Accessing ICT Enabled Content in Low-Income Countries: Think Big, Start Small, and Scale Up

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ABSTRACT

While the digital revolution has transformed the way many of us work and live, more than half the world’s population lives in rural areas that have been shut-out of the digital transformation. Low-income countries have yet to realize the benefits from the digital revolution; therefore, a need exists for innovative and alternative models to overcome the lack of access to knowledge and learning. This paper examines the challenges faced by low-income countries in accessing ICT enabled content and proposes a Big-Small model where low-income countries can harness the ICT revolution. This paper concludes with a discussion on sustainability and future research directions.

Keywords: Developing Countries, Developing Economies, ICT, Information and Communication Technology, Least Developed Countries, Low Income Countries, Model

INTRODUCTION

Access to content is the right to knowledge access (Rossini, 2007). Prior research indicates that ICT investment increases growth dividend (Roller & Waverman, 2001), facilitates economic growth (Waverman, Meschi, & Fuss, 2005), combats poverty (Calderon & Serven, 2004), and promotes expansion in economic activities (World Bank, 1991). ICT is also touted as a means for low-income countries to leapfrog out of their economic predicament (Murthy, 2001). Much of the literature available about ICTs in a development context focuses on the digital divide. The emergence of the ‘digital divide’ (Brown, 2000) reflected the social and economic imbalance between high and low income countries.

In considering the digital divide, issues of access and connectivity are often the first level of focus. However, there are at least four dimensions of the digital divide—an information divide due to some people’s inability to gain access to online information due to demographic characteristics; a skills divide related to computer specific capabilities; an economic opportunity divide related to the inability to receive training, education or employment opportunities; and a demographic divide related to certain people’s inability to participate in electronic offerings (Molla & Al-Jaghoub, 2007; Mossberger et al., 2003). This study focuses on skills and economic opportunity divide. Innovation in low-income countries can be hampered by the multi-prong
challenges of the digital divide including access to the Internet, ICTs, and content (Rossini, 2007). These challenges are also highlighted by the World Bank Findings as the three pillars of the ICT revolution: connectivity, capacity, and content (Parakash, 2003).

The literature, when discussing low-income (developing) countries, includes countries like Brazil, China, India, and Mexico. Many of these countries have affordable Internet connectivity similar to high-income countries. Telephone rates are inversely correlated to content access, i.e., digital content is less accessible when telecommunication costs are high.

Over the last decade access to the Internet has markedly improved in low-income countries. For instance, in 2006 low-income countries accounted for nearly half of the Internet use; up from 36% in 2003 (UNCATD, 2006; UNCTAD, 2004). And as far back as 1997 most African countries, 48 of the 53 African countries, had Internet connectivity; the five exceptions were Congo, Equatorial Guinea, Gabon, Libya, Somalia, and Western Sahara. The primary reasons for these exceptions were either geopolitical isolation, as in the case of Libya and civil war as in the case of Somalia (Landweber, 1997). Therefore, country level Internet connectivity has been achieved around the world and it is not the primary challenge. The primary Internet connectivity challenge is connectivity to low-income or rural communities. Even in the United States, rural residents in 2003 lagged by half in broadband access compared to their urban counterparts; 9% households in US rural communities with broadband access compared to 22% for urban residents. By 2005 the broadband access gap in US rural and urban communities was 24% and 39%, respectively (Associated Press, 2005).

About half, 53%, of the world population in 2000 lived in rural communities from which 87% of them were from Africa and Asia (UN Population Division, 2001). These two regions have each 70% of their population in rural communities (UN Population Division, 2001). China and India, with their large population, account for 70% of the Asian rural population. China with 60% of its population, 800 million people, (Economist, 2007; China-Profile, 2007) and India with 70% of its population, nearly 700 million people, (Wikipedia, 2007; Press, 1999) account for the large proportion of the Asian rural community. When China and India are excluded the Asian rural population is much smaller. In contrast, over forty Sub-Saharan African countries have an average of 89% of their population in rural communities (World Bank, 2007b; Mbeki, 2005). Hence, content access models for low-income countries must consider the challenges in Sub-Saharan African countries.

This study is motivated by the research question: what ICT enabled models can be used to harness digital content access in low-income countries? The study evaluates the content access challenges in low-income countries and proposes a model for digital content access that can be implemented despite the challenges.

In the remainder of this paper, first, we set the context by discussing the availability of open education resources followed by content access challenges in low-income countries. We then propose the Big—Small ICT model for accessing content in low-income countries. We conclude with a discussion of sustainability and revenue model.

