

# E-LEARNING FOR TEACHER TRAINING IN TANZANIA

POLICY, PLAYERS, MODELS, AND RECOMMENDATIONS  
FOR THE ASANTE AFRICA FOUNDATION

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PP200: Introduction to Policy Analysis  
Goldman School of Public Policy  
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Spring 2013

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## PROJECT PARTNERS

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### GSPP STUDENT CONSULTANT TEAM

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This report has been prepared by a graduate student team from the Goldman School of Public Policy (GSPP) at the University of California at Berkeley. Daniel Baker, Ashley Bliss, Roy Chung, and Corey Reynolds are full-time graduate students at GSPP, each bringing different experience in domestic and international politics and policy, education, law, economics, and technology. As a component of “Introduction to Policy Analysis” (IPA) course at GSPP, these students conducted research for the Asante Africa Foundation from January to May 2013.

### ASANTE AFRICA FOUNDATION

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The Asante Africa Foundation’s mission is to increase access to education and improve the quality of learning for children in East Africa. Since 2006, Asante Africa’s programs have provided a comprehensive response, helping disadvantaged children acquire a solid education. In partnership with teaching institutions, communities, students, and families, Asante’s approach aims to create safe and healthy learning environments, enhance and strengthen teaching quality, and provide merit-based scholarships to disadvantaged children. At present, Asante Africa sponsors more than 150 student scholars in primary and secondary school and collaborates with 22 villages and 41 schools to directly impact 480 teachers and 23,000 children in Tanzania and Kenya. Asante Africa is currently exploring how to leverage e-learning technologies to support their work in teacher training.

## EXECUTIVE SUMMARY

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Rural Tanzania is struggling to provide an adequate number of qualified teachers to keep up with increased primary and secondary school enrollment rates. Teachers enter classrooms with minimal teaching experience and education, sometimes having never studied the subject they are teaching. As a result of this under-qualification, teachers struggle in critical topics such as math, science, and English, exacerbating the trend of low academic performance. A lack of well-qualified teachers means the country is producing students whose education is cut short, as they are not passing national exams for graduation. This result is a great disappointment and an unacceptable outcome for students who represent years of investment and hope for the future. Primary and secondary school teachers must have sufficient knowledge and skills in the classroom. Teacher training will need to employ a variety of tools, among them education of and with Information and Communications Technologies (ICTs).

This project has two components. First, it provides a landscape review of national and international policies and initiatives that affect education in Tanzania, clarifying how Asante Africa's programs can best fit into the country's established systems. Second, it identifies best practices for using e-learning ICTs to train teachers and improve the country's education system. The report identifies four prospective e-learning models, and recommends that Asante Africa consider aspects of two: mobile learning and massive open online courses (MOOCs). Through our model evaluation, we found that these two models ranked best for Tanzania in effectiveness, cost, rural feasibility, scalability, and sustainability. Once a delivery method is in place and Asante Africa ensures technical support for the teachers utilizing the training materials, Asante Africa can strategize a plan for content and curriculum that leverages its Khan Academy videos. By implementing the recommended ICTs for learning and teacher training, Asante Africa will deliver increased access of quality training to teachers in the rural districts of Tanzania, improving the academic environment and performance of students throughout the country.

## INTRODUCTION

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### DEFINING THE PROBLEM

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Rural education districts in Tanzania struggle to adequately train teachers to implement national education strategies—a critical gap in Tanzanian education identified by last year's GSPP team analysis. Since that report, Asante Africa has 1) partnered with Khan Academy to translate 1,000 math and science videos from English to Swahili and 2) secured a \$500,000 grant to elevate the quality of secondary school teaching, and build teacher competency in child-centered pedagogy and critical math, science and English subject areas. Teacher training will employ a variety of tools, among them education of and with ICTs.

The organization seeks a recommendation on how e-learning can be an effective component of teacher training, given national education policy and the infrastructure constraints of rural Tanzanian schools.

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## PROJECT GOALS

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This project will include a review of best practices for using e-learning ICTs to train teachers in the Tanzanian context and a recommendation for models moving forward. We will begin with a survey of national education policy and international non-governmental initiatives impacting this local effort. This information will put the ICT recommendations in context and may be used by Asante Africa to inform an implementation strategy and related fundraising efforts.

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## METHODOLOGY

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This project is two-fold: an exploratory analysis of ICT solutions for teacher training and a survey of national and international policy and initiatives that touch Asante Africa's work in this area. As such, the first phase of work was split into two tracks.

### **Track 1: E-Learning Models**

The team reviewed relevant academic literature, best practices, reports, and case studies involving e-learning, especially for use in teacher training. Focusing on the developing world, the research team flagged promising practices, as well as examples of effective implementation.

### **Track 2: Policy Research**

Concurrently, the team performed significant academic and internet-based research on current Tanzanian education and ICT policy, important organizations, and critical international initiatives that may help inform Asante Africa's fundraising strategy.

The second phase of our work brought the two tracks together to recommend an e-learning model to deliver teacher training. Leveraging the problem definition and evidence gathered in the first phase, the team took the following approach, based on Eugene Bardach's Eightfold Path, to derive a recommendation (Bardach 2012):

- **Identify criteria:** Through conversations with Asante Africa's program staff, a review of best practices, and the research performed in the first phase, the team identified a set of five criteria with which to evaluate an e-learning/teacher training model.
- **Propose Models:** Based on best practices and research of other successful e-learning models in developing countries, the team identified four candidate models for Asante Africa to consider in its ICT and teacher training program.
- **Evaluate Models:** The team utilized a qualitative scale to assess each of the models against the criteria. We then confronted the trade-offs to each of the

- models, developing pros and cons for each possible model.
- Develop Recommendation: By qualitatively assessing at the trade-offs of each model, the team was able to drive to a recommendation.

## TODAY'S EDUCATION AND TEACHER TRAINING POLICY LANDSCAPE

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### NATIONAL POLICY AND INITIATIVES

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The Tanzanian Government recognizes the central role of education in improving the quality of life for its citizens. It considers the provision of quality universal primary and secondary education for all the most reliable method to build a sustainable future for the country. This principle is well-articulated in national policies and initiatives that focus on improving access to education at all levels, providing quality and equitable education to both boys and girls, and improving management and financing for education. Tanzania considers ICTs a critical component for this education-improvement goal, and has established several policies and programs that aim for ICT integration in student and teacher training. It is important that Asante clarify and understand the overall national education policy, objectives, and approaches, so that Asante's e-learning initiatives can incorporate successfully into the country's education system.

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### POLICY, PROGRAMS, AND INITIATIVES

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#### TANZANIA DEVELOPMENT VISION 2025

The Tanzania Development Vision 2025 is a long-term plan for national development that is characterized by five main attributes: high quality livelihood; peace, stability, and unity; good governance; a well-educated and learning society; and a strong and competitive economy capable of producing sustainable growth and shared profits. The Vision places high priority on education, considering it to be crucial in bringing about social and economic transformation.

#### NATIONAL STRATEGY FOR GROWTH AND REDUCTION OF POVERTY (NSGRP) (2005)

The National Strategy for Growth and Reduction of Poverty, established in 2005, is a framework that prioritizes poverty reduction in Tanzania's development agenda. The framework identifies education as a priority sector and ICT as a powerful and critical tool in the fight against poverty. The attention on ICT is to empower the country's citizenry, particularly the poor and those living in remote, rural, and marginalized urban environments, to access information and use ICT as a tool to lift themselves out of poverty. The NSGRP is informed by the aspirations of Tanzania's Development Vision 2025. (Hooker, Mwiyeria & Verma 2011, 20).

## TANZANIA BEYOND TOMORROW (2011-2020)

The Tanzania beyond Tomorrow (TBT) is a new program under the Ministry of Education and Vocational Training that will define an e-Education Program for Basic Education for 2011-2020. It was started as a project for secondary education with the goal to use ICT to alleviate the teacher-shortage problem, particularly in math and science. The program will improve access, equity, and quality in the delivery of basic education through integration and harmonization of ICT in teaching and learning. Specifically, TBT will create a unified ICT framework, enhance the use of appropriate ICT in education, provide and improve ICT infrastructure to support teaching and learning, provide capacity building, transform basic education curriculum for e-delivery modes, develop guidelines for e-education programs, integrate ICT in educational management functions, and enhance ICT research and development. (Hooker, Mwiyeria & Verma 2011, 20).

## THE FRAMEWORK FOR ICT USE IN TEACHER DEVELOPMENT IN TANZANIA (2009)

In 2009, the Ministry of Education and Vocational Training (MoEVT) and the Global e-Schools and Communities Initiative (GESCI) developed the *Framework for ICT Use in Teacher Professional Development in Tanzania* that would integrate ICT into the teacher education system using the existing ICT infrastructure at Government Teacher Training Colleges. The Framework outlines the visions, goals, resource requirements, and expected outcomes for ICT integration in teacher training and development, while focusing on policy, curriculum and content, pedagogy, ICT infrastructure, organization and management, and teacher professional development. (Hooker, Mwiyeria & Verma 2011, 19).

