

EUROAFRICA-ICT/P8 ZOOM STUDY SERIES

THE CASE OF EDUCATION AND ICT IN UGANDA

DECEMBER 2012

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www.euroafrica-ict.org



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ABOUT EUROAFRICA-ICT/P8

Africa and Europe have recognised that the development of Science, Technology and Innovation (STI) and the spreading of Information and Communication Technologies (ICT) to all components of a society are key. The “8th Africa-EU Strategic Partnership” (“Partnership 8” or “P8”) inter-links three priorities which can leverage a faster socio-economic development in Africa: Science, Information Society and Space. Partnership 8 Action Plan II lists as a priority the development of an inclusive information society in Africa. In that perspective is being formed a multi-stakeholder implementation group (co-chaired by the African Union Commission, AUC and the European Commission, EC) aimed at enhancing cooperation between the two regions.

EuroAfrica-P8 is a FP7 project funded by the European Commission (DG CNECT) and spanning 24 months (2012-2013) with the aim of strengthening ICT research and policy links between Africa and Europe under the “8th Strategic Partnership”. The project is defined in full continuity with and builds upon the substantial results obtained and the significant

momentum created by several previous projects (2006+), designated - over the years - as “the EuroAfrica-ICT Initiative”.

The project is gathering partners able to significantly impact the expansion of Euro-African cooperation on ICT research in close liaison with the EC and the AUC and in partnership with key stakeholders in the field.



The Consortium consists of eleven partners with significant experience of ICT policies in both regions, as well of Africa-EU S&T/ICT cooperation.



The EuroAfrica-ICT initiative main objectives

- Strengthen EU-African policy and ICT research links with the aim of reinforcing the “8th Africa-EU Strategic Partnership” (P8);
- Identify, analyse and map EU-African joint ICT research priorities;
- Provide evidence-based recommendations to the European and African Union Commissions for future cooperation initiatives;
- Provide support and guidance to European and African organisations in their efforts to connect and develop joint research projects in the ICT field;
- Support and sustain the activities of the P8 Africa-EU Implementation Group and the Joint Expert Group (JEG8);
- Enhance the participation of African organisations in FP+ ICT collaborative projects; and
- Achieve strategic coordination with other initiatives/projects/programmes sharing similar or related objectives.

The EuroAfrica-ICT initiative main activities

- Organise cooperation and thematic events synchronised, when possible, with policy dialogue meetings;
 - Identify, analyse and map joint ICT research priorities between the two regions;
 - Produce recommendations for future cooperation initiatives;
 - Form 5 consortia working on joint EU-Africa EU/FP+ proposals demonstrating the return on investments in e-infrastructure and their supply chains;
 - Produce 4 to 6 zoom/case studies (success stories, innovative ICT research and technological developments or results in specific African countries or regions);
 - Publish 2 iterations of an e-Consultation aimed at achieving strategic coordination with other initiatives or programmes sharing similar or related objectives;
 - Assist the day-to-day operation of the “Africa-EU Strategic Partnership on Science, Information Society and Space” (P8) multi-stakeholder implementation group and the JEG8 - Improving as much as possible the operation of Partnership 8;
 - Ensure the participation in the P8 group meetings of key stakeholders in the ICT field.
- Provide support and guidance to European and African organisations in their efforts to connect and develop joint research projects in the ICT field;



INTRODUCTION

This paper is the third of a series of six “Zoom Case Studies” contributing to the work of EuroAfrica-ICT/P8 project and specifically to its Work Package 3 establishing ICT sector priority themes for joint Euro-African research groups. The paper is contributing to the identification of such priorities within the education sector that can have high potential for collaborative R&D on ICT, leading eventually to development and diffusion of new technologies with entrepreneurial and social benefits.

Governments and other stakeholders around the world have increasingly been embracing a vision for development which includes movement towards what have been called “Knowledge Societies”, and have been adopting policies and strategies to foster this development. Governments of developing countries see it as necessary to build more knowledge-based societies not only to improve the efficiency of domestic economies but also to take advantage of economic oppor-

tunities outside their own borders. Education is critical to the development of knowledge societies as it is the source of basic skills, a foundation for knowledge acquisition and innovation and an engine for socio-economic development. However, education systems have been relatively slow to respond to this new demand, typically tending to focus firstly on technical ICT skills and only recently beginning to consider the range of 21st century skills which students need to think creatively, solve problems, communicate effectively, identify and analyse existing information, and create knowledge.

The recent study¹ prepared for the World Bank by ICT Development Associates recognises that the future development of Africa will be heavily influenced by how Africa manages to deliver quality

¹ ICT Development Associates (2011). Transformation-Ready: The strategic application of information and communication technologies in Africa. Education Sector Study Final Report. Prepared for the African Development Bank, the World Bank and the African Union by: Dr Lishan Adam, Neil Butcher, Dr F. F. Tusubira, and Claire Sibthorpe. Edited and coordinated by Claire Sibthorpe and David Souter. The World Bank. Washington D.C. USA.



education to its citizens. This study has examined the potential for using ICT to support the improvement and transformation of the education sector in Africa, with the aim - requested in its terms of reference - of raising awareness and stimulating action, especially among African governments and development partners. It identifies specific opportunities and challenges, and recommends areas of intervention for governments, educational institutions, the private sector and NGOs, and development partners.

The following note based on the aforementioned study will provide an overview of the context of education in Africa, together with a conceptual framework and review of critical issues concerning the integration of ICT in education. It will analyse the landscape of ICT in education around selected central themes and highlight the connections between them. As a useful starting point for developing a conceptual framework for ICT in Education in Africa, the study lays out the NEPAD e-Schools Initiative. The vision of the NEPAD e-Schools Initiative is to ensure that young Africans can participate actively in the global Information Society and

knowledge economy. Significantly, the initiative itself makes no explicit reference to ICT. It proposes that the focus of business planning in African schooling should be set squarely on ensuring that schools are better equipped to prepare learners socially and economically to become proactive, engaged citizens. Technologies are tools that should contribute towards achieving this, rather than becoming another logistical “problem” that needs to be “solved”.

