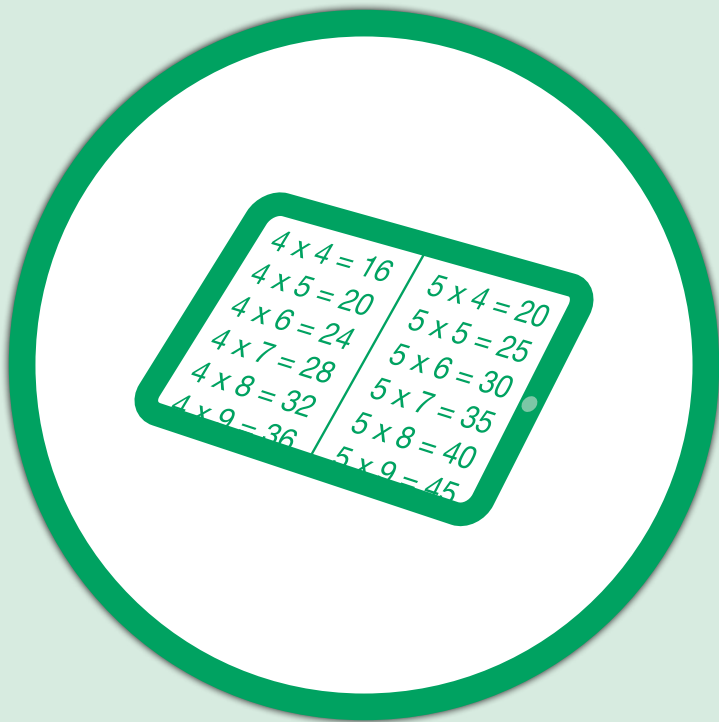


ICTs for **EDUCATION** in Africa



Public Disclosure Authorized

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This document, on the use of ICTs for Education in Africa, is the summary of the full sector study which was carried out by a team from *ict* Development Associates led by David Souter and comprising Lishan Adam, Neil Butcher, Claire Sibthorpe and Tusu Tusubira. The full report is available at www.eTransformAfrica.org. This document forms chapter four of the publication edited by Enock Yonazi, Tim Kelly, Naomi Halewood and Colin Blackman (2012) “eTransform Africa: The Transformational Use of ICTs in Africa.”

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eTransform AFRICA



ICTs for **EDUCATION** in Africa

*Information and communication technologies (ICTs) have the potential to transform business and government in Africa, driving entrepreneurship, innovation and economic growth. A new flagship report – **eTransform Africa** – produced by the World Bank and the African Development Bank, with the support of the African Union, identifies best practice in the use of ICTs in key sectors of the African economy. Under the theme “Transformation-Ready”, the growing contribution of ICTs to Agriculture, Climate Change Adaptation, Education, Financial Services, Government Services and Health is explored. In addition, the report highlights the role of ICTs in enhancing African regional trade and integration as well as the need to build a competitive ICT industry to promote innovation, job creation and the export potential of African companies.*

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INTRODUCTION

The future development of Africa and its participation in the knowledge society will be greatly influenced by how Africa manages to deliver quality education to its citizens. The African Union specifically acknowledges this in its Second Decade of Education for Africa (2006–2015) Plan of Action:

Education forms the basis for developing innovation, science and technology, in order to harness our resources, industrialise, and participate in the global knowledge economy and for Africa to take its rightful place in the global community. It is also the means by which Africa will entrench a culture of peace, gender equality and positive African values.

While ICT has been used in many parts of the world to improve the quality and increase access to education, most African countries still face the challenge that increased expenditure

on education is not necessarily achieving the expected benefits. This chapter examines the potential for the use of ICT to support improvement and transformation of the education sector in Africa, including brief case studies of South Africa, Uganda and Senegal. It identifies specific opportunities and challenges, and recommends areas of intervention for governments, development partners and other stakeholders. It looks in particular at the following five areas:

- teacher professional development;
- digital learning resources;
- affordable technologies;
- education management information systems (EMIS); and
- National Research and Education Networks (NRENs).