## THE ICT POLICY FOR BASIC EDUCATION (2007)

As the potential of ICT as a tool for improving education grew in Tanzania, the Ministry of Education and Vocational Training (MoEVT) developed the *Information and Communication Policy for Basic Education*. (MoEVT 2007). This policy presents guidelines for ICT integration in all pre-primary, primary, secondary, university, and teacher education. It considers issues of infrastructure, curriculum, training, administration, management, and evaluation with a mission to “to enhance access, equity, quality and relevance of basic education, while stimulating and improving teaching and life-long learning.” (MoEVT 2007, 5).

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## THE GOVERNING BODIES

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### MINISTRY OF EDUCATION AND VOCATIONAL TRAINING

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The Ministry of Education and Vocational Training (previously the *Ministry of Education and Culture*) is the primary government body responsible for providing education in Tanzania. The department is primarily accountable for the formulation, monitoring, and evaluation of policy implementation, teachers’ training, registration of schools, and

inspection of education infrastructure. MoEVT is managed by a minister (current Minister: Shukuru Kawambwa), deputy minister, permanent secretary, chief education officer, and several directors in charge of the various Divisions and Units. Several Division and Unites of relevance for Asante Africa include:

- Higher Education Division
- Technical and Vocation Education Training Division
- Adult and Non-Formal Education Division
- Teachers Education Division\*
- Diversity Unit
- Education by Media Unit
- Pre-primary and Primary Education Unit
- Secondary Education Unit\*
- School Inspectorate Division\*
- Policy Planning Division
- National Commission for UNESCO
- Zonal and District Offices

#### **Teachers Education Division\***

Within MoEVT, the Teachers Education Division coordinates all teachers' education and training; initiates and reviews teachers' education policies, guidelines and standards; monitors and evaluates implementation of Teacher Development Management Strategy; and provides teachers' education management support service. To stay in accordance with national guidelines and standards for teacher education and training programs, this division is relevant as Asante develops teacher programs for schools. Specifically, it reviews teacher education curriculum, instructional materials, and teaching learning methods; monitors projects and training programs related to teacher education; monitors the quality of teacher education training, teaching processes and outputs; and oversees the professional development of tutors in teachers' colleges. (MoEVT, Teacher Education Division 2013).

#### **Secondary Education Unit\***

As Asante works to elevate quality of secondary school teaching and improve learning outcomes for youth in secondary schools, MoEVT's Secondary Education Unit would assist for national coordination. The Secondary Education Unit provides inputs in the development, monitoring, evaluation, and reviewing implementation of education policy; they initiate the development and review of secondary education curriculum, instructional materials, and teaching methods including physical education and ICT; they monitor and evaluate the quality of secondary education, teaching and learning processes, and outputs; and they prepare and disseminate guidelines for ensuring increased access and equity of participation, while also monitoring and evaluating their implementation. (MoEVT, Com Office 2013).

### **School Inspectorate Division\***

The School Inspectorate Division functions in education management, secondary education, basic education, and teacher education. The Division carries out school inspections with the goal to provide advice to the commissioner for better decision making and planning; inspection, training and advice to school managers, school boards and teachers on good pedagogical practice and implementation of school development plans; improvement of teaching standards in schools; in-service training of teachers; and supervisory visits to improve the quality of teaching in schools. (MoEVT, School Inspectorate Division 2013).

Working under the MoEVT, Regional Education Officers coordinate all regional education matters. District/Municipal Education Officers head the District/Municipal education offices. The MoEVT runs the country's education system, and each district/municipal office manages the school buildings, and allocating equipment and materials to the schools. Direct management of the primary and secondary school falls under the Prime Minister's Office Regional Administration and Local Government (PMO-RALG). PMO-RALG handles the implementation of education initiatives and operates at the regional level through its Regional Secretariat and Local Government Authorities (LGAs). (Hooker, Mwiyeria & Verma 2011, 25).

### **TANZANIA INSTITUTE OF EDUCATION (TIE)**

The Tanzania Institute of Education is a parastatal organization under the MoEVT charged with the responsibility of ensuring the quality of education in Tanzania at the pre-school, primary, secondary, and teacher training levels. TIE's responsibilities include curriculum design and development for pre-primary, primary, secondary, and teacher education levels; to provide and oversee education quality assurance with regard to teaching methods, subject objectives and standard of teacher-learning materials; and, to provide technical advice to MoEVT and to other stakeholders working provide quality education at all levels. TIE's achievements in ICT include the development of ICT syllabus for primary, secondary, and teacher education, the establishment of a recording studio for e-content development, a proposal for teacher professional development using e-learning, and an ICT strategic policy plan.

TIE is split into four academic departments consisting of Curriculum Development and Review (CDR); Educational Materials Design and Development (EMDD); Research, Information and Publications (RIP); and, Centre for Curriculum Training (CCT).

#### **Curriculum Development and Review (CDR)**

CDR is responsible for designing and developing the curriculum for pre-primary, primary, secondary, and teacher training colleges. The department is headed by a Director and is divided into five sections that comprise Early Childhood Development, Primary Education, Secondary Education, Teacher Education, and Special Needs and Non-formal Education.

### **Department of Educational Materials Design and Development (EMDD)**

EMDD designs and coordinates the development of education materials including books, manuals, guides and e-learning materials for schools and teacher's colleges. They consult with stakeholders involved in development and production of educational materials and conduct workshops/conferences for stakeholders on educational materials design and development. Additionally, they supervise, develop and test educational materials on their suitability for use in schools and teacher's colleges, and set standards to ensure the quality of these educational materials. They also design, develop and test model prototypes for large scale production of teaching/learning devices and equipment.

### **Centre for Curriculum Training (CCT)**

The primary role of CCT is to develop and conduct programs that focus on improved teaching and learning in schools and teachers colleges. CCT designs and develops training programs for stakeholders and curriculum professionals, as well as coordinates and monitors the implementation of these programs. They do the same for in-services training courses for teachers, Teacher College tutors, school inspectors and other actors involved in the implementation of curricula. CCT works closely with EEMD to provide consultancy services related to education and training programs.

TIE is currently working towards their Corporate Strategic Plan (CSP), a five-year plan that will run July 2011-June 2016 guiding the Institute to become the center of excellence in the design, development and implementation of curriculum. The plan has taken into consideration the recommendations of MoEVT's Medium Term Strategic Plan, the National Development Vision 2025, and the National Strategy for Growth and Reduction Poverty, as well as the views of TIE stakeholders.

### **TANZANIA LIBRARY SERVICES BOARD (TLSB)**

The Tanzania Library Services Board is a national institution under the MoEVT. The Board promotes, establishes, equips, and develops libraries, information centers and documentation centers. TLSB acquires, organizes and distributes books, non-book materials, and other forms of information materials to individuals, schools, institutions, and the public in general.

### **MINISTRY OF COMMUNICATION, SCIENCE, AND TECHNOLOGY**

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The Ministry of Communication, Science, and Technology (MCST) (previously the *Ministry of Science, Technology, and Higher Education*), headquartered in Dar es Salaam, oversees the science and technology policy programs, acquisition and application of technology, development of local expertise in science and technology, and dissemination of research findings regarding the development of science and technology in higher education policy, universities, institute of technology, and technical colleges. At

an international level, they work closely with UNESCO. Two MCST programs of interest for Asante are:

### **National Communications Infrastructure Backbone Network**

The National Communications Infrastructure Backbone Network aims at improving connectivity with the country at the East Africa region through lower prices for accessing efficient, quality, and affordable ICT services through improved communications infrastructure services. The network when completed will facilitate connectivity to villages with ICTs and establish community access points; universities, colleges, secondary schools and primary schools with ICTs; scientific and research centers; public libraries, cultural centers, museums, post offices, archives; health centers, hospitals; along with local and central government departments.

### **Development and Promotion of Science and Technology Education in Tanzania**

The project for the Development and Promotion of Science and Technology Education in Tanzania was established due to the slow pace of science education development in the country due to weak collaborative efforts in promoting science and technology education between Ministries responsible for education and the private sector. A taskforce, with members from MoEVT and MCST, was formed to explore ways of promoting science and technology education. The taskforce found that low interest in science from primary up to university education is due to such factors as low compensation as a career scientist, science subjects being difficult to pursue at school, and the costs of educating a scientist are higher than those from arts based subjects.

### **TANZANIA COMMISSION FOR SCIENCE AND TECHNOLOGY (COSTECH)**

The Tanzania Commission for Science and Technology is a subsidiary institution to the Ministry of Higher Science, Technology, and Higher Education. COSTECH coordinates and promotes research and technology development activities in the country. It advises the government on all matters relating to science and technology, including the formulation of science and technology policy, priority setting for research and development, allocation and utilization of resources. COSTECH facilitates national, regional, and international cooperation in scientific research and technology development, and their application to the socio-economic development in the country. A specific focus area includes the development of multimedia teaching material.

COSTECH works closely with Mwenge University College of Education as an approved education institution by the Tanzania Commission for Universities. Additionally, a particular COSTECH initiative, entitled “Failures in Science and Mathematics (SMT)” in Tanzania Secondary Schools addressed the importance of teaching and learning of science and mathematics in schools, for development of capacity for science and technology in the country and for socio-economic development.