Considering the above, this note proceeds to highlight one country - Uganda - as a case study nation whose digital education system is still at the early level of development, but which is utilizing ICT to increase access and quality of educational resources and services to their populations.

The Case Study presented here draws from recent contractual research implemented by ICT Development Associates under a larger study commissioned by eTransform Africa, a partnership between the World Bank and the African Development Bank (AfDB), supported by the African Union (AU).



the enabler for both innovation and education. International Education in the Development Agency GeSCI³, highlights relevant dimensions to consider in ICT interventions. It considers ICT in education to be critical both for development at a societal level, and for enabling individuals to secure employment in a knowledge society. However, the potential of ICT in education can only be realised when it is embedded in a social context that is open to innovation and supported by a favourable policy environment. Government policy has a real impact on strategic initiatives and often determines their parameters through laws, regulations and the allocation of funds. The potential educational power of Web 2.0 platforms is particularly significant in contributing to education and the knowledge society. Content is important in these, primarily as a tool to be used by learners to construct their own knowledge, building on what it is that they already know. The NEPAD e-Schools Initiative has identified the following principles as fundamental to supporting the uptake of ICT in schools⁴:

- Across the continent, every young African and each school context is unique;

³ Neil Butcher and Associates (2010). ICT, Education, Development, and the Knowledge Society - Thematic paper prepared for African Leaders in ICT: Building Leadership Capacities for ICT and Knowledge Societies in Africa

⁴ See: Ernst & Young. (2006). NEPAD e-Schools Initiative Business Plan. Unpublished report.

- There is no single technical or educational model/approach to integrating ICT in schools which can be adopted across the continent, or even uniformly across a single country;
- The primary objective of continental and national e-schooling policies and plans should therefore be to create an enabling environment which stimulates and supports schools to invest in, acquire, and effectively use ICT to the educational benefit of young Africans;
- To be successful, any investment in ICT infrastructure should be accompanied by investments in:
 - Supportive legal, regulatory, and policy frameworks;
 - Affordable connectivity;
 - Relevant educational ICT applications and electronic content (teaching and learning materials for both school and health contexts);
 - Professional development of all important players, including government officials, schools principals, administrators, teachers, and learners;
 - Maintenance and support strategies; and
 - Effective governance and operational systems and processes.
- Experience suggests that several infrastructural preconditions are required before a school is able to integrate ICT effectively into its day-to-day operations. These include access to reliable power,



secure and appropriate school buildings, and good road access to the school. Provision of this infrastructure, while critical to effective integration of ICT into schools, is not specifically part of initiatives concerned with ICT in education. Therefore, an important objective of e-schooling initiatives should be their alignment with national infrastructure delivery initiatives;

- Dysfunctional schools cannot be made functional through the deployment of ICT;
- Successful integration of ICT into education depends on schools developing the capacity to produce their own technology plans rather than responding to directives from above. When technology decisions are forced onto schools it is usually not possible for school communities to develop a sense of ownership of the technology they receive, which results in high levels of wastage. Schools need to be empowered to develop technology plans which support their unique requirements and contexts, and to make their resulting choices and investments accordingly;
- Integration of ICT in education should be driven by national governments through the appropriate policy and planning processes. These processes should draw on support and contributions from donors, the private sector and civil society. These contributions should be aligned with a clear national strategy rather than dictating what that strategy should be;
- There is a multitude of ways in which one can imagine a future where ICTs

are integrated into schools and have changed the way in which education systems function. To name a few:

- Government support staff communicate by e-mail with each other and school management teams and no longer rely on hard-copy letters, gazettes and official circulars which are posted or delivered to them;
- Government positions and vacancies are published electronically and distributed by e-mail to improve transparency in job application and appointment processes. Applications can be submitted electronically;
- School management teams make extensive use of Education Management Information System (EMIS) data to report on their school status and to manage school record-keeping, staff appointments and other management functions;
- Teachers can access curriculum documents and supportive educational content linked to these documents freely and easily from the Internet, in order to reduce their preparation time and improve the quality of their teaching;
- Individual teachers are in electronic contact with a whole community of peers and have access to a range of professional development opportunities which encourage and sustain collegial support and innovation;



- Parents can access information about individual school performance and make applications for enrolment electronically;
- Parents are notified by e-mail or SMS if their child is absent from school, ill or in disciplinary action;
- School progress reports are distributed electronically to parents and there is a repository for each learner, accessible through the World Wide Web, through which they can view all reports throughout their child's school career;
- Learners can access assessment material from the Internet and can submit applications for further educational opportunities and bursaries and scholarships online;
- Learners use and publish information to the World Wide Web and are able to collaborate with other learners in other schools, other regions and internationally;
- Learners can access school timetables, homework assignments, assessment dates and extramural schedules electronically, and are notified electronically of new events and programme changes.

Policy development

Internationally, the need to provide quality education for all learners has motivated countries to develop plans focused on

the use of ICT for teaching and learning. The drive to promote ICT in education has typically been aligned with broader social and economic goals. In particular, visions of how ICT in education can lead to participation in a global knowledge economy, and of how ICT will improve national economies, are set out in ICT policies. While national policies provide a framework for implementation, there is a trend towards a more decentralised approach in implementation, examples of which include Australia, Thailand and Indonesia. ICT integration in schools needs to consider individual, social, economic and political environments, recognising that change will not occur in the same manner in each country or across different locations in the same country, and that integration of ICT in education needs to be sensitive to cultural differences.