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LANDSCAPE ANALYSIS

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 policies for ICT in education. Several African governments are prioritizing the use of ICT in education, in order to achieve critical strategic developmental objectives – or at least agreeing policies to do this.

Developing countries, however, have experienced difficulties in adapting policies and regulations to rapid changes in technology and market structure. In some instances, policies concerned with ICT and education are not complemented by policies in other relevant areas, such as telecommunications, that support such development. Furthermore, ICT policies are not always accompanied by detailed implementation plans or commitment from government to implement them.

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 and is also deemed essential by governments, parents, employers and funders of higher education. Despite this, there is no direct correlation between increased spending on ICT and improved education performance.

Benefit and impact, to the extent that they can be reliably measured, are more functions of how ICT is deployed than of what technologies are used.

The growth of knowledge societies has placed increasing emphasis on the need to ensure that people are information-literate. However, it is important to consider expanded definitions of information literacy that are based on mastering underlying concepts rather than on specialized skill sets. Education systems need to develop and establish methods for teaching and evaluating these critical literacies at all levels of education.

ICT can facilitate a transition of the role of the teacher in the classroom into that of an instructional manager helping to guide students through individualized learning pathways, identifying relevant learning resources, creating collaborative learning opportunities, and providing insight and support both during formal class time and outside of contact time. Unfortunately, however, most professional development programmes tend to concentrate on teaching educators how to use the technology itself. Professional development needs to focus on how to mentor and guide learners in this environment.

At the same time, the emergence of the concept of Open Education Resources (OER) has led to growth in the collective generation and sharing of content by networked groups of people, and in the proliferation of technologies that enable cheap information-sharing and collaboration. The digitization of information in all media has also, meanwhile, introduced significant challenges concerning intellectual property.

ICT is reducing barriers to entry for potential competitors to traditional education institutions by reducing the importance of geographical distance, enabling potential new efficiencies in overheads and the logistical requirements of running education programmes and research agencies, and expanding cheap access to information resources. As a result, there has been significant growth in the number of distance education programmes in which teachers and students are

physically separated, and in which teaching and learning take place by means of individual technologies or combinations of technologies.

Mobile and personal technology platforms are increasingly seen as appropriate for services of all kinds. The capabilities of mobile and personal devices have grown, driven partly by the increasing availability of digital materials and applications.

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- ➔ *Widening access to ICT infrastructure and connectivity* p8
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OPPORTUNITIES AND CHALLENGES

Planning for new interventions which aim to harness ICT to improve education must begin with contextualized needs analysis and careful preparation which takes account of the realities

within which implementation will take place. There is no single right approach which suits all educational environments but there are a number of general opportunities which are worth noting:

Establishing an enabling policy environment

Establishing an enabling policy environment, or reviewing what is in place to ensure sufficiency, is a major opportunity for many countries (see Box 1 right page). South Africa and Egypt are examples of countries that have achieved significant progress in the integration of ICT in education through enabling policy environments, supported by appropriate institutional and regulatory structures. They illustrate that, where there has been significant scaling up of ICT integration into teaching and learning, implementation has been carried out through cross-sectoral collaboration between ministries of education and other sectors. An enabling policy environment

includes policies and initiatives that help to drive the national ICT agenda, and includes policy on ICTs in education, bandwidth and connectivity. Existing education policies in most African countries need thorough review and updating to ensure that the policy for ICT in education supports and is supported by complementary policies for education as a whole. Additionally, all education legislation should be reviewed and updated to safeguard against legal and conceptual contradictions created by ICT in education policies. Most important is the need to align resource allocations and budgets with priorities defined in these new policy positions.