### NATIONAL COUNCIL FOR TECHNICAL EDUCATION (NACTE)

The National Council for Technical Education oversees and coordinates technical education and training in all post secondary, non-university tertiary institutions. NACTE is composed of a Chairman and nine Councilors appointed by the Minister for Science, Technology and Higher Education.

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### ADDITIONAL EDUCATIONAL ORGANIZATIONS

#### NATIONAL EXAMINATIONS COUNCIL OF TANZANIA (NECTA)

The National Examinations Council of Tanzania is the governmental institution responsible for administering all national examinations and awarding primary, secondary, and post-secondary official diplomas. The Council consists of a chairman and 14 members appointed by the Ministry of Education and Culture.

#### TANZANIA EDUCATION AUTHORITY (TEA)

The Tanzania Education Authority is a corporate body that works together with government, public and private partners to manage resources for the country's Education Fund. The Fund provides loans and grants to schools, colleges, and universities for projects that will improve quality of education, increase access, and promote equity at all educational levels. TEA supports education improvements through textbook distribution, funds for education programs, and funding for ICT investments. Institutions are required to write proposals to TEA requesting assistance for their services.

#### TANZANIA COMMISSION FOR UNIVERSITIES (TCU)

The Tanzania Commission for Universities is tasked to recognize, approve, register and accredit Universities, and local or foreign University level programs being offered by registered education institutions. TCU coordinates the functioning of all university institutions to establish a harmonized higher education system in the country.

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### INTERNATIONAL INITIATIVES AND TANZANIAN EDUCATION

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#### EDUCATION FOR ALL

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Education for All (EFA) is a global initiative aimed at providing education to every citizen in every society. It was launched in Jomtien, Thailand in 1990 by a coalition of development agencies, headed by UNESCO (United Nations Educational, Scientific, and Cultural Organization), and governments, including Tanzania, with the goal of an expanded vision of learning that would promote literacy and access.

Ten years later, realizing that progress on the EFA initiative was short of its goals, the coalition met again in Dakar, Senegal to reaffirm its commitment to expanding education and to revise its six goals to be achieved by 2015:

**Goal 1**

Expanding and improving comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children.

**Goal 2**

Ensuring that by 2015 all children, particularly girls, children in difficult circumstances and those belonging to ethnic minorities, have access to, and complete, free and compulsory primary education of good quality.

**Goal 3**

Ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life-skills programmes.

**Goal 4**

Achieving a 50 per cent improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults.

**Goal 5**

Eliminating gender disparities in primary and secondary education by 2005, and achieving gender equality in education by 2015, with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality.

**Goal 6**

Improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills.

(UNESCO, Education for All Goals 2012).

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**MILLENNIUM DEVELOPMENT GOALS**

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EFA's goals were intended to complement the Millennium Development Goals (MDG), to which Tanzania is also a signatory. In particular, EFA is supportive of goals 2 and 3. Goal 2 is to achieve universal primary education, with a national target of ensuring by 2015 everywhere, boys and girls alike, will be able to complete a full course of primary schooling. Goal 3 is to promote gender equality and empower women, with a national target of eliminating gender disparity in primary and secondary education, preferably by 2005, and to all levels of education by 2015.<sup>1</sup>

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<sup>1</sup> The remaining, less applicable goals of the MDG are:

Goal 1: Eradicate extreme poverty and hunger; Goal 4: Reduce child mortality; Goal 5: Improve maternal health; Goal 6: Combat HIV/AIDS, malaria, and other diseases; Goal 7: Ensure environmental stability; Goal 8: Develop a global partnership for development. (UN Development Programme 2010).

The synergies between the goals of EFA and goals 2 and 3 of the MDG are apparent. Both goals of the MDG seek to increase access to early education, focusing most specifically on primary education and on women. Each of the EFA goals also works to achieve these goals, approaching them from a different vantage point.

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### EDUCATION AND TRAINING POLICY

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Tanzania approached its commitment to the 1990 EFA through the Education and Training Policy in 1995. Its aims are to decentralize education to regions; improve the quality of teacher training programs, teaching supplies, and the curriculum; expand the provision of education through the liberalization of education and training; promote science and technology through vocational training; promote equitable access by establishment of a right to education; and broaden the base of funding through communities, NGOs, and education investment. (Ministry of Education 1995).

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### PRIMARY EDUCATION DEVELOPMENT PROGRAMME

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Tanzania, like many of the other signatories to EFA, found the 2000 target to be overly optimistic and renewed its commitment in Dakar in 2000. Shortly following this commitment came policy implementation via the Primary Education Development Programme from 2001-2006. This program, started with funding and partnership from the European Commission, World Bank, and others, aimed to expand access to quality education by: increasing levels of enrollment; improving the quality of teaching and learning; promoting capacity building within the education system; and strengthening institutional arrangements that support the planning and the delivery of education services. (EuropeAid 2006).

The PEDP is considered one of the first successful education programs in Tanzania. It significantly increased primary school enrollment through the abolishment of school fees. Primary schools had been fee-free before a fiscal crisis in the 1980s, and following their reinstatement, the fees caused a steady decline in access and attendance. (Woods 2007, 8). Through a combination of fee removal and expansion of school facilities, the PEDP saw strong progress towards the goals of EFA and MDG.

Building on the successes of the PEDP, the PEDP II was adopted from 2007-2011. Its focus continued to be on capacity, while further emphasizing quality of teaching and institutional improvement. “The component on Expansion, focused on both access and equity, was given the highest priority. It aimed at ensuring full identification and admission of all eligible children and their regular attendance. On the other hand, the Quality component had the objective of promoting improved quality of teaching and learning and promotion of quality so as to enhance learning outcomes.” (PEDP II Evaluation 2012, ix). Unfortunately, on evaluation, the PEDP II had unsatisfactory success in achieving its goals. (PEDP II Evaluation 2012, xi).

Amongst the recommendations moving into the PEDP III are guaranteeing cost certainty for education programs, improving teaching recruitment and deployment, especially to rural schools, enhancing teacher morale, and enhancing the school learning environment through infrastructure and supplies. (PEDP II Evaluation 2012, xii-xiv). Each of these recommendations looks to develop schools beyond the considerable improvement in capacity to achieve holistic success in improved education.

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## RESULTS

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By many measures, the programs in Tanzania since the renewal of EFA and the MDG have been quite successful. Primary school attendance has risen from 60% in 2000 to 95% in 2010. As well, the difference between boys and girls has almost evened. (SIDA 2013). The United Nations Development Programme rates Tanzania as very likely to achieve the MDG targets on the basis of the progress made thus far. (UN Development Programme 2010).

However, this progress has not come without cost. More than 50,000 new primary school teachers have been hired between 2003 and 2010. “This rapid expansion has brought major challenges. Resources such as teachers and money for teaching and learning materials have not correspondingly increased. . . . The main issue in education in Tanzania today is to improve the quality of teaching.” (SIDA 2013).

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## ASANTE AFRICA’S OPPORTUNITY

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The improvement of teacher quality seems to be where Asante has a place in the national and international intervention into Tanzanian education. Through these overarching initiatives with outside funding and short deadlines relative to the magnitude of the changes desired, Tanzania has been able to make a lot of progress in a short amount of time on several measurable characteristics. However, that progress has caused the education system to lag behind in other ways, including teacher training. Embodied in the liberalization of education and training, Tanzania has taken quantity over quality with a large inundation of newly minted teachers.

However, access to and expansion of education was only a small part of the PEDP framework. Beyond increasing access, the PEDP aimed to improve the quality of teaching and learning, while strengthening institutional arrangements that support the delivery of education services. The rapid changes brought on by the PEDP success resulted in a high demand for secondary education and secondary education teachers. Access to secondary education has been addressed through the SEDP. Unfortunately, these measures have not been able to prevent the quality of education from dropping, particularly in secondary education and math and science subject areas, due to quantity over quality. “The pressure for expansion requires a re-examination of the mechanisms for the preparation and development of teachers and managers of Tanzania’s education

system so that quality of education is not affected negatively.” (Komba & Nkumbi 2008, 67). This seems to exactly fit the niche that Asante would like to fit in Tanzania, improving quality through teacher training and providing another institutional connection for Tanzanian schools to achieve these goals.

Asante’s goals fit as well into the 1995 ETP, where decentralizing education, improving teacher training, and broadening the base of education funding all fit Asante’s goal of using grant money to improve teacher training in rural schools. These are areas that go beyond the specific goals of the MDG that Tanzania has made significant progress toward achieving into areas that clearly still need work. The consistent pledges to improve the education system as part of the Tanzanian Development Vision of 2025 are indication and the myriad sub-plans to these main international initiatives lends us to believe that there will be openness to Asante’s plans.

In sum, the national and international policy reviews seems to give reason to be encouraged. Tanzania has consistently demonstrated a commitment to improving education over the past 25 years. In making progress, it has bolted ahead in access and new facilities, leaving an issue with teacher training that begs for a solution. In approaching that solution, specific reports believe that Tanzania has an openness to technological solutions of the kind that Asante suggests and are willing to continue to adapt to achieve those solutions.