ICT Infrastructure and networks

The role of technology infrastructure in enabling ICT in education has been recognised internationally. ICT infrastructure, in this context, includes access to equipment as well as connectivity. An important aspect of the use of ICT in education concerns the devices through which educators and learners access learning materials and collaborative platforms. It is very expensive to equip schools and universities and to keep them up to date with ICT equipment. This is not just a mat-



ter of hardware and software purchases, but also the recurrent costs associated with maintenance and support. Rapid advances in technology have continued to add potential to the use of ICT as an integral part of teaching and learning. However, changes and innovations in technology tend to be much faster than changes in the education system. This is an area of concern as reform may be dependent on technologies that are no longer available or supported. Connectivity is an important aspect of accessing learning resources. At a policy level, connectivity requires continued focus on the supply of competitive access to wired and wireless broadband networks, and on the allocation of spectrum targeting wireless broadband services. Many countries have addressed this issue. For example, in Turkey, Egypt and Jordan, the Ministries of Education have taken responsibility for funding broadband Internet connectivity for schools⁵.

Professional development

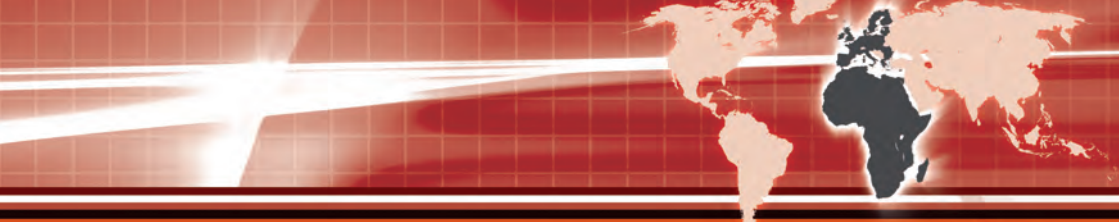
Appropriate teacher training is essential if educators are to use ICT effectively for teaching and learning. Fully integrating technology into teaching and learning requires well-qualified educators. There are as many schools of thought on how best to equip educators with skills and knowledge to use ICT for teaching as there are tried-and-tested models for

5 HEDCOM Sub-committee on ICT. 2008. Report on the Study Tour of the Hedcom Sub-committee on ICT.

professional development. The dominant schools of thought regarding ICT integration are divided between those which focus on whether teachers need ICT literacy skills, without looking at how those skills will be applied pedagogically, or whether ICT should be deployed in a manner that equips teachers with ICT literacy skills and, at the same time, shows teachers how to use these skills to plan lessons and use technology for teaching and learning. There is great interest in participatory approaches to professional development which involve educators in initiating and designing their own professional development, sharing materials and ideas, and discussing challenges and solutions. This approach can also help teachers to become model lifelong learners. Case studies have indicated that a model of “learning by doing” may be a good starting point for initiating forms of future staff development linked to school-based curricula.

Materials development

The provision of materials for learning is considered critical for the successful integration of ICT in education. One of the most important developments globally in this area has been the emergence of Open Education Resources and Web 2.0 platforms, which allow the user to become a source as well as a consumer of information (the architecture of participation). New ICT services such as

A decorative header featuring a world map in a light orange-red hue against a dark red background with a grid pattern. A bright light source on the left creates a lens flare effect across the top.

blogs and wikis encourage users to add to and shape content within their communities, rather than “owning” their own content and reading that of others.

Research, monitoring, and evaluation

Evaluation is recognised as especially important in the field of ICT, where technology itself is evolving very rapidly and where there are many unknown factors about how to apply it most effectively.

However, monitoring and evaluation are not receiving the attention they require. Many of the issues and challenges associated with educational ICT initiatives are well-known to experts and practitioners in the field. However, data on the nature and extent of these challenges are limited in most countries because of a lack of monitoring and evaluation tools, and of methodologies that address the use of ICT in schools and its impact on teaching and learning.



II. TRENDS IN IMPLEMENTATION



Innovations in technology have resulted in an increased use of ICT in education worldwide. This has led governments and other stakeholders to develop policies to guide their use. In Africa, many governments have focused on developing national ICT policies and National Information and Communication Infrastructure Plans

to support their socio-economic development efforts and their policies concerning ICT in education. Several African countries are prioritising the use of ICT in education to achieve critical strategic development objectives. For example:

- Kenya's National Information and Communication Technology (ICT) Strategy for Education recognises that "an ICT literate workforce is the foundation on which the nation will become a knowledge-based economy.... [Education is] a platform for equipping the nation with ICT skills in order to create dynamic and sustainable economic growth"⁶;
- The Egyptian Information Society

⁶ Kenyan Ministry of Education (June 2006). National Information and Communication Technology (ICT)



Initiative aims to use e-learning applications to spread knowledge and information through the Internet. The Egypt Education Initiative's objective is to improve education in Egypt through the effective use of ICT⁷;

- In South Africa, the government has expressed its commitment to the knowledge society through the establishment of a Presidential National Commission on Information Society and Development (PNC on ISAD), which focuses on policy and development of ICT in priority areas of e-Government including e-health; e-education; small, micro and medium Enterprises (SMMEs); and content development⁸.

Unsurprisingly, African countries are at very different stages in considering policies to harness ICT in support of education and development. As a result, in some instances, ICT and development policies may not be complemented by other relevant policies - for example a telecommunications policy that supports such development - or by associated budgetary allocations. Some countries (for example Angola, the Republic of Congo and Cameroon) have national ICT policies but not policies that make specific reference to ICT and education.