Widening access to ICT infrastructure and connectivity

Widening access to ICT infrastructure and connectivity is another priority. It is important first to *harness devices*

that teachers and learners already own. The proliferation of mobile phones has meant that more learners have

Box 1**Establishing an enabling policy environment**

While responsibility for the management of schools is shared between national and provincial government in South Africa, all priorities and programmes are in line with national policy determined by the national government. South Africa has a number of cross-sectoral and mutually supportive policies. Successful implementation of policy requires enabling institutional arrangements. South Africa has several public entities and agencies concerned with ICT, as well as a national commission to advise on ICT development in the country. These support ICT in education in various ways as part of their mandates.

Uganda first developed a National ICT Policy framework in 2003. While

there is a draft education sector-specific ICT policy, this draft, at the time of this study, was still with Cabinet for ratification. The absence of an approved policy and strategy for ICT in education is the most likely cause of a lack of common focus and direction among many, largely donor-driven, initiatives for ICT in education.

Senegal, on the other hand has the necessary policy environment for ICT in education, but has seen limited real progress. Adopted in 2009, the policy has yet to have any significant impact on the state of ICT in education. This suggests that Senegal still has to put in place a more comprehensive range of related policies in order to achieve success.

access to ICT devices than ever before, offering opportunities in terms of sustainability and scalability. A number of pilot projects are testing the use of mobile phones to support educational activities and some, such as the Yoza and Math for Mobile projects in South Africa, are seeking to exploit this high level of access to learning on an increasingly large scale (see Box 2).

However, mobile phones may not be the most appropriate platform to address a particular educational need, and may present challenges of access, cost and usability. As technology costs decline further, other devices (such as laptops and tablets) are likely to become more affordable and accessible platforms for both teachers and learners.

Box 2 next page →

Box 2

Widening access to ICT infrastructure and connectivity

Alongside a vibrant private sector, the government of South Africa has invested substantially to develop the country's telecommunications sector. It has made considerable strides in the electrification of schools, with more than 85 per cent of public schools covered by 2009. South Africa also has initiatives in place to provide computer laboratories in schools and connect them to the internet.

Because of the high penetration of mobile technology in the country, especially among the young, South Africa is piloting projects that make use of mobile technology for learning. South African universities are also making use of mobile technologies to support academic administration and community work.

In the absence of an enabling policy environment in Uganda, it is not

surprising that – apart from donor-driven projects supplemented by initiatives of the communications regulator, the Uganda Communications Commission – there has been no coordinated effort yet to address access and connectivity for schools. The overwhelming majority of schools in Uganda – primary and secondary – lack access to both the internet and power.

In Senegal, telecommunications operators are the main players in the extension of internet connectivity to schools. There are, in addition, a number of externally funded projects aimed at providing access to schools, the largest to date being the USAID Basic Education project (USAID/EDB). All of these were initiated before the adoption of an ICT in education policy. The impact of this policy in directing donor-funded projects remains to be seen.

Models of shared access to mobile devices, as well as those focused on teacher access, are more realistic from the perspectives of cost and support than one-to-one computer access. These devices can be moved around within schools, and can therefore be more easily integrated into classroom teaching.

One-to-one computing strategies may be suitable for providing access to teachers. If they have laptops or netbooks, they can use these to engage in informal learning at their own pace, to source and develop materials, and to design and project lessons. This approach is being explored in countries including South Africa (Teacher Laptop Initiative) and Kenya (Laptops for Teachers Programme).

Providing increased connectivity to support education and learning

The increasing *rollout of competitive fibre to Africa and within African countries* and greater *penetration of wireless and mobile platforms* have expanded opportunities for connectivity and broadband access. Wi-Fi and WiMAX especially create the opportunity for wide scale deployment of wireless access devices.

The *emergence of National Research and Education Networks (NRENs)* in Africa

over the past ten years has created an important opportunity to extend affordable non-commercial broadband to education institutions. South Africa and Kenya stand out as examples where a combination of sector liberalization and government investment in connectivity to education, working with NRENs, has led to prices falling to less than 10 per cent of what they were three years ago.