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## E-LEARNING MODELS FOR TEACHER TRAINING

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### ICT IN TANZANIA

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With respect to Information Communication Technologies (ICTs), Tanzania fell behind even other countries in sub-Saharan Africa after it imposed a ban on television and computers from 1974-1984. (ICT Observatory 2009). However, the Tanzanian Development Vision of 2025 and more specific reports have identified technology as key in the long-term interest of Tanzanian development. This is evidenced in a situational analysis of ICT in Tanzanian education that found that

the government and MoEVT recognize the potential of ICT to act as a tool for improving education delivery, outcomes and impact, as evidenced through the national plans, policies and strategies. The *Tanzania Vision 2025*, the key national development strategy, recognizes the role of education as a strategic change agent for transformation of the economy to a knowledge economy, and identifies the potential of ICT to address most of the development challenges including those presented by education. The National ICT Policy of 2003 recognizes that ICT can enhance education opportunities and advocates for the introduction of an e-education system.

(Swarts & Wachira 2010, 6).

Unfortunately, despite this apparent readiness for ICT in Tanzania, there appears to be minimal results from government initiatives to provide ICT in primary and secondary schools to improve the rare current access. (Swarts & Wachira 2010, 6). An important development came in 2005 through the partnership of the Ministry of Education and Vocational Training (MoEVT) and the Swedish International Development and Cooperation Agency (SIDA). Under this partnership, teacher training colleges were equipped with computers and internet connectivity, with a further goal to equip secondary schools with information and communications technology through the eSchools program.

With the significant increase in school capacity to achieve the Millennium Development goals has come a lack of teachers and poor quality teaching. For the MDG, Tanzania Development Vision 2025, and National Strategy for Growth and Reduction of Poverty goals to have the effect intended, teacher training must be an emphasis of national governments and international initiatives. Yet, teacher training is not often an emphasis of national governments and even international programs and initiatives. Many believe that ICTs can contribute to this conversation and have great potential for transforming the teacher education process and changing the ways teachers access knowledge, information, and curriculum. (UNESCO 2001, 1-4; UNESCO 2002, 10-11; Unwin 2005, 3-4; Botha, *et al.* 2012, 2).

The national government has made an effort to develop the *Framework for ICT Use in Teacher Development* that outlines the goals and resource requirements for ICT integration in teacher training and development. Under this Framework, Teacher Colleges offer ICT teacher training for basic ICT skills. To implement this Framework, Tanzania rolled out the Teacher Development for 21<sup>st</sup> Century (TDev21) pilot program January-June 2011. However, this must be expanded so that training allows teachers to apply ICTs in their teaching and learning. This is where Asante can add value to schools with e-learning teacher training initiatives. Tanzania's most recent strategy, *Tanzania Beyond Tomorrow*, defines an e-education program for basic education and hopes to harmonize these various ICT and education initiatives under the MoEVT. (Hooker, Mwiyeria & Verma 2011).

There is a great literature on the subject, yet most research to date focuses on how teachers can and should be trained in the use of ICTs, versus how ICTs can be used to deliver and enhance teacher training. Both are critical. Without a solid understanding of ICTs, any teacher training solutions delivered by them become ineffective because teachers will not have the skills to properly implement them. In a Tanzanian environment increasingly interested in ICT training, the time has come to explore how ICTs can be used to deliver teacher training to rural teachers, both pre- and in-service. Additionally, ICTs are often assumed to mean only internet and computers, but ICT solutions to deliver e-learning and teacher training encompass, in actuality, much more than that.

Though e-learning for teacher training in the developing world is in its infancy, we do know that when distance education is used for professional development, “completion rates are typically higher, and costs per successful student in distance education generally compare favourably with conventional education”. (Unwin 2005, 115). Others suggest that e-learning can be used effectively for all four main aspects of teacher training: providing trainee teachers with a general education; improving their knowledge of the subjects they will teach; teaching them about children, the curriculum and pedagogy; and developing their classroom skills. (Perraton 2000, 2).

Based on research and case studies from the developed world, including the U.S., Canada, and Europe, five themes emerged as central to the success of using e-learning solutions for teacher training. These and other important success factors are integrated into the discussion of criteria and the recommendations below.

- Teachers must first be trained in basic ICT skills
- Subject area, pedagogy, and ICT training must occur both pre-service and in-service
- Training solutions must be integrated across curriculum (e.g., English, science, math) and across sectors (i.e., ICTs can be used to give and get information on education, public health, agriculture, and more)
- Teacher trainings must include relevant, locally produced content
- Solutions should make use of some blend of print, audio, video, television, computers, internet, small group face-to-face, and traditional classroom-based learning

#### IMPORTANT COMPONENTS OF E-LEARNING MODELS

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While there are numerous aspects that contribute to effective online learning, we find that the following aspects are most crucial. The first factor is the actual curriculum or subject content, including whether the content is interesting, relevant, accurate, up-to-date, and in line with the needs of future employers. The effectiveness of Teaching and Learning Activities (TLAs) used during an e-learning course is widely discussed in the literature. (Cite?) Some researchers address this issue in terms of the need for interesting learning interactions or how attractive design improves learning and motivation. This research has come to explicit suggestions on what activities are needed, including the need to develop new curricula specifically designed for an e-learning setting, thereby showing awareness that e-learning is different from traditional classroom-based teaching.

The next critical aspect is the choice of pedagogical model. It is not widely agreed which pedagogical methods are appropriate for e-learning and many discussions concern a shift from a more instructor-centered approach to a learner-oriented approach, where the students take ownership of their learning. Important activities described are frequent follow-ups, teacher interventions, and continuous assessments. Other activities concern the students' choice between self-study or group work (referring to the level of interaction with other participants). Much research shows that students in distance

learning miss social engagement and a feeling of being involved; a commonly-stated reason for not passing a course or for dropping out is that the student is left to self-study, feeling alienated and isolated.

Another major aspect is the delivery mode of the course. Different levels of flexibility and personalization may be needed for the students to be able to pass a course. This factor concerns whether students should be allowed to learn at their own pace and take the examinations when they want and if they should be allowed to choose the medium of content delivery.

The last major component refers to which support functions are provided during the course. Regarding this issue, e-learning is very different from traditional classroom teaching, where support is given and questions are answered face-to-face. Contact or intervention from the institution to its students and support from the tutor or other staff (including IT-support) improve learning and pass rates. The support can be the institution calling up students before the course starts and asking whether they will attend or how he or she is progressing or just making sure there is an IT support unit available for the students. The main point is to not let the student remain confused over time. The teachers and staff delivering the course will also need faculty support. The level of support available for teachers and staff makes a difference where teachers generally are more motivated and committed when they feel supported by their schools. The schools can support the teachers by providing technical support, training, assistance, or just showing the commitment of the institutional leaders.

When e-learning models are constructed and implemented with these four major aspects in mind, they are far more likely to be successful, as they take into account crucial cultural, infrastructural, and pedagogical aspects.

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## CRITERIA

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Identified based upon the above best practices, a significant body of academic and professional literature, and Asante Africa's priorities, needs, and constraints, these criteria will be used to assess each of the proposed models. Their applicability is much broader, however, and they can also be used to assess any future e-learning solutions Asante Africa may explore. The criteria themselves are ranked in order of importance, with the most important criteria first.

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## EFFECTIVENESS

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The *Effectiveness* criterion considers how well the proposed solution works and when it works (or fails). This criterion directly relates to the overarching goal of Asante Africa in this e-learning project: elevating the quality of secondary school teaching and building teacher competency in child-centered pedagogy and critical math, science, and English subject areas through ICTs. It asks, "Does the model under analysis support this goal?" Countless factors contribute to any discussion of effectiveness and efficacy; this analysis

will focus on three key components:

### **Technical Competency Required**

Technical competency of teachers is a clear short-term factor affecting the effectiveness of any e-learning for teacher training solution. As such, solutions that require an advanced level of technical competency may be unfeasible and ineffective. Some ICT training for teachers will be required for any e-learning solution, so this criterion will take into account the simplicity or complexity of each option, with a preference for technology solutions that are simple to learn.

### **Stakeholder Buy-In**

The choice and implementation of an e-learning strategy for teacher training should involve input from relevant stakeholders and partners, including teachers, those involved in teacher education, universities and teacher colleges, curriculum developers, and solution providers. Each group must buy in to the strategy and solution, so the *Effectiveness* criterion will take into account the potential for stakeholder buy-in for each technology option.

### **Content**

Different solutions will require different content. And as discussed above, in order for an e-learning solution to succeed, content must be relevant and locally produced. Unique culture and social norms must be taken into account. Thus, the *Effectiveness* criterion will also consider ease of access to local content.

The *Effectiveness* criterion, perhaps more so than others, must be considered holistically with all criteria (e.g., an astronomically high-cost project may be highly effective, but may not be feasible given known constraints).