Furthermore, ICT policies are not always

7 Strategy for Education and Training, p.3. Czerniewicz, L. (ed). 2007. Report on Higher Education ICTs and e-Learning in Egypt, p.4. Cape Town: CET

8 The PNC on ISAD, <http://www.pnc.gov.za>

accompanied by a detailed implementation plan or commitment from the government to implement them⁹. The World Bank notes that developing countries have faced challenges in adapting policies and regulations to rapid changes in technology and market structure¹⁰.

Nevertheless, ICT is expanding the range of options available to education planners in the teaching and learning strategies they choose to use, providing an often bewildering array of choices in systems, design options, teaching and learning combinations, and strategies for administering and managing education. Increasingly, investment in ICT is being seen by education institutions as a necessary part of establishing their competitive advantage, because it is attractive to students (particularly in those parts of the world where young people have near-ubiquitous access to ICT) and because it is deemed essential by governments, parents, employers and funders of higher education. There is, however, no automatic correlation between increased spending on ICT and improved performance of education.

Benefit and impact, to the extent that

9 Information drawn from various country reports in Farrell, G., Isaacs, S., and Trucano, M. (2007). Survey of ICT and Education in Africa (Volume 2): 53 Country Reports. Washington, DC: infoDev / World Bank.

10 IEG (Independent Evaluation Group). 2011. Capturing Technology for Development: An Evaluation of World Bank Group Activities in Information and Communication Technologies. Washington, DC: Independent Evaluation Group. The World Bank Group.



they can be reliably measured at all, are more functions of how ICT is deployed than of what technologies are used.

The development towards knowledge societies has placed greater emphasis on the need to ensure that people are information-literate. Information literacy has been defined as: “the capacity to identify an issue and then to identify, locate and evaluate relevant information in order to engage with it or to solve a problem arising from it”¹¹. Information literacy should not be considered a given, even amongst learners with ubiquitous access to ICT - though many institutions are mistakenly assuming greater information literacy amongst “tech-savvy” learners. Education systems need to provide formal instruction in information, visual, and technological literacy as well as in how to create meaningful content with today’s tools. However, it is important to consider expanded definitions of these literacies that are based on mastering underlying concepts rather than on specialised skill sets. Education systems need to develop and establish methods for teaching and evaluating these critical literacies at all levels of education.

As students learn the skills of using ICT in education, the professional role of

teachers as mentors - able to impart the wisdom that only experience can provide - also grows in importance. The role of the teacher in the classroom is becoming more like that of an instructional manager who helps to guide students through individualised learning pathways, identifying relevant learning resources, creating collaborative learning opportunities, and providing insight and support both during formal classes and outside contact time. However, most professional development programmes focus on trying to teach educators to use the technology. Professional development work also needs to address ways in which mentors can guide learners in this environment, and to include:

- Developing and supporting mentoring in formal education and in employment structures;
- Fostering coherence and discipline in thinking;
- Navigating the ethics of a world with no apparent limits;
- Coping with the challenges of “unlimited” choice; and
- Encouraging learners and/or employees to become creators in the educational and professional environments.

Another significant trend is the emergence of the concept of Open Education Resources (OER), which refers to educational resources that are freely avail-

¹¹ McCausland, H., Wache, D. & Berk, M. (1999). Computer literacy; its implications and outcomes. A case study from the Flexible Learning Centre. University of South Australia. p. 2.



lable for use by educators and learners without an accompanying need to pay royalties or licence fees. The concept is gaining momentum and is seen by some as having potential transformative power for education. There has also been very considerable growth in the collective sharing of knowledge and the generation of knowledge-related content as more people become connected, and as those who are connected make use of Web 2.0 technologies and services. Collective intelligence and mass amateurisation are, as a result, pushing the boundaries of scholarship, while dynamic knowledge creation and social computing tools and processes are becoming more widespread and accepted. The digitisation of information in all media has introduced significant challenges concerning intellectual property, especially copyright. Copyright regimes and their associated business models, which worked effectively prior to the development of ICT, are increasingly under threat and in some cases rapidly becoming redundant¹². ICT is also reducing barriers to entry for potential competitors to traditional education institutions, by reducing the importance of geographical distance as a barrier, by reducing the overhead and logistical requirements of running education programmes and research agencies, and by expanding cheap

access to information resources. Yet another trend is the growth in number and types of distance education programmes in which teachers and students are physically separated and in which teaching and learning takes place by means of single technologies or combinations of ICT. In the past, such programmes made use of print, radio, and television. Now, ICT is driving changes in these “open” or distance education programmes, which are increasingly using the Internet and the World Wide Web for the delivery of educational materials and adopting a more extensive range of interactive forms.

The final trend that needs to be considered here is that mobile and personal technology is increasingly seen as a delivery platform for services of all kinds, reaching well beyond the education sector. In Africa, mobile cellular subscriptions in 2010 reached the 45% of people, and this proportion continues to rise due to very high demand and falling costs. The growth in the capabilities of mobile and personal devices is enabling and feeding on increased availability of digital materials and applications. The Amazon Kindle (a wireless e-book reader) and the Apple iPad (a slate computer with touchscreen interface) are examples of devices that are meeting the needs of emerging e-reader and e-textbook markets. The use of these and other mobile devices for educational purposes is often

¹² The Independent Evaluation Group (2011). An Evaluation of World Bank Group Activities in Information and Communication Technologies - Capturing Technology for Development World Bank report. The World Bank Group: Washington DC.



described through the term “m-learning”, although this is also used more widely to describe any sort of learning that takes place when the learner is not at a fixed,