Harnessing ICT to improve management and administration

There is also value in *harnessing ICT to improve educational management and administration* (see Box 3). One major problem with current management information systems is the lack of adequate and well-designed policies and strategies for the collection and use of educational information by both governments and individual institutions. There is a need to support African governments so that they can formulate cost-effective and sustainable strategies for educational data collection and use, and for the development of indicators that enable the monitoring of national

and regional education performance. There is also a need to upgrade current Educational Management Information Systems (EMIS) through the adoption of web-enabled tools, and for the sharing of knowledge on requirements, challenges and opportunities. The National Education Statistical Information System (NESIS) programme, which has been promoted by the Association for Education Development in Africa (ADEA) provides a platform to promote policy and other capacity support for EMIS development in Africa.

Box 3**Harnessing ICT to improve management and administration**

South Africa has established a comprehensive range of EMIS platforms that cover the acquisition, processing, dissemination and reporting of education data at the national level, and within different education strata.

In Uganda, several development partners – including the World Bank, USAID and DFID – have at different times supported EMIS, including decentralization to districts and the incorporation of GIS capability into the system. EMIS in Uganda has, nevertheless, faced several challenges, including unreliability of data, challenges in decentralization resulting from a lack of human capacity in

EMIS and equipment maintenance, and challenges in sustainability resulting especially from connectivity costs. In addition, the data collected are only used at the centre: they are not yet used to support decision-making by schools or districts.

In Senegal, there are centrally managed systems for collecting educational statistics at all levels of education. There are also systems for managing examinations, finance, and human resources. Most of these are internally developed, pointing to the fact that Senegal has made significant progress both in capacity development and in implementing EMIS.

Open source platforms provide another opportunity for African countries, though they require expert human capacity. One example is OpenEMIS, which was sponsored by UNESCO. OpenEMIS

allows database administrators to adapt a generic tool to the specific characteristics of their national education system and to customize the components of the information system appropriately.

Harnessing Open Educational Resources

The growth of Open Educational Resources (OER) and the communities around them provides a significant opportunity to improve access to and use of high quality educational materials (see Box 4), of which African governments and educators can take

advantage. Developments include those, such as OER Africa and the Teacher Education for Sub-Saharan Africa (TESSA) Initiative, which are involved in promoting and supporting the creation and use of OER in Africa.

Box 4

Harnessing digital learning resources

Several initiatives provide free educational resources in South Africa. The Thutong portal, run by the Department of Basic Education, has resources on curriculum and examinations, teacher development, school administration and management. Mindset Network, an NGO, has been distributing high-quality materials for the schooling and health sectors openly and freely. The Siyavula project, founded in 2008, works with teachers to develop teaching and learning materials in collaboration and then share them through an open licence agreement.

Uganda does not have any significant initiative to produce OER, either in the public or private domains. Senegal, on the other hand, has made considerable progress in developing digital learning resources. At the national level, the Ministry of Education has collaborated in the development of an education portal through which teachers can download learning resources and adapt them to local needs. The portal also provides a training space that allows teachers to take courses, participate in collaborative work and engage with peers and experts.

The transformative educational potential of OER revolves around increased availability of relevant high-quality learning materials that can contribute to more productive work by students and educators. The principle of allowing adaptation of materials also provides a mechanism to develop roles for students as active participants in educational processes. OER has the potential to build capacity by providing institutions and educators, at little or no cost, with access to the means to develop their competence in producing educational materials and to carry the necessary instructional design to integrate such materials into high quality programmes of learning. NGOs and the private sector are active in the generation of OER, offering opportunities for collaboration

with governments and educational institutions.

Important challenges to OER development include: the need to ensure that the resulting products are educationally effective and of a high standard; provision of adequate ICT infrastructure and connectivity; buy-in from those academics and educators who are not yet aware of the benefits and possibilities; adjustments to staff workload to enable participation in content creation and adaptation processes; capacity to develop and adapt OER resources; and hidden costs associated with search and adaptation. There is also a need to develop enabling policies for intellectual property rights, human resource benefits, and quality assurance.