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## **RURAL FEASIBILITY**

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The level and quality of infrastructure varies enormously across Tanzania, but in general, cities and urban areas enjoy much more reliable electricity and internet access than rural areas. In fact, 80% of Tanzanians live in rural settings, and only about 2% of this population has regular access to electricity. (Spitsen 2012). Additionally, in a 2012 survey, the most common barrier to e-learning identified by African educators and experts was bandwidth. (Isaacs & Hollow 2012). The digital divide is real and must be considered. Rural, for this analysis, will be defined as having limited and unreliable access to electricity and non-cellular internet (e.g., WiFi, Ethernet). Most of Asante Africa's partner schools are located in rural areas, so technology solutions that are more effective in rural areas will be ranked higher.

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## **LOW COST**

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Cost is, of course, a significant concern and a constraint for Asante Africa. Though this analysis does not provide detailed cost information for each of the proposed models, we

qualitatively rank potential cost based on what we know about implementation in other contexts, existing infrastructure in Asante Africa’s network of rural schools, the production and delivery of content, and other factors influencing total cost. Lower-cost projects are ranked higher. Further cost-benefit analysis is suggested.

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#### SUSTAINABILITY

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The sustainability of any e-learning solution should be built into the strategy early on. Strategic and implementation plans should ensure that costs for ongoing maintenance, serviceability, upgrades (both to technology and to curriculum), and replacement are built into budgets. Additionally, computers in Tanzania are extremely susceptible to viruses, so this criterion also takes into account how easily serviced a solution will be. That is, can a technical issue easily be solved so e-learning can resume? As such, some solutions are more sustainable than others--requiring less maintenance and upgrade costs. These solutions will score higher. Again it is important to note that this report does not present detailed maintenance, upgrade, and replacement cost scenarios and instead relies on qualitative data and anecdotal evidence.

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#### EASE OF SCALABILITY

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This criterion will assess two aspects of scalability: 1) how easily the model could be adapted to different settings (e.g., urban/rural, poor/wealthy, and 2) how easily the model could be scaled to more schools. Models that are easily replicated (scaled) and can apply in multiple settings will be scored higher.

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### PROPOSED MODELS FOR USING E-LEARNING FOR TEACHER TRAINING

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#### MOBILE LEARNING

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Mobile learning, or m-learning, is a personal, unobtrusive, spontaneous, “anytime, anywhere” way to learn and to access educational tools and material that enlarges access to education for all. It reinforces learners’ sense of ownership of the learning experience, offering them flexibility in how, when, and where they learn. In developing countries, mobile technologies potentially deliver education without dependence on an extensive traditional communications infrastructure, leapfrogging some of the intervening development phases encountered in developed countries, such as installing extensive electricity power grids and building multiple computer rooms in educational institutions. Although m-learning experience remains limited, it is becoming a credible, cost-effective component of blended open and distance learning (ODL) provisions, adaptable to an institution’s needs and situation.

Smartphone mobile devices are educationally interesting because they offer several communications channels on one device, including email, voice, and text messaging. They are also generally cheaper than computers and have comparable functionality with

desktops or laptops in that they allow wireless access to educational materials, other students and internet resources. Two examples of successful use of mobile learning in developing nations are as follows;

### **ZMQ project, India**

Sponsored by ZMQ Software Systems, the project uses mobile phones and focuses on Hindi-speakers. Popular regional content is converted into engaging m-learning material for under-privileged and semi-literate people. Examples are “My classroom,” about an epidemic and how it spreads, and about disasters and measures to control them; “Save your village,” an animated short series to prevent the spread of HIV/AIDS in villages; “Spread the red ribbon,” an interactive game to spread awareness of HIV/AIDS using a popular regional character called “Babu”; and “Interactive Quiz,” comprising 20 scenario-based multiple choice questions. In the span of fifteen months, over 10.3 million game sessions were played. In December 2006, a new series of mobile games on HIV/AIDS education was launched in Kenya, Tanzania, and Uganda in local languages. In two years time, the games reached over 6 million mobile handsets with a real-time download of 1.2 million game sessions played. (Traxler 2005, 5).

### **School Empowerment Programme, Kenya**

With funding from the Department for International Development (DFID), U.K. through Imfundo, the Kenyan government is starting a pilot that will use bulk SMS text messaging as in-service training to primary school teachers and local support cadres across rural and urban areas, linking into other media used in their courses. Mobile phone ownership and coverage is high across the country, except the remote north. (Traxler, 2005, 6).

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## **MOOC CLASSROOM LEARNING**

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Many are already looking to the next phases of these online courses in the developing world, a future that may look more like a blending of online and traditional college work than one existing entirely on the Internet. In India, Microsoft Research, which has offices in Bangalore, is working with universities on “massively empowered classrooms” that provide online lectures, forums, and quizzes to engineering undergraduates at many different schools taking the same computer science course. Another idea of interest in India is a Microsoft research project that scans the content of e-textbooks and pulls out the most important concepts that could be paired with online instructional videos. So an Indian professor, for example, could talk about electromagnetic fields next to a diagram from a physics text. Another project, called VidWiki, allows anyone to annotate a video with comments and text in their own language. The MOOC online classroom could prove to be a very versatile method through which Asante Africa can deliver Khan Academy videos at teacher training colleges or other Internet and computer equipped resource centers.

Right now, in Rwanda, a nonprofit called Generation Rwanda is getting started on an

ambitious experiment that is likely among the first of its kind: an entirely MOOC-based university. Though it is only entering pilot stages later this year, its eventual goal is to create a 400-person university in Rwanda, with MOOCs providing the lessons and teaching fellows guiding students through discussions and problematic areas. To start, the first students will try out a Harvard University course on Justice, and a University of Edinburgh course on Critical Thinking and Global Challenges. Already, the program has struck a partnership with Southern New Hampshire University to test and certify associates degrees as its startup university gets off the ground. (Leber, 2013)..

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### ONLINE VIDEO MENTORSHIP MODEL

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In the United States, one of the most popular and successful tools for training and evaluating early childhood educators is the Classroom Assessment Scoring System (CLASS). This online training tool was created by the Teachstone Company to provide a reliable, valid assessment of teacher and child interactions (Emotional Support, Classroom Organization, and Instructional Support) and to answer the need for easier distribution of educational and professional development content to informal and formal caretakers. Unlike traditional delivery methods of in person and in physical classroom assessments, this tool was devised to help minimize logistical issues such as transportation, scheduling, and high costs of in-person professional development. Although in person coaching and development is still a major component of the CLASS system, the online component of the program is equally important and crucial to its success and growth (Pianta, 2013).

Focusing on the online components of CLASS, the process for launching the program is quite straightforward. Teachstone has devised several online tools that train, teach, repeatedly quiz, coach, and supplement online childhood educators. These tools are all hosted online at their website and are accessible immediately following payment for a subscription and are available online in English and Spanish at the toddler and pre-K levels. In terms of cost, the more people within an organization that use the online tools, the lower the subscription cost per person. The structure of the online training is as follows:

- Looking at CLASSrooms (LAC) is a 20-30-hour, online program that provides structured video observations and feedback aligned with the CLASS tool to support teachers and improve learning. LAC is an interactive, multimedia program focused on the CLASS tool with authentic classroom videos.
- The MyTeachingPartner (MTP) video library and coaching program developed through the Center for Advanced Study of Teaching and Learning provides teachers effective, evidence-based teaching tools that improve their interactions with students across all grades level PK-12.
- MTP provides targeted, ongoing video feedback to teachers through online resources, and web-mediated consultation throughout the school year. The MTP program is different from typical classroom assessments that involve lists of things teachers should change or do better. Instead, it is a set of

aligned resources: web-based videos of best practices, video-based feedback and support from a trained consultant, and online activities.

Such a model could prove worthwhile for Asante Africa to assess in terms of bringing e-learning to teachers who interact with young students, similar to the teachers reached by the online CLASS assessment service. Currently, CLASS is being implemented at over 450 schools nationwide, in addition to international use around the world. This type of service could be built and implemented in the teacher training colleges or mobile learning hubs for teachers to receive professional development.

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### TABLET DISTRIBUTION MODEL

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With cost constraints, logistics, and mobility in mind; distributing relatively inexpensive tablet computers pre-loaded with translated Khan Academy videos and the capability to update content seems like an interesting model to study. One of the biggest pushes in tablet education comes from Thailand, which has just signed a deal that would bring an estimated one million tablets to its students ages 6 to 8 nationwide. The \$32.8 million (1.02 billion Thai Baht) One Tablet PC Per Child campaign is the world's largest education tablet-distribution deal to date and finally became official after members of the Pheu Thai party announced the initiative last summer during election season.

In partnership with the Chinese firm Shenzhen Scope, 400,000 tablet units are expected to ship within the next 90 days with an additional 530,000 units on the way. The latter part of the deal is currently not finalized, but the country's government hopes to continue working toward one million tablets for its students. "Thailand is the first country in which we have provided large numbers of tablets for students," said Shenzhen Scope chairman Liu Jun. "Now we are talking with other governments to provide this kind of tablet device for [other] students, including Pakistan, Brazil and South Africa." The select device model, priced at \$81 per unit, is the Scopad SP0712: A 7-inch Android device running the 4.0 Ice Cream Sandwich operating system. It's also got 1GB of RAM, 8GB of internal memory, and a 1.5 GHz single core CPU. Shenzhen Scope will also set 30 help centers around the Southeast Asian country to provide user support specifically for tablets received from the campaign (Garun, 2012).