OPEN EDUCATION RESOURCES

Today, there is significant amount of educational content that is freely available digitally. Many groups including MERLOT, Connexions, FLOSS4EDU and TESSA, MIT, UC Berkley, and Stanford University have opened their educational mega power to the public. MERLOT is reaching out to Africa through the MERLOT African Network initiative which provides FREE access to MERLOT content for African higher education institutions. The Connexions project is another example that started at Rice University and became a global source for open educational content. Success areas for the Connexions initiative were reported as

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modularized content; value to author, instructor, student; brand equity, content quality, user community, site usability; and revenue model (Dholakia, 2006).

Other platforms that are making a difference in Africa include Free/Libre and Open Source Software for Education (FLOSS4EDU), Qdoc Quiz Wiki, Teacher Education in Sub-Saharan Africa (TESSA), and the Global Text Project with its vision to deliver free online textbooks.

The MIT open courseware initiative has made 1800 courses freely available. UC Berkeley’s YouTube approach helps improve content access at all levels (Havenstein, 2007). The Stanford iTunes initiative has also allowed public access to a wide range of lectures, speeches, debates and other university content (Tomassi, 2006). And “Twenty-five Nobel price-winning scientists are calling for the US government to make all taxpayer funded research papers freely available” (USA Today, 2004).

These pioneers have opened many educational opportunities including bring people back to the educational equation; reduce high cost of educational material; reduce time lag between production and use of learning; and enable reuse, re-contextualization, and customization, i.e. translation and localization (Baramiuk, 2007). And by and large, high-income countries have made the requisite infrastructure investments to tap into this freely available educational content. However, low-income countries face several challenges that hinder access. Researchers need to devise models that will avail the vast digital knowledge source to low-income and rural communities even when they don’t have Internet connectivity.

CHALLENGES OF CONTENT ACCESS

The Hewlett Foundation, a pioneer in the open education repository (OER) movement, has identified four components in its OER approach: sponsor high quality open content; remove barriers, e.g., ICT barriers; understand and stimulate use, e.g., research & development, feasibility studies, and awareness creation; and equalize access, e.g., reach underserved communities (Atkins, Brown, & Hammond, 2007). In this section we outline the challenges of content access in Sub-Saharan Africa using the four components identified by the Hewlett Foundation.

High Quality Open Content

Open content refers to non-proprietary content that is freely available, often online. As indicated above many institutions have made educational content openly available. If low-income countries are to take advantage of the digital revolution they too must take part in both content authoring and content access. However, much of Sub-Saharan Africa is being challenged in accessing content, not to mention authoring. Direct measurement to assess country of origin for Internet content authoring is often difficult because content author may not reside in the same place as the computer (server) used to host the content. One potential surrogate measure for Internet content author countries is the number of Internet hosts registered by country. Giancarlo Livraghi (2007a, 2007b) reported 433,193,199 Internet host computers worldwide compared to 1,522,000 in Africa; Africa accounting for only 0.35% of the global Internet host computer count. Three African countries: South Africa, Morocco, and Egypt with 68.1%, 17.6%, and 5.9%, respectively, account for 91.6% of Africa’s total Internet host computers. The remaining 50 African countries, combined, have only 127,445 Internet host computers, less than 0.03% of the worldwide count. In contrast, the United States has 230,600,000 Internet host computers, 53% of the worldwide count. The total number of Internet host computers in the 50 African countries is less than that of Turkey; a country that has less than 10% of Africa’s population but has over 1.6 million Internet host computers. This indicates the dearth of content authoring in many African countries.

Africa’s lack of content authoring poses a long term challenge. The issue is not lack of
content but the personnel and ICT connectivity. The Brazilian Minister of Culture, Gilberto Gil, at the iCommons Summit in Rio in June 2006, challenged low-income countries to embrace their own cultural differences and diversity and to use ICTs to make their voices heard globally, projecting their own knowledge and culture into the international arena (Rossini, 2007). The Brazilian Minister invoked the term “tropicalism” (Rossini, 2007) to describe the need for countries in low-income countries to actively participate in content authoring. “Tropicalism” is a Brazilian term associated with the music revolution in the latter half of the 20th century where avant-garde musicians, artists, writers, and film makers identify themselves with a goal of breaking from its dependence on official patronage and ideological censorship to make film attractive to the public while still representing the interest of the people (Brazil, 2007). ICTs provide a workable venue for Africa to disseminate its unique content and join the spirit of “Tropicalism”.