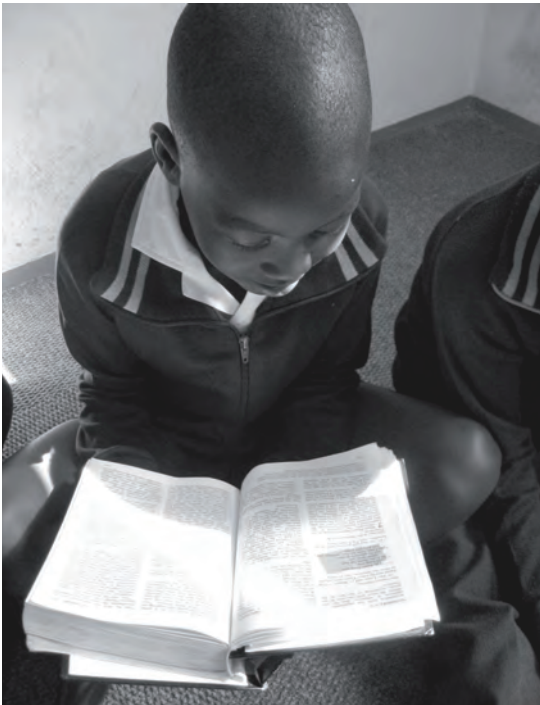
predetermined location or takes advantage of the learning opportunities offered by mobile technologies and networks¹³.

¹³ http://www.itu.int/ITU-D/ict/statistics/at_glance/KeyTelecom2010.html



III.

CRITICAL ISSUES



There are many issues and challenges to be considered regarding the use of ICT in education, including the following¹⁴:

The absence of comprehensive policies enabling and supporting interventions, and which are themselves supported by clearly defined and resourced strategies for implementation at national level as well as at the level of educational institutions. Strong government support is important for advancing ICT availability and usage in education as a broad social and economic development enterprise, a challenge faced by many education insti

¹⁴ Information in this section is based on reports from Trucano, Michael. 2005. Knowledge Maps: ICTs in Education. Washington, DC: infoDev / World Bank; Neil Butcher and Associates (2010). ICT, Education, Development, and the Knowledge Society - Thematic paper prepared for African Leaders in ICT: Building Leadership Capacities for ICT and Knowledge Societies in Africa; and World Bank. ICT and Education-Key issues. Retrieved from <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTEDUCATION/0,,contentMDK:20533883~menuPK:617610~pagePK:148956~piPK:216618~theSitePK:282386~isCURL:Y,00.html>



tutions in Africa. The creation of a strong enabling policy environment requires that African leaders have sufficient information and understanding about the knowledge economy and are familiar with the ways in which policy frameworks may hinder or support this objective. Some of the critical policy questions surrounding the use of ICT in education relate to access, equity, finance and the challenges of scaling interventions.

The lack of financing and prioritisation of ICT investments as a barrier to effective ICT use. Little is known about the true costs of ICT in education and, given budgetary and resource constraints, widespread investment in ICT in education may not be possible in many African countries. Despite a widespread belief that investing in ICT is cost-effective, as well as on-going reductions in the price of hardware, software and connectivity, the total cost of ownership of ICT - which includes maintenance, upgrading, skills and development as well as these three factors - remains high. It is, therefore, critically important to improve understanding of the costs and benefits associated with ICT types and uses in different educational contexts, so that scarce resources can be targeted effectively. Because there are high up-front costs and large recurrent costs, governments have used a variety of different financing and

cost-recovery mechanisms. Public-private partnerships and user fees are important components of financing ICT in education in many countries, but more research is needed to determine the impact and effectiveness of these mechanisms.

Limitations in the infrastructure required to support the use of ICT in education. Particularly important factors in this context are limited access to power (about 60% of the population in Africa lacks domestic access to electricity)¹⁵ and the lack of affordable and reliable Internet access (less than 12% of the population in Africa were believed to be Internet users in March 2011)¹⁶. The lack of an affordable and accessible telecommunication backbone and of a stable electricity supply impacts on the roll-out of ICT in education and development initiatives. The wide gap in ICT access between urban and rural areas has resulted in a concentration of such initiatives in the former.

A lack of capacity at all levels to integrate and support the effective use of ICT in education. This challenge includes a shortage of human capacity across all important stakeholder groups (including policymakers, teachers, administrators, technical staff and education managers).

¹⁵ <http://www.lightingafrica.org/component/k2/item/22.html?layout=item>

¹⁶ "Internet usage statistics for Africa", March 2011, <http://www.internetworldstats.com/stats1.htm>



Harnessing ICT for education and socio-economic development requires visionary and skilled leadership and management. African political leaders, civil servants and administrators need to be knowledgeable about the potential that ICT presents in terms of socio-economic development. It is important to build expertise among African leaders and administrators and to ensure that leveraging ICT for a knowledge society is both a top-down and bottom-up process.

A lack of necessary ICT skills amongst teachers and of specific training to enable them to use ICT effectively in the classroom. The professional development of teachers is crucial to ICT for education as they are at the heart of the educational process. Experience has shown that a variety of support and enabling mechanisms is needed in order to optimise teacher use of ICT. Teachers require access to relevant, timely and ongoing professional development to enable them to explore the use of new tools and techniques that can help them to engage with and support learners in new and productive ways. They also need time and resources to explore this new knowledge base and to develop new skills, with the support of school administrations. Lastly, teachers and their managers require sufficient access to technologies and the necessary technical support.

Limited supply of appropriate content, including learning materials and learning support tools. Although ICT (and the Internet in particular) provides access to a wide range of resources, there is relatively little digital education content that is relevant to local contexts or based on local curriculum frameworks. Experience shows that unless digital learning resources are directly related to the curriculum, and to the assessment methods used to evaluate educational outcomes, ICT interventions may not have positive educational impacts.