Tablet computers could be a successful teaching tool, but it remains to be proven that it is a viable option in rural Tanzania. The amount of teachers that can be assigned to or share a tablet will impact the cost of the program, along with the ability to track performance outcomes. That said, this is a very interesting model that several other countries are pursuing alongside Thailand in efforts to reach rural populations and improve educational outcomes.

## EVALUATION OF MODELS

Model	Criteria	Rank
Mobile Learning	Effectiveness	4.5
	Rural Feasibility	3.5
	Low Cost	4
	Sustainability	4
	Ease of Scalability	4
	<i>Total</i>	<b>20</b>
MOOC Classroom Learning	Effectiveness	8.5
	Rural Feasibility	2
	Low Cost	3.5
	Sustainability	4
	Ease of Scalability	3
	<i>Total</i>	<b>21</b>

Model	Criteria	Rank
Online Video Mentorship	Effectiveness	9
	Rural Feasibility	2.5
	Low Cost	2
	Sustainability	3
	Ease of Scalability	2
	<i>Total</i>	<b>18.5</b>
Tablet Distribution	Effectiveness	7
	Rural Feasibility	3
	Low Cost	3
	Sustainability	2.5
	Ease of Scalability	3
	<i>Total</i>	<b>18.5</b>

Scale
<p><b>Effectiveness (1-10)*</b></p> <p><b>1:</b> Will almost certainly NOT aid in elevating the quality of secondary school teaching and building teacher competency in child-centered pedagogy and critical math, science, and English subject areas. Requires advanced levels of technical competency. Teachers, administrators, and education advocates are not likely to buy in to this solution. Content is not readily available, and development of content will be onerous.</p> <p><b>10:</b> Will almost certainly aid in elevating the quality of secondary school teaching and building teacher competency in child-centered pedagogy and critical math, science, and English subject areas. Technical competency required is minimal and manageable. Teachers, administrators, and education advocates are most likely to buy in to this solution, and content will be readily available and easily produced.</p>
<p><b>Rural Feasibility (1-5)</b></p> <p><b>1:</b> The limited and unreliable access to electricity and non-cellular internet in rural schools and villages will prohibit any success of this proposed solution.</p> <p><b>5:</b> Limited and unreliable access to electricity and non-cellular internet in rural schools and villages will have little to no impact on the success of the solution.</p>
<p><b>Low Cost</b></p> <p><b>1:</b> Solution implementation is assumed to be prohibitively expensive, given Asante Africa's budget constraints. Things that are assumed to affect cost include introduction of new hardware, development of content, introduction of better electricity, and/or internet, etc.</p> <p><b>5:</b> Solution is assumed to be inexpensive and, thus, implementation is definitely feasible given Asante Africa's budgetary constraints.</p>
<p><b>Sustainability</b></p> <p><b>1:</b> Prohibitively high costs of maintenance, upgrades (to both technology and curriculum), and replacement make this solution infeasible. Technology used would be extremely tough to service. The model is not sustainable for many years.</p> <p><b>5:</b> Costs for ongoing maintenance, upgrades (both to technology and to curriculum), and replacement are low or unnecessary, and the technology is easily serviced. Thus, the model is extremely sustainable.</p>
<p><b>Ease of Scalability</b></p> <p><b>1:</b> Scaling this model to different settings and bringing it to different schools will be virtually impossible (or highly cost-prohibitive)</p> <p><b>5:</b> Model is known to easily be adapted to different settings (e.g., urban/rural, poor/wealthy) and model can very easily (and inexpensively) scaled to more schools.</p>
<p>*Effectiveness is deemed the most important criterion, thus it is scored out of 10 versus 5.</p>

## CONFRONTING TRADE-OFFS

When judged against these criteria, each model will perform differently. Asante Africa will need to confront these trade-offs (e.g., a highly effective model may be too cost-prohibitive, or a relatively low-cost model may not scale well and may be tough to maintain and upgrade). This section explores some of these trade-offs by presenting “pros” and “cons” for each model, and explains how each model earned its ranking in

“Evaluation of Models” above. Of note is the fact that each of the four models explored scored similarly in sum. Thus, tradeoffs are significant, as each model excelled in some areas and was less successful in others.

#### MOBILE LEARNING

##### **Pros**

Mobile learning solutions are inexpensive and leverage existing technology and infrastructure (i.e., teachers already have and use cell phones, and many targeted rural villages have reliable cellular coverage). This is a flexible solution, allowing teachers to learn whenever and wherever they would like, and across many communications channels—SMS, voice, email, and potentially video. The mobile learning model is as feasible in urban settings as it is rural ones, and scaling it to reach more and more teachers is fairly simple. Additionally, regular maintenance and upgrades of phones and infrastructure by industry means this model would remain sustainable, from a technical perspective, long-term. Thus, this model scored highly in the Rural Feasibility, Low Cost, Ease of Scalability, and Sustainability criteria.

##### **Cons**

Mobile learning, however, is unproven for teacher training. Success in communicating critical public health messages does not necessarily translate to success in this context. The mere character constraint of SMS (140 characters) means this form may not be effective in communicating complex lessons in math, science, and English. If lessons are given using a different medium (online video or Skype, for example), bandwidth issues could arise. As such, this model performed poorly in the Effectiveness criterion, deemed to be the most critical of all criteria.

#### MOOC CLASSROOM LEARNING

##### **Pros**

A MOOC model would allow Asante Africa a relatively easy and low-cost way of getting the translated Khan Academy videos to the teachers that need them. MOOCs are used effectively worldwide, and continue to gain popularity, including mentions in Tanzanian national education and ICT policy. The MOOC model scored highly in Effectiveness, Low Cost, and Scalability given the fact that Khan Academy videos could be easily leveraged for little investment, the model has proven effective in delivering lessons to large numbers of people in other contexts, and teachers and administrators are likely to see the value of such e-learning. Additionally, capital expenditures to set up a MOOC are much lower than required in other options.

##### **Cons**

Because a MOOC requires computers and internet—not reliably available in Asante Africa’s network of rural schools—the largest constraint of this model would be transporting teachers to “centers” or hubs where they can participate in the training. Thus, the MOOC model receives a lower score in Rural Feasibility. It is recommended that Asante Africa explore what these hubs could look like and how teachers could get there and bring lessons back to their schools. Existing facilities (e.g., teacher colleges) could be

leveraged but there are questions if whether these facilities can adequately handle the large number of teachers demanding training in Tanzania.

#### ONLINE VIDEO MENTORSHIP

##### **Pros**

This hybrid approach bringing together traditional online learning and one-on-one feedback from a mentor is the most proven of the four models, and thus scores highest in Effectiveness. Most of the MOOC model pros apply here; Khan Academy videos could be easily leveraged, and this model certainly supports Asante Africa’s goals for teacher training. Special to this model, however, is the opportunity for continued professional development and feedback outside of the “traditional” MOOC “classroom” (e.g., Skype, phone calls, or text messages with mentors to reinforce concepts and further professional development).

##### **Cons**

Though thought to be highly effective, this is very resource-intensive model and scored poorly on the Low Cost criterion, especially given the need for numerous mentors and a management system to oversee the program. This need also leads to lower score for Scalability, as bringing more teachers into the program would require more mentors. Lastly, this model faces similar infrastructure constraints as the MOOC model; teachers would need to be brought from rural villages to hubs in order to participate (Rural Feasibility).

#### TABLET DISTRIBUTION

##### **Pros**

Tablets are becoming more cost-effective, as evidenced by the One Tablet per Child program in Thailand. Though ease of use and the learning curve to proficiency may be constraints, tablets offer a fairly simple user interface and could be pre-loaded with only the necessary teacher training content. One can imagine a program where one tablet was sent, pre-loaded, to each rural school, and teachers switched off using content most relevant to them. The tablets are easily maintained and upgradable, and offer a relatively long life span, and this type of program would be easily scalable—requiring only sending additional tablets to additional schools.

##### **Cons**

Even though the cost of tablets is certainly decreasing, their cost is relatively high compared to the other alternatives. The One Tablet per Child program in Thailand enjoyed such low tablet cost because of the magnitude of its initial order—unfeasible for Asante Africa. Additionally, even with a simple user interface, requiring teacher to learn how to effectively operate a new technology like a tablet presents significant barriers. There are also concerns of safety and security; tablets are easily lost and/or stolen, and this cost must be considered.

## RECOMMENDATION

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Based on the above research and analysis, we recommend that Asante Africa focus on implementing aspects of mobile learning and massive open online courses (MOOCs) to begin an e-learning for teacher training program.

From the four models studied, we found mobile learning and MOOCs to be nearly equally promising as they proved to be 1) cost-effective 2) rurally feasible 3) sustainable and 4) scalable. We recommend implementation of effective components of each.