Building human capacity

Building sufficient and competent human capacity remains a challenge for most African countries. Countries that have developed a national strategy for professional development find it easier to achieve scale in the training of their teachers and in resourcing their

professional development. For example, Namibia's TECH/NA! strategy maps out training of the entire education workforce from ministry to school level, with training of teachers focused on pre-service and in-service training by teacher training colleges.

Box 5

Building human capacity

One of the important features of teacher education in South Africa is the National Framework for Professional Teacher Education and Development (NFPTED), which specifies how ICT can be used to widen access to teacher education, improve teacher-learners' motivation, speed up communication, and provide an enriched environment for learning. ICT professional development has been integrated into pre-service teacher education by some universities, and there are also many opportunities for in-service teacher professional development in ICT. The training by universities in ICT teacher professional development has been complemented by the efforts of School-Net South Africa, which manages

three large teacher development programmes: Intel Teach, Microsoft PiL, and the Commonwealth Certificate for ICT Integration.

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 pedagogical issues around ICT in learning. Uganda has remained at the small-scale pilot level, without any visible plan or strategy for national level expansion. Senegal, in addition to participating in international programmes like Microsoft PiL and iEARN, has some national level initiatives that address both pre-service and in-service training.

There are parameters for good practice which inform the strategy for professional development for ICT integration that can be taken on board in African countries. Those developed within the

NEPAD e-Schools Initiative advocate a holistic multi-stakeholder, multi-modal delivery approach to professional development, specifying that all educational role-players should "possess the skills

and competence required to use ICT effectively in their daily lives”. In addition, “ongoing educational opportunities – formal, non-formal, and informal – [should be] made available to, and... used by, all of these groups of people to further develop their educational ICT competence”. Opportunities for teacher competence development include worldwide and regional programmes such as iEARN, which is available in 29 countries on the African continent.

Because of their reliance on teachers themselves to contribute and sustain them, communities of practice offer a cost-effective model of professional development. Teachers that engage in communities of practice are more confident of their work and less afraid to display it for scrutiny and critique by others. Examples include the Partners in Learning Network (PILN), Siyavula, and the Teacher Education in Sub-Saharan Africa (TESSA) Forum.

Challenges

The opportunities for ICTs in education must be understood within a context of challenges and difficulties. These include:

- the absence of comprehensive policies which enable and support interventions and which are supported by clearly defined and resourced strategies for implementation at national level as well as at the level of educational institutions;
- lack of financing and prioritization of ICT investments;
- limited infrastructure of the kind required to support the use of ICT in education;
- lack of capacity at all levels to integrate and support the use of ICT in education effectively;
- lack of necessary ICT skills among teachers, and of the specific training needed to be able to use ICT appropriately in the classroom;
- lack of appropriate content;
- lack of accurate, comprehensive, up-to-date data on education; and
- the tendency of ICT to accentuate social, cultural and economic disparities.

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 remains elusive.

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CASE STUDIES

Three country case studies, of South Africa, Uganda and Senegal, were conducted to enable a deeper examination of success factors and challenges.

South Africa provides an example of a country which is at a comparatively advanced stage of implementing ICT in education. Uganda offers lessons for countries where there has been some effort to introduce ICT in education, and where the education sector appears vibrant, but where there is no coordinated framework. Senegal, like South Africa, was one of the early pioneers of ICT in education, has a reasonably well-developed framework and, according to all indications in the literature, has a vibrant education sector. However, the UNDP Human Development Report 2010 education indicators point to educational outcomes well behind those in South Africa and Uganda.

The progress of South Africa, Uganda and Senegal against the challenges identified above is briefly outlined in Boxes 1–5. The case study countries, through their achievements and challenges, suggest the following lessons:

1. A robust policy environment that supports the ICT in education policy is an enabling, but not sufficient, condition for ICT roll-out.
2. Policy requires supportive institutional arrangements that may necessitate central-level coordination.
3. ICT integration in education requires national budget support as well as nationally driven partnerships with the private sector. Total reliance on donor-funded projects that are necessarily driven by differing donor agendas will lead to standalone projects that are not sustainable.
4. 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.
5. Success of 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.