Lack of accurate, comprehensive, up-to-date data on education. In Africa, donors, rather than governments, have been the key players in the Education Management Information System (EMIS) development and therefore organic growth towards data-driven planning has been largely absent.

The tendency of ICT to accentuate social, cultural and economic disparities. ICT projects tend to give preference to schools and learners in urban areas and in areas where infrastructure is well established. There is, as a result, a very real risk that ICT can further marginalise groups already excluded or marginalised from educational practices and innovations - such as special needs students, learners in remote areas, students from historically marginalised linguistic, cultu-



ral or ethnic groups and from low income communities. However, ICT also holds promise and offers opportunities for facilitating greater inclusion of such groups in existing educational practices and environments. Supportive policies and careful planning and monitoring are needed to achieve this. It is generally believed that ICT can empower teachers and learners, promote change and foster the development of 21st century skills, but data to support these perceived benefits from ICT are limited and evidence of effective impact is elusive. Globally, insufficient

attention is paid to monitoring and evaluation during the design of most ICT initiatives, and Africa is no exception. In addition, there appears to be a shortage of useful resources attempting to translate what is known to work and not work in this field. As technology and the specific tools available for education change quickly, and as new technologies emerge, it is critical that their cost and impact in educational settings are examined. As a result, there is a great need for research on the appropriateness of specific ICT tools to help meet educational goals.



IV. EDUCATION AND ICT IN UGANDA



Uganda has multiple ICT in education initiatives, but still has a long way to go in terms of effective, coordinated implementation. This is not a result of lack of interest: the government of Uganda consi-

ders education among its top priorities, and the country was one of the pioneers of Universal Primary Education despite, at the time, objections from major funding agencies. The level of literacy is also quite high, as are the expected years of schooling for children. Uganda was selected as a case study country in expectation that it would draw out lessons for those countries where there has been some effort to introduce ICT in education but where there is no coordinated framework.

Establishing an enabling policy environment

Successful integration of ICT in education requires cross-sectorial collaboration and detailed sets of policies. The approaches taken in Uganda are examined below and



compared with approaches in Senegal and in South Africa. Uganda, in contrast with South Africa, has a fragmented approach to ICT in education. Uganda first developed a National ICT Policy framework in 2003¹⁷, which recognised the potential of ICT in supporting development across different sectors. The development of an education sector-specific ICT policy in 2005¹⁸ was another outcome, although, at the time of this study, the draft document is still with Cabinet and has yet to be ratified. This draft policy document aims to coordinate the disparate ICT projects which are taking place within the sector, leveraging the potential role of the private sector to deliver much needed investment in light of limited investments from government. It touches on a range of issues that need to be addressed in providing a supportive environment for integrating ICT in education. These include legal and security aspects, infrastructure, curriculum revision, and ICT skills training for teachers at different levels.

The issue of Uganda's ICT in education policy was a matter of debate that occurred also during the national workshop held as part of this study. Many participants thought that Uganda lacked a unified national direction with which to deal with ICT in education. One participant aptly summarised this as "Government needs to be

switched on". Another attributed it to the fact that most of those currently making decisions today were trained at a time when ICT was not used in education and so do not appreciate the need. While Ministry of Education and Sports (MoES) officials pointed out that a policy document had been prepared, the workshop agreed that this has been pending approval by Cabinet for a rather long time. Uganda is therefore still at the starting stage with respect to integration of ICT in education.

Widening access to ICT infrastructure and connectivity

Uganda, by contrast, has not seen any government effort to date that seeks to extend Internet connectivity to schools. The initiatives identified, with the exception of those of the Uganda Communications Commission, are all donor driven. Fibre backbones in Uganda are still far from achieving full national reach, leaving wireless access either via VSAT or the mobile network operators as the most common options for Internet access. In addition to this challenge, the overwhelming majority of schools at all levels, both primary and secondary, lack access to both the Internet and power. Rural schools are especially marginalised with respect to connectivity and access.

Uganda's main connectivity device is the mobile phone. The Uganda Communica-

¹⁷ <http://www.ucc.co.ug/nationalictpolicyframework.doc>

¹⁸ <http://www.education.go.ug/ICT/ICT%20policy%20July%2005.pdf>



tions Commission (UCC) estimates that 100% of the population is now within reach of a mobile network¹⁹. Wherever the mobile network goes, data services of varying capacity and quality are offered, the most advanced being within the major urban centres. Not surprisingly, the mobile phone is the most commonly used means of accessing the Internet. However mobile phones are banned in schools.

Access to power remains a limiting factor: the power grid has only 400,000 registered customers nationwide

Even with these, the grid can only provide about 60% of normal demand, leading to extensive load-shedding²⁰. In the national workshop for this study, participants were vehement about the lack of reliable power. One participant, Daniel Kakinda from SchoolNet Uganda, noted during the workshop that, “in urban areas where the grid is, load-shedding is unpredictable.”

Connectivity and access initiatives in Uganda include Connectivity for Educator Development (Connect-ED)²¹, a project that was funded by USAID as part of the Education for Democracy and Development Initiative (EDDI). This project ran from 2000 to 2003 (with a no-cost extension into 2004), with the aims of integra-

ting computers into the teaching methods of Primary Teacher Colleges (PTCs) and of building staff capacity to create materials and use them in teaching activities. Connect-ED created multimedia and computer laboratory facilities at the Institute of Teacher Education, Kyambogo (then ITEK, now Kyambogo University) and eight other Primary Teachers Colleges (PTCs) across the country. Each laboratory was equipped with a 64kbps Internet connection. The project developed a computer literacy course that was offered at each of the PTCs and trained some support staff. The intervention was really nominal: on average each PTC had about 300 students to about 10 PCs, limiting individual access to a level that negated effectiveness.