Mobile learning fits very well with Asante Africa's rural demographic, which necessitates simplicity in devices and ease of access. With cellphones, distribution of devices is relatively cost-effective, highly scalable, and sustainable. Although universal issues of power access, cellular network range, and Internet connectivity will prove as major barriers, these hurdles will remain the same throughout all the methods discussed. That said, mobile devices do have the added bonus of being able to access resources through cellular networks, as opposed through solely via the Internet. Though this might prove irrelevant to some rural villages, the secondary option of content accessibility is something to note. Mobile learning allows teachers to be in control of their learning, potentially communicate with mentors and other teachers, and have access to videos or training material at all times. Because cellphones are more ubiquitous than personal PC's and computers, their potential for scale and sustainability is highly promising. Concern about the effectiveness of mobile learning as a sole model could be mitigated by using it in conjunction with MOOCs.

Combining MOOCs with aspects of other e-learning models we explored is particularly interesting. For example, a MOOC course can be accessed via mobile devices, tablets, laptops, and include video mentoring and coaching as part of its curriculum. In this sense, the MOOC model is highly versatile and adaptable; it can be accessed through a variety of mediums and customized to provide personalized training for teachers. For example, *Generation Rwanda's* entirely MOOC-driven University of 400 students; AA can follow the progress and lessons of this experiment, and potentially recreate a similar learning module for it's teachers to congregate at teacher training colleges to access. They can then have the option of revisiting these MOOC resources online or offline; as preloaded content on a tablet, cellphone, or inexpensive data "thumb" drive. One of the greatest advantages of MOOCs are their cost-effective nature; designing and scaling a MOOC is inexpensive; as once the curriculum is developed, the amount of cost that goes into it is relative to the amount of updating, depth of resources, technical support, and personalization to be offered.

Further down the line, and given more resources, the tablet distribution model may be worth looking into—as the devices are generally cheaper to purchase than smartphones or laptops, and provide improvements in ease of use (learning a few touch commands as

opposed to the technical learning curve of laptops), features (as opposed to cellphones) and portability. Tablets also have far longer battery life than laptops, so from an energy-conscious perspective, they provide another benefit for sustainability and function in a rural environment where power supplies are an issue. Should Asante Africa want to distribute tablets to a limited population of teachers, who would then share access to the tablets and become conveyers and teachers of the knowledge themselves (students become the teachers), then this model may prove more cost-effective and sustainable than expected.

Seeing as the content and curriculum have not been developed in depth, aside from translated Khan Academy videos, the future format and content of learning curricula is something Asante Africa can strategize once a delivery method is in place. Similarly, a pedagogical method should be strategized to work best with the constraints and lives of teachers in Tanzania. For example, will teachers learn more efficiently if given total flexibility and unstructured content, or will an online facilitator and rigid course structure prove more effective? Lastly, Asante Africa should ensure that technical support be provided for teachers utilizing the training materials. Should teachers from rural areas lack technical proficiency, the impact of the teaching materials will be greatly diminished. These aspects of E-learning will be critical in assessing the efficacy and quality of instruction provided by the videos and any accompanying resources for teacher training. Thus, Asante Africa should keep these considerations in mind as they progress into measuring learning efficacy.

## CONCLUSION

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This report has followed a two-path structure. First, it put modern e-learning and teacher training programs into context within the national and international policy framework in Tanzania. This context comes with the understanding that any project that Asante Africa is able to implement in Tanzania will be working in complement or in contrast to the history and policy that is already established in Tanzania. We conclude that Tanzania is ready and willing to address ICT solutions to its very real teacher training needs, provided that Asante is able to overcome infrastructure and funding shortcomings.

Second, the report addresses specific e-learning models that can be successful in the rural Tanzanian context that is Asante's main focus. We completed a review of successful models in similar developing countries, then ranked those models qualitatively on criteria tailored to the rural Tanzanian context. This review concluded that Massive Open Online Courses or MOOCs provided the most promising model to apply individually to rural Tanzania, but that mobile learning was another promising solution that could add greatly to an e-learning program as a supplement. Putting these two paths together, we believe that Tanzania is a good candidate for e-learning and ICT solutions that can make an immediate and meaningful impact in Tanzanian teacher training.

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## APPENDIX 1: ACRONYMS AND ABBREVIATIONS

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AAF	Asante Africa Foundation
COSTECH	Tanzania Commission for Science and Technology
EFA	Education for All
ETP	Education Training Policy
GESCI	Global e-Schools and Communities Initiative
GSPP	Goldman School of Public Policy
ICT	Information and Communication Technology
M-Learning	Mobile Learning
MCST	Ministry of Communication, Science, and Technology
MDG	Millennium Development Goals
MoEVT	Ministry of Education and Vocational Training
MOOC	Massive Open Online Course
NACTE	National Council for Technical Education
NECTA	National Examinations Council of Tanzania
NSGRP	National Strategy for Growth and Reduction of Poverty
PEDP	Primary Education Development Program
SEDP	Secondary Education Development Program
SIDA	Swedish International Development and Cooperation Agency
TBT	Tanzania Beyond Tomorrow
TCU	Tanzania Commission for Universities
TEA	Tanzania Education Authority
TIE	Tanzania Institute of Education
TLSB	Tanzania Library Services Board
UNESCO	United Nations Educational, Scientific and Cultural Organization

## APPENDIX 2: ANNOTATED BIBLIOGRAPHY OF KEY PLAYERS AND INITIATIVES

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### ORGANIZATIONS

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Swedish International Development Cooperation Agency (SIDA).  
<http://www.sida.se/English/>

SIDA: Tanzania. <http://www.sida.se/English/Countries-and-regions/Africa/Tanzania/>

- Sida has been working in Tanzania in Teacher education for more than three decades. In 2005, the MoEVT with support from Sida initiated a program for introducing ICTs in teacher's colleges. SIDA assisted in the development of the 2009 and 2011 ICT teacher training frameworks.

The Global e-Schools and Communities Initiative (GESCI). <http://www.gesci.org>

- GESCI is a global organization offering strategic advice to the education and training sector (primarily Ministries of Education) in developing countries on the effective use of ICTs for Education. GESCI assisted in the development of the 2009 and 2011 ICT teacher training frameworks.

Global Development Learning Network (GDLN). <http://gdln.org>

GDLN: Regional Association for Africa. <http://gdln.org/affiliates/gdln-regional-association-africa-association-african-distance-learning-centers-aadlc>

- Not listed in report. GDLN, coordinated by the World Bank, offers the resources required for videoconferencing and internet-based learning, including technical assistance and facilities. GDLN has over 120+ partner centers that are often housed in universities, government institutions and think-tanks. With offices in Tanzania, they could serve as a resource for Asante.

IICD. <http://www.iicd.org>

IICD: Tanzania. <http://www.iicd.org/our-work/tanzania>

- Not listed in report. IICD works in Latin America and Africa to help non-profit, public, and private sectors use ICT to meet their development goals in economic development, health, gender and education. With offices in Tanzania, they could serve as a resource for Asante.

BridgeIT. <http://www.iyfnet.org/bridgeit>

- Not listed in report. BridgeIT was established in 2007 by the International Youth Foundation, partnering with Nokia and Pearson. Their goal is to deliver educational videos via mobile phones and the mobile phone network for both urban and rural classrooms.

NoPC. <http://www.nopc.org.uk>

- Not listed in report. NoPC is a London based program that has partnered with Airtel. The program has been piloted in secondary schools, and they have been working with teacher colleges. The focus is to use one PC that will operate like a server to run multiple monitors in a classroom. The structure is 5 monitors to one PC.

## REPORTS

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Education Sector Partners Group: <http://ed-dpg.or.tz/>.

- If we were to do this project over again, this would be the first website we would recommend. It is a one-stop shop for education policy in Tanzania. It has links to virtually every major education report in PDF form and a good overview of the education sector in general, all well-organized and easy to navigate. When looking for more information, this website is the first place to visit.

Basic Education Development Committee. *Primary Education Development Plan (2002-2006)*. United Republic of Tanzania, 2001. Web. April 30, 2013. <[http://www.ed-dpg.or.tz/pdf/PE/Primary%20Education%20Development%20Plan-PEDP%20I\\_2000-06.pdf](http://www.ed-dpg.or.tz/pdf/PE/Primary%20Education%20Development%20Plan-PEDP%20I_2000-06.pdf)>.

Education Sector Development Committee. *Primary Education Development Plan (PEDP) Phase III (2012-2016)*. United Republic of Tanzania, 2012. Web. April 30, 2013. <[http://www.ed-dpg.or.tz/pdf/PE/Primary%20Education%20Development%20Programme-PEDP%20III\\_Final\\_Nov%202012.pdf](http://www.ed-dpg.or.tz/pdf/PE/Primary%20Education%20Development%20Programme-PEDP%20III_Final_Nov%202012.pdf)>.

- The Primary Education Development Programme is Tanzania's most important policy document to address its international commitments to Education for All and the Millennium Development Goals, as well as its own Tanzanian Development Vision. We have listed the first PEDP and the most recent from November 2012.

Hooker, Mary, Esther Mwiyeria, and Anubha Verma. *ICT Competency Framework for Teachers in Tanzania*. Global e-Schools and Communities Initiative, 2011. Web. April 30, 2013.