5

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➔ *For development
partners* p22

RECOMMENDATIONS

For policy makers and regulators

RECOMMENDATION ①

Establish 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 directed by a single, integrated ICT-in-education strategy so that they are working towards common national strategic objectives.

To be effective, strategies should be developed through appropriate processes of consultation within countries, in order to ensure that there is strong consensus on the proposed approaches by all major stakeholders, combined with buy-in to the strategic objectives that have been defined.

RECOMMENDATION ②

Widen 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.

RECOMMENDATION ③

Harness ICT to improve management and administration

Promote data-driven decision-making at all levels. The focus on data usage at all levels implies that investment in

future EMIS development should focus on schools, colleges and universities that provide the data.

RECOMMENDATION 4

Harness 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. In the first instance, priority

content could be derived from open content sources. If suitable content is not available, it will be useful to identify and invest in priority content development focus areas.

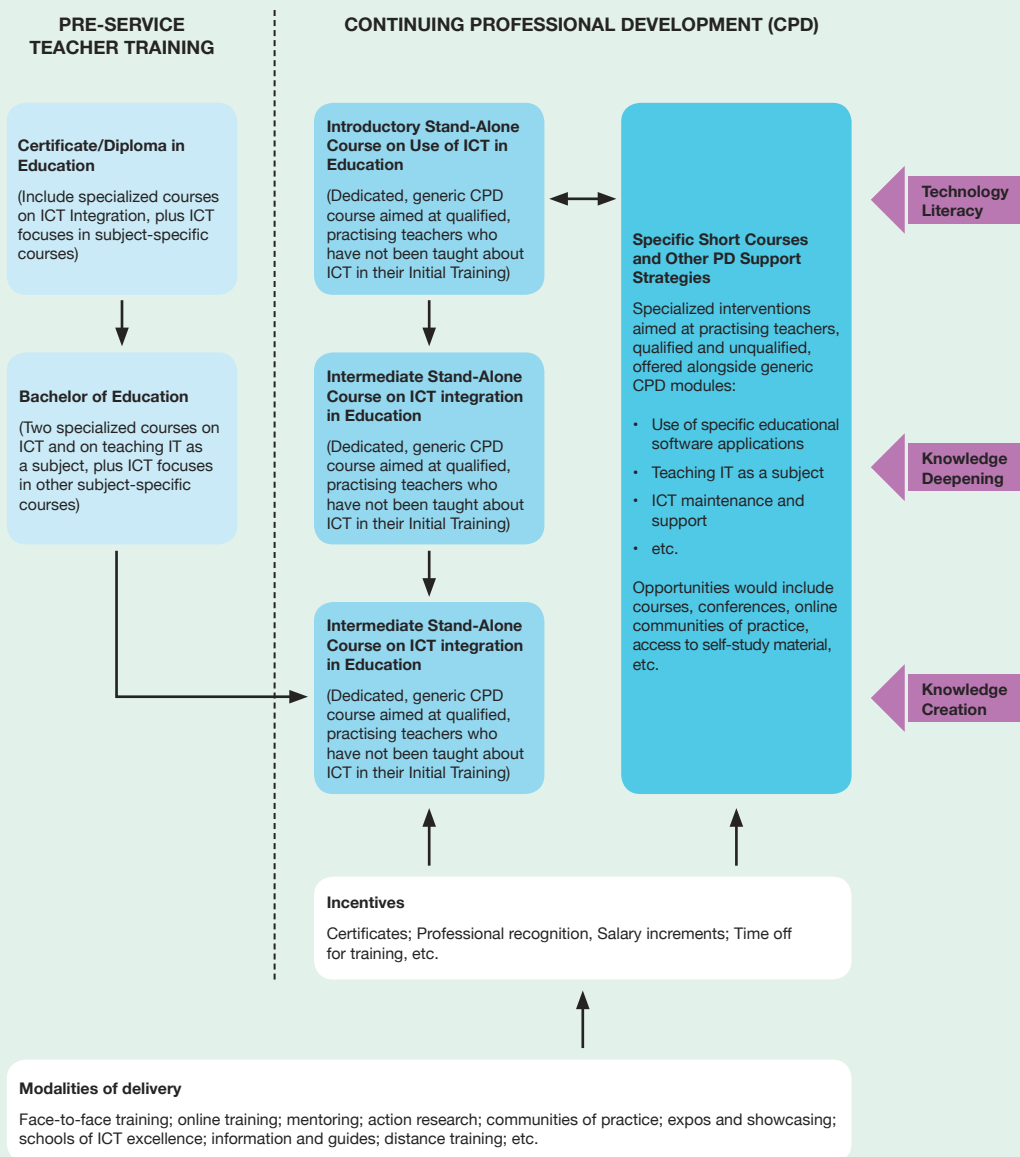
RECOMMENDATION 5

Build human capacity

Adopt a suitable global professional development framework to guide national implementation of ICT in education professional development. The UNESCO ICT Competence Standards for Teachers and Teacher Training (CFT) is a good starting point for planning professional development

strategies at national level. Figure 1 presents a model for such a framework, based on the approach that Guyana has used to develop a professional development for ICT integration strategy using the UNESCO ICT Competency Framework.

Figure 1 **Illustrative model of national framework for ICT professional development**



For development partners

Development partners 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. They are especially well positioned to stimulate and support initiatives that are based on cross-border collaboration:

RECOMMENDATION 6

Ensure funded projects contribute to national policies and objectives

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 to be

unsustainable and may even impede progress in effective roll-out of ICT in education by creating conflicts of interest and unnecessary fragmentation.

RECOMMENDATION 7

Consider investment in the enabling policy environment

Should national strategy be unclear, development partners should consider support for governments to develop the

policy environment, including expert support, financing and capacity building at both national and regional levels.

RECOMMENDATION 8