The Research and Education Network of Uganda (RENU) has plans to reach out to all levels of education, by providing backbone connectivity derived from capacity on the national fibre backbone. The Rural Communication Development Fund (RCDF), which is managed by the Uganda Communications Commission, has sought to introduce ICT laboratories within schools in line with the National ICT Policy. One such project is the School-based Telecentres Project that was implemented from 2004 to 2009 by SchoolNet Uganda²². Schools were provided with ICT laboratories, but with a requirement that the surrounding community could

19 Uganda Communications Commission, End of year performance review 2010: <http://www.ucc.co.ug/endOffYRReview2011.pdf>

20 Data from the Electricity Regulatory Authority, Uganda

21 http://pdf.usaid.gov/pdf_docs/PNADC164.pdf

22 <http://schoolnetuganda.sc.ug/projects/on-going-projects/school-based-telecentre-project.htm>



use the laboratory after school hours and over the weekend. Since the target areas were all rural, connectivity was provided via VSAT to five rural schools. The Uganda Connectivity (UConnect) Project, an initiative of Mission Mobile Education in Europe started in 1995 as a computer literacy project targeting schools in rural areas²³. The project set up computer laboratories using donated computers and solar panels in rural schools in northern Uganda. Later, UConnect launched a mobile component - an old Swiss Army truck loaded with PCs that could connect to the Internet via dial-up modem - which became its enduring image. The truck could drive anywhere, set up shop and tutor local residents on how to use PCs and connect to the Internet.

What emerges from the Ugandan experience is a series of pilot projects that have not moved to the stage of large-scale roll-out. There is also a lack of information about whether or not project objectives were achieved in each case.

Harnessing ICT to improve management and administration

Since 1999, the Ministry of Education and Sports in Uganda has had a number of projects aimed at improving EMIS, all funded by different development partners.

Data are collected through an annual census carried out across schools. After analysis, the resulting information is used to plan and monitor various activities across the education sector²⁴. The World Bank funded the project during 1999-2001, with an emphasis on creating EMIS at MoES headquarters. DFID (Department for International Development, UK) support from 2001 to 2003 emphasised decentralising EMIS to the districts. With support from USAID between 2004 and 2005, attention was given to creating a strategic plan and building GIS capability into the existing EMIS. More recently, MoES has received a new USAID grant to further enhance the current EMIS. Unfortunately the implementing partner, the Academy for Educational Development (AED), was suspended by USAID and the project is currently on hold²⁵.

EMIS in Uganda has faced several challenges, including unreliability of data, challenges in decentralisation relating to human capacity in EMIS and equipment maintenance, and challenges in sustainability relating especially to connectivity costs. Additionally, all data are only used at the centre - they are not used to support decision-making by schools or districts.

23 www.uconnect.org

24 <http://www.education.go.ug/EMIS.htm>

25 <http://www.usaid.gov/press/releases/2010/pr101208.html>



Harnessing digital learning resources

In Uganda, MoES has improved the quality and relevance of local materials by stimulating the local publishing industry, defining curricula, creating standards for educational materials, and procuring them locally. However, this and other initiatives are standalone, not being driven by an overall policy and strategy direction. The only noteworthy example is CurriculumNet which was a pilot project of the National Curriculum Development Centre (NCDC) to explore an ICT-based curriculum delivery strategy for primary and secondary schools.

The goal of CurriculumNet was to develop, test, and implement online resources that are directly linked to curricula at both primary and secondary school levels, and thereby explore how an ICT-based curriculum could support the growing number of students brought into Ugandan schools by the Universal Primary Education (UPE) policy. IDRC and the Open Learning and Information Network, both from Canada, funded the

project which ran from 2001 to 2005. Critical challenges included the low level of ICT literacy among staff in different schools, lack of connectivity and computers (one computer for 40 students), and irregular power supply. Resources to maintain the computers that were critical for classes had also not been provided for in budgets. The project nevertheless produced content in a variety of formats, including CDs, websites and print, at the school level.

Building human capacity

While both Uganda and Senegal have initiatives aimed at building the capacity of teachers, both countries appear to focus on computer literacy among teachers rather than the pedagogic issues around ICT in learning. Uganda has remained at the small-scale pilot level, without any visible plan or strategy for national level expansion. It has participated in projects including Connectivity for Educator Development (Connect-ED), CurriculumNet, and Uganda Connectivity (UConnect).



V.

LESSONS LEARNED FROM THE CASE STUDY COUNTRIES (UGANDA, SENEGAL, SOUTH AFRICA)



The case study countries - with their mixture of successful and less successful initiatives - bring out the following lessons. Not surprisingly, these echo some of those drawn in the chapters dealing with other themes.

A robust policy environment that supports the e-education policy is an enabling, but not sufficient, condition for ICT roll-out in education. In addition to this, policies in other sectors are required to create the necessary environment. A comparison between South Africa's and Senegal's ICT in education policy environments illustrates this clearly. While Senegal is much poorer than South Africa, this alone does not explain the widely different levels of success and progress.

Policy requires supportive institutional arrangements that may necessitate coordination at the centre. Universal access to ICT, for example, should be linked to universal access to power, but these fall under different agencies reporting to different ministries.



ICT integration in education requires national budget support as well as nationally driven partnerships with the private sector. Total reliance on donor-funded projects, which are necessarily driven by differing donor agendas, will lead to standalone projects that are not sustainable.

National ownership and sustainability

planning are critical in all initiatives if they are to go beyond the novelty pilot level to nationwide projects that have real impact.

The successful integration of ICT in education requires a change of focus from computer literacy for teachers to understanding ICT integration in education from the pedagogic perspective.