As researchers develop a model to open content access, content authoring should be an integral part of the model, i.e. rural communities need to engage in content authoring not just content access. As rural communities embrace the notion of content authoring and sharing, the OER concept of courseware for mining should permeate; the Hewlett Foundation has “helped shift faculty perspective from this courseware is mine to this courseware is for (open) mining” (Atkins, Brown, & Hammond, 2007). The Connexions network, for example, has workable mechanism for creating and incorporating content to the knowledge repository for those with Internet connectivity. The proposed Big—Small model suggests to make this possible with or without Internet connectivity.

In addition to access challenge, low-income countries are faced with quality and sustainability of content (Atkins, Brown, & Hammond, 2007). While simultaneously promoting African content generation a mechanism for evaluating content has to be considered. A discussion of how to maintain the quality of open content is beyond the scope of this paper, suffice it to say that a review process and rating by readers should be integrally considered to maintain the quality and relevance of all content. Content generation should also incorporate localization and contextualization challenges as well as shortage of trained personnel (Dzvimbo, 2005). Lessons learned from the OER movement should also be considered including re-use, where content is available in editable formats like wikis instead of view only formats like PDF; fragmentation, creating global repositories in lieu of the fragmented institution based OER repositories; and infrastructure cost (Baraniuk, 2007).

**Remove Barriers: ICT Access Issues**

Several factors create ICT barrier including Internet access, infrastructure, hardware and software acquisition, cost of ownership, and intellectual property. These issues, vis-à-vis content access, in Sub-Saharan Africa are discussed in this section.

**Internet Access**

Access to content and ICTs in advanced economies is focused at the individual level; for example, blackberries and i-phones that provide anytime/anywhere access to the individual. This individual access is possible in high-income countries because the broadband Internet access needed to support these services is affordable for individuals.

Broadband Internet access, for example 6000 Kilo bit per second, in the United States is available at $33.00 dollars per month; cost for broadband access represents only 1.1% of per capita income. In contrast, per capita income for many of the Sub-Saharan African countries is below $1,000 (IMF, 2007). In Ethiopia, for example, broadband Internet access, defined as 256 Kilo bits per second—20 times slower than the example used in US, costs $100 per month after the recent 107% discount, $1,200 annually (ETC, 2005). Ethiopia, with its per capita income of $177 (IMF, 2007) broadband access is equivalent to 678.00% of per capita
income, i.e. it will take the annual income of seven people to subscribe to a broadband access in Ethiopia. This price differential illustrates one of the reasons why Sub-Saharan African countries rank low in the ITU digital access index (ITU, 2003).

Infrastructure

Infrastructure is like the highway everyone loves to use but no one wants to pay for. Without a capable infrastructure many of the ICT revolution benefits cannot be realized. Paradoxically, many funding organizations do not want to pay for infrastructure. In many African countries ICT connectivity and content access challenges are compounded by the lack of electricity and high Internet access fees (Negash, 2006a; Parakash, 2003).

It has been shown that a critical mass in telecommunication investments, where the number of telecommunication infrastructure users is large enough to place downward pressure on prices, are needed before related economic developments are achieved (Roller & Wavernman, 2001). Even if many of the infrastructure issues are to be addressed, reaching out to rural communities will take time. A framework that will address the gamut of ICT challenges in Sub-Saharan Africa, from no Internet connectivity to full broadband Internet availability, with transition plan is needed.

Hardware and Software Acquisition

Complementary ICTs such as computers are not affordable for most Africans (Prakash, 2003). From a non-governmental organization (NGO) that has distributed over 3000 refurbished computers in Ethiopia, we learned that the average cost of a refurbished computer (Pentium IV, 2.4 GHz, Speed, with 256 RAM, with CD ROM and 17-inch CRT monitor) is around $400.00. This is significantly higher than the same computer available for under $150 in the U.S., a factor of 2.5 times higher cost in Ethiopia. These costs are not affordable for the average Ethiopian when considering the economic disparity of 20:1 between the U.S. and Ethiopia. For example, given the purchasing power of individuals in the US, i.e., 20 times higher than those in Ethiopia, a computer price of $400.00 for an Ethiopian is equivalent to a price tag of $8,000.00 for an American (400x20=$8,000) or looking it another way a computer priced at $150.00 in America should be available for $7.50 (150/20=$7.50) for average Ethiopians to afford it. Of course it is unthinkable to expect U.S. residents to pay $8,000 for a refurbished computer. This price differential partly explains why personal computer penetration in countries with advanced economies like Japan, Korea, Canada, and United States are high at 78.2%, 77.9%, 66.8%, and 61.8%, respectively; and many of the African countries hover below 5% (ITU, 2003). If a similar level of digital revolution is expected in Sub-Saharan Africa, then we have to devise ways where computer prices are comparable, i.e., refurbished computers priced at $7.50.

