge and skills in technology, business management and interpersonal skills to effectively lead organizational integration and process re-engineering activities.

7 Conclusion & Future Research

It is important to note that it is must to have a curriculum and trained teachers and yet quite another to implement the curriculum especially if the requisite teaching materials are not availed as in the case of ICTs which require heavy investment by both government and other partners.

Research into this area and above all, into the optimal ways to achieve the integration of technologies into teaching and learning in the East African context is sorely needed. First, infrastructure issues will need to be resolved so that we can truly bring these countries into the 21st century and harness ICTs to support its further educational and economic development.

The needs identified through this review include a shift from 'Education for ICT' to the use of

'ICT for Education' and for ICTs to be integrated throughout the curriculum, blending their use with other tools and resources to support student learning; It is necessary to prioritize provision of initial and ongoing in-service teacher education that effectively equips teachers to integrate ICT into subject teaching and learning using contemporary pedagogical approaches. A holistic and comprehensive framework within and across North East African countries to include infrastructure enhancement, development of ICT use in schools and large-scale professional development has to be carried over; Building evaluation and sustainability into these programmes and policies from their inception and linking them to broader education reforms and community agendas undoubtedly leads to greater achievements.

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