VI. RECOMMENDATIONS



This final chapter of the report presents both general and specific recommendations for policy makers and regulators in African countries, and for development partners. Although there are many possible recommendations that might usefully be presented to governments,

development partners and other stakeholders, the focus of the following recommendations is on having strategic importance for ICT in education.

Recommendations for policy-makers and regulators

In implementing the following recommendations, it is almost certain that most sub-Saharan countries will need expertise that is not currently available within their governments. The following generic guidelines provide a starting point in moving towards implementation, but governments should be prepared to engage the necessary expertise - through employment, sub-contracting/consultancy, or the secondment of experts from countries that have made significant progress - to help them in developing the detail of poli-



cy and implementation that is specific and appropriate to their national contexts.

Establishing an enabling policy environment - Ensure that all investments in ICT in education (including those made by governments, development partners, individual educational institutions and NGOs) are - to the greatest extent possible - directed by a single, integrated ICT-in-education strategy so that they are working towards common national strategic objectives.

Widening access to ICT infrastructure and connectivity - Implement programmes that enable students, teachers, and administrators to gain access to, or own suitable computing devices, and that support the development of NRENs as a means to enable resource-sharing and collaboration.

Harnessing ICT to improve management and administration - Promote data-driven decision-making at all levels.

Harnessing digital learning resources - Consider judicious investments in content creation and aggregation to ensure compliance with African curricula and/or local language demands, motivating usage by educators and students.

Building human capacity - Adopt a suitable global professional deve-

lopment framework to guide national implementation of ICT in education professional development.

Recommendations for development partners

Development partners have various roles to play in relation to the use of ICT in education. They are potential sources of funding for initiatives which cannot be readily financed from national budgets, as well as potential sources of policy guidance and expertise. Development partners are especially well positioned to stimulate and support initiatives that are based on cross-border collaboration. In this light, it is recommended that development partners:

Ensure that funded projects contribute to implementing the initiatives outlined in the recommendations for policymakers and regulators - Often, ICT in education projects initiated by development partners have not been clearly aligned to broader national policies and objectives. Where this has been the case, such projects tend - at best - to be unsustainable and - at worst - to impede progress in effective roll-out of ICT in education by creating conflicts of interest and unnecessary fragmentation. Should it not be clear what the national strategy is, initial investments might most usefully focus on supporting policy and stra-



tegy development at the national level.

Consider investment in the enabling environment - In particular, development partners should consider support for governments that want to move towards establishing enabling policy environments, including expert support, financing and capacity building at both national and regional levels.

Consider investments at a regional or continental level that build common capacity across countries - There are many ways in which regional or continental initiatives can contribute to building capacity that would support policy makers in implementing the kinds of initiatives outlined in the previous set of recommendations.

Continue to fund pilot projects that test the use of new and innovative technologies, ensuring that these experiments are well evaluated and the results widely shared - Development of technology is still occurring rapidly and bringing with it new educational opportunities. As a result, it is important to run controlled 'experiments' taking place on a regular basis in order to test the potential educational applicability of these new technologies and approaches, examine their total cost of ownership and establish their strengths and weaknesses. Often, it is difficult for governments to fund such experimenta-

tion, but it remains an essential part of building a knowledge base of best practice. Development partners have a critical role to play in supporting such activities.

Ensure that the intellectual capital generated by funded projects is shared under a suitable open licence and made accessible via an appropriate web platform - Over the years, development partners have invested large sums of money in innovative initiatives which have produced important and high-quality products, either in the form of software applications, research outputs, educational resources, or other similar forms of intellectual capital. In a small minority of instances, there has been a good reason to allow the project grantee to retain full copyright of this intellectual capital in order to establish a viable long-term business model. More often than not, however, over time, this intellectual capital has simply been lost due to restrictions in its re-use and subsequent poor curation of the intellectual capital in a suitable repository. While some donors have started to impose requirements that funded projects release their intellectual capital under an open licence and have developed websites to store the products of such projects, the majority still do not do this, with the result that, in the long term, the full value of these investments is lost to education in Africa. Adopting policies that lead to



release intellectual capital under open licences (unless there are valid reasons not to do so) and ensuring that this is stored in a sustainable online repository would help significantly to reduce wastage and duplication of investment.

Undertake an evaluation and impact assessment of regional initiatives at different stages of development and implementation

- This report has highlighted regional initiatives in thematic areas, ranging from those focused on digital learning resources and teacher education, such as the Education in Sub-Saharan Africa (TESSA) initiative and AVU's ICT-Integrated Teacher Education programme, to those focused on connec-

tivity and access such as the UbuntuNet Alliance. Some of these have achieved gains which are discussed in this report, but the impact of many is uncertain. Investments by donors - and indeed by national governments - in this crucial field will be much more productive if they are rooted in independent critical evaluation of these regional initiatives. This will provide a better understanding of which initiatives to support and how these can be best supported, reinforced or expanded where appropriate. Approaches resulting from independent evaluation could potentially include support for collaboration between regional initiatives so that they reinforce one another.



ACKNOWLEDGEMENTS

The EuroAfrica-ICT/P8 Partnership would like to express its gratitude to the ICT Sector Unit/World Bank Group (EuroAfrica-ICT/P8 “Knowledge Partner”) and the eTransform Africa Partnership.

The World Bank is involved in, among other things, producing six zoom/case studies in the framework of the EuroAfrica-ICT/P8 project and with the support of Sigma Orionis and CSIR, featuring success stories and innovating ICT research and technological developments in specific African countries and regions.

The involvement of the World Bank Group in this activity is crucial to describe the context, analyse and understand the barriers to the greater adoption and mainstreaming of transformational use of ICTs, analyse and understand the enabling factors of success and estimate the cost and opportunities to scale the innovation in Africa.

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