Consider investments to build capacity at a regional or continental level

Regional or continental initiatives can contribute to building capacity that would support policy makers in

implementing the kinds of initiatives outlined in this chapter. These might include:

1. development of common, openly licensed course and programme materials;
2. support for the aggregation and release under open licences of digital learning resources produced in African countries, possibly by supporting regional consortia of providers;
3. establishment of platforms for capacity building and knowledge exchange on EMIS deployment;
4. support for the development of NRENs and deployment of associated data networks and applications (e.g. grid-computing, video-conferencing, e-learning, etc); and
5. development of the capacity of policy makers and regulators to enable them to establish more effective ICT in education policies, strategies and regulatory frameworks.

RECOMMENDATION 9

Continue to fund pilot projects to test innovative technologies

Technology is still developing rapidly bringing with it new educational opportunities. Experimentation is important, therefore, 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 experimentation, 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, not least in ensuring pilot projects are well evaluated and the results widely shared.

RECOMMENDATION 10

Ensure that intellectual capital generated by funded projects is shared

Adopting policies that lead to release of 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.

RECOMMENDATION 11

Undertake an evaluation and impact assessment of regional initiatives

Investments by donors, and national governments, in this crucial field will be much more productive if they are rooted in independent critical evaluation of regional initiatives at different stages of development and implementation. This will provide better

understanding of which initiatives to support and how these can be best supported, reinforced or expanded where appropriate, including support for collaboration between regional initiatives so that they reinforce one another.

Further reading

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www.eTransformAfrica.org

Publications for eTransform Africa include the Summary Report, Main Report which includes an overview chapter and summary chapters of the full reports, and the full reports themselves covering the following sectors and cross-cutting themes:

Sectors themes:

- Agriculture
- Climate Change Adaptation
- Education
- Financial Services
- Modernizing Government
- Health

Cross-cutting themes:

- Regional Trade and Integration
- ICT Competitiveness

For a more detailed presentation on the role of ICT in education in Africa, see the full eTransform Africa sector report: <http://www.etransformafrica.org>.