<[http://www.gesci.org/assets/files/Tanzania\\_Needs\\_Assessment\\_Report\\_Draft\\_Final\\_230911\\_3\\_.pdf](http://www.gesci.org/assets/files/Tanzania_Needs_Assessment_Report_Draft_Final_230911_3_.pdf)>.

- This paper presents the results of the Teacher Development for 21<sup>st</sup> Century (TDev21) pilot from January-June 2011. The program pilot's goal was implementation of teacher competency standards for ICTs in Tanzania. The framework used by this program is the *ICT Competency Framework for Teachers* (ICT-CFT) developed by UNESCO by educational and private sector partners. ICT-CFT is a global framework of standards covering 15 skill areas for teachers in five educational domains, in 3 progressive levels. It is global and any country can deploy this framework based on its own needs and context.

Ministry of Education and Culture. *Education and Training Policy*. United Republic of Tanzania, 1995. Web. April 30, 2013.

<<http://www.tzonline.org/pdf/Educationandtrainingpolicy01.pdf>>.

- The Education and Training Policy was adopted by Tanzania in 1995 in order to address the goals of the original Education for All agreement in 1990. It sets goals for comprehensive reform of Tanzanian education.

Ministry of Education and Vocational Training. *Information and Communication Technology (ICT) Policy for Basic Education*. United Republic of Tanzania, 2007. Web. April 30, 2013.

<[http://planipolis.iiep.unesco.org/upload/Tanzania%20UR/Tanzania\\_ICT\\_Policy\\_for\\_BasicEducation\\_2007.pdf](http://planipolis.iiep.unesco.org/upload/Tanzania%20UR/Tanzania_ICT_Policy_for_BasicEducation_2007.pdf)>.

- The ICT Policy for Basic Education was formulated in 2007 as an initiative by the MoEVT to enhance and improve the quality of education in the country. The policy serves as a guide to the integration of ICT in basic education to achieve educational and national development objectives.

Ministry of Education and Vocational Training. *Evaluation of the Impact of the Primary Education Development Programme Phase Two (PEDP II) 2007 – 2011*. United Republic of Tanzania, 2012. Web. April 30, 2013.

<<http://www.ed-dpg.or.tz/pdf/PE/PEDP%20II%20Evaluation%20Report-June%202012.pdf>>.

- The Ministry of Education and Vocational Training (formerly the Ministry of Education and Culture) completed an evaluation of its second Primary Education Development Programme that lists its successes and shortcomings going into the next phase of its education policy.

Mwalongo, Alcuin. "Teachers' perceptions about ICT for teaching, professional development, administration and personal use." *International Journal of Education and*

*Development using Information and Communication Technology (IJEDICT)*, Vol. 7, Issue 3, 2011 pp. 36-49. Web. May 16, 2013.

<<http://ijedict.dec.uwi.edu/include/getdoc.php?id=4888&article=1272&mode=pdf>>.

- This survey investigated teachers' perceptions about ICT learning and was added to gain insight into how ICT is being received in Tanzania. Although the survey methods are limited, it gives a current and topical overview of the reaction to teachers to ICT solutions that are already in place in Tanzania. The survey also gives a fairly good overview of the state of ICT integration as of 2011.

UNESCO. *Teacher Education through Distance Learning*. Paris: UNESCO. 2001. Web. April 30, 2013. <<http://unesdoc.unesco.org/images/0012/001242/124208e.pdf>>.

- This UNESCO document presents 10 case studies, representing diverse applications of different modes of distance learning, including models using ICTs. UNESCO commissioned this set of case studies due to demand for guidance on implementing programs of distance education for teachers. Of special note are the exploration of the Enlaces program in Chile (see below for more) and the case titled "Professional Development of Headteachers in Burkina Faso".

UNESCO. *Information and Communications Technologies in Teacher Education: A Planning Guide*. Paris: UNESCO, 2002. Web. April 30, 2013.

<<http://unesdoc.unesco.org/images/0012/001295/129533e.pdf>>.

- This UNESCO document provides guidelines and resources for developing a successful teacher training program using ICTs. It addresses technological, as well as cultural, concerns and includes resources for outreach to teachers, administrators, and other stakeholders. This guide was developed by an international group of experts with extensive experience in the integration of ICTs into teacher preparation programs.

United Nations Development Programme Tanzania. *Millennium Development Goals*. Dar es Salaam: UNDP Tanzania, 2010. Web. April 30, 2013.

<[http://www.tz.undp.org/mdgs\\_goals.html](http://www.tz.undp.org/mdgs_goals.html)>.

- The Millennium Development Goals are a blueprint agreed to by all of the developing countries and development institutions to be reached by a target date of 2015. The United Nations Development Programme Tanzania specifies these goals, as well as their application and progress in Tanzania.

UNESCO. *EFA Global Monitoring Report*. Paris: UNESCO, 2013. Web. April 30, 2013.

<<http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/efareport/reports/>>.

- Education for All Global Monitoring Reports for every year from 2002 to 2013/14 are available, including regional reports for sub-Saharan Africa and a Kenyan education fact sheet that could be useful as Asante looks to take the research from Tanzania to Kenya.

## APPENDIX 3: SUCCESSFUL PROGRAMS LEVERAGING E-LEARNING FOR TEACHER TRAINING

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### PROFORMAÇÃO PROGRAMME (BRAZIL)

Coordinated by the Brazilian Ministry of Education, the Proformação Programme aims to train 27,000 teachers in 15 states, at a cost of \$1,100 per teacher. Proformação leverages pre-existing learning resources (content and curriculum) from several in-country institutions with the goal of creating an online teacher certification for the thousands of uncertified teachers working across the country. It leverages e-learning solutions as well as face-to-face education. The program includes an evaluation component, and external evaluations to date have been positive: 98.3% of teacher trainees; 97% of tutors, and 100% of local education managers reported that the program “works well.” (Bof 2004).

### ENLACES PROGRAMME (CHILE)

Enlaces is the ICT component of Chile’s larger educational reform initiative, beginning in 1992. The program’s goal is to integrate the use of ICTs into everyday Chilean education, including to improve teaching and teacher quality. Currently, Enlaces is working to increase rural coverage by expanding technological infrastructure, though today all secondary schools and half of Chile’s primary schools are taking part in the program. The Enlaces program has trained 70,000 teachers through a network operated by the country’s universities. (Hinostroza, Hepp, & Laval 2000).

### CONNECTIVITY FOR EDUCATOR DEVELOPMENT PROGRAMME (UGANDA)

In 2000, the Ugandan Ministry of Education and Sports and the United States Agency for International Development (USAID) launched the Connectivity for Educator Development Programme (Connect-ED). The program began by translating print-based national teacher training curriculum into interactive computer versions. Connect-ED also set up numerous Education Technology Centres that are used for teacher professional development. Noteworthy is the fact that Connect-ED’s present second phase is funded by International Education Systems, a division of the international not-for-profit Education Development Center. (IST-Africa 2013).

### RELIEF INTERNATIONAL’S SCHOOLS ONLINE PROGRAMMES (JORDAN)

Through regional teaching centers in cities, this program provides teachers with 170 hours of ICT training, including how to integrate technology into their curriculum. The Jordanian Ministry of Education has endorsed this program as “best of its kind in the country.” (Relief International 2010).

### WORLD LINKS FOR DEVELOPMENT PROGRAMME (GHANA)

As part of the World Links for Development Programme (WorLD Programme), this

initiative works to link Ghanaian secondary school students and their teachers with other students and teachers across the globe. A unique component of the program is that scarce financial resources formerly devoted to textbooks, reference materials, and journals can be redistributed since the WorLD Programme provides access to these materials online. Additionally, this program supplies hardware and training to Ghana's primary teacher training college for use in collaborative distance education. (World Bank 2004).

#### COMMONWEALTH OF LEARNING'S SOUTHERN AFRICA TEACHER TRAINING PROGRAMME

In the early 2000's, the Commonwealth of Learning (COL) and eight Southern African countries (Botswana, Malawi, Namibia, South Africa, Tanzania, Zimbabwe, Mozambique, and Zambia) collaborated on a five-year distance education project to train in-service teachers and administrators. The specific models of delivery for this curriculum depended on each country's unique infrastructure. This program has evolved to the Learning for Development plan, which also includes workshops and trainings delivered virtually. (Commonwealth of Learning 2012).

#### THE NEW PARTNERSHIP FOR AFRICA'S DEVELOPMENT (NEPAD) E-SCHOOLS PROGRAMME

Launched in 2003, this NEPAD initiative aims to provide computers and internet access to all schools in Africa within 10 years (a total of 600,000+ schools). Though the primary goal of the program is to ensure that African students graduate from secondary schools with ICT skills, it does include a teacher-training component. Again, however, this teacher-training component is focused on training teachers to use ICTs, rather than using the ICTs to deliver other professional development lessons. (NEPAD e-Africa 2013).

#### MATEN EUROPEAN PROJECT (UKRAINE)

The Multimedia Application for Telematics Educational Network (MATEN) project in Ukraine is a comprehensive ICT for education project that includes a teacher-training component. It began with research on e-learning and frameworks for content delivery, and a later phase addressed how distributed networks can contribute to teacher training. Little information is available on the results of this initiative. (MATEN 2013).

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