One of the considerations for our Big—Small model is the cost factor per person: How do we reduce the cost of a computer person to $7.50? One should think big and find innovative ways to achieve these price targets. The MIT $100 per laptop project is one such big thinking. Even the $100 per laptop price point is not affordable for Africans in rural communities. We don’t anticipate computer prices to drop by a factor of 20 any time soon. Therefore while thinking about the big ideas we should have options to start small. For example, distributing hardware/software acquisition costs among many individuals by sharing them at a community center. Purchasing five computers, at $400 each, would cost $2,000. If the five computers are installed at a community center or library and shared by 300 people, the cost per person can be reduced below the target price of $7.50. Hence starting small, by implementing community level ICT access, will achieve cost parity.
Total Cost of Ownership

As stated above, acquisition cost for hardware and software is financially challenging for rural communities, and much more when Total Cost of Ownership (TCO) is considered. According to the Gartner Group and Forrester Research acquisition cost is only one-third of TCO (Total Cost, 2001). Total cost of ownership includes hardware and software acquisition, installation, training, support, maintenance, and infrastructure. A typical five-year TCO for a networked personal computer is 21% acquisition cost, 21% technical support, 13% administrative costs, and 45% end-user support (Total Cost, 2001). The single largest cost in TCO is end-user support which is comprised of initial training for end-users and ongoing operational support. These challenges are magnified in rural communities where basic keyboarding training and ICT awareness is lacking. The proposed Big-Small model accommodates cost effective end-user training. Users need a customer support center where they can get help for day-to-day operational issues. Establishing community centers in advance of individual level access will afford continuity for customer support. A community level approach will provide a long-term end-user training and support model.

Intellectual Property for Content

Software piracy is rampant in developing economies; most places in China, for example, Linux and Windows cost the same amount of money (Schafer, 2004). Regardless of economic capability intellectual property has to be respected at all times. Dalindyebto Shabalala from the Center for International Environmental Law (CIEL) in Geneva argues that low-income countries should have intellectual property standards tailored to their own circumstances (Shabalala, 2007).

The open education movement promises to disintermediate the scholarly publishing industry, in the process rendering some current business models not viable and inventing new viable ones, copy rights among them (Baraniuk, 2007). It will also change the way that we conceive of and pursue authorship, teaching, peer review, and promotion and tenure (Baraniuk, 2007). Low-income countries should incorporate digital intellectual property legislations in their laws (Shabalala, 2007). Copyright rules for content like the Creative Commons should also be integrated.

Awareness and Local Access

Lack of awareness ranks high in the challenges for the diffusion of OER in Sub-Saharan Africa. Kuzvinetsa P. Dzvimbo, the former Rector of African Virtual University (AVU), a program initiated by the World Bank in 1997, cited lack of awareness and access to resources as challenges when AVU attempted to disseminate the MIT open courseware to its partner universities (Dzvimbo, 2005).

A mechanism for accessing content locally, independent of Internet connectivity should be part of the long term solution. AVU, for example, used a mirroring server to make OER content available at the local level (Dzvimbo, 2005). Libraries that do not have Internet connectivity could access OER content from a local server that is periodically updated.

Equalize Access: Reaching Underserved Communities

Before individuals invest in ICT they need to know what benefits they can get from it. The potential beneficiaries, rural communities in this case, need to define the business need, and what they expect as an outcome. Defining what each member of the rural community can derive from ICT investments requires awareness about the tools. One way rural communities can gain quick benefits from ICTs is through Internet Intermediaries (James, 2004). Internet intermediaries use an intermediary person that inquires users’ needs and identify potential solutions using the Internet, i.e. end users present their problems to the intermediary who then will search the Internet for alternative solutions on their behalf. Internet intermediaries may provide a logical transition in supporting rural
communities (James, 2004). Intermediary and government-based services can be achieved through community level ICT connections.

THE BIG—SMALL MODEL

The proposed Big—Small model was first published in 2005 as a model to help low-income countries access educational content through Information and Communication Technology (ICT) (Negash, 2005). This was an outgrowth from an action research at a non-governmental organization (NGO) in Ethiopia. The NGO focused on providing technology-enabled library information access to underprivileged youth. The research paper was a result of the action research regarding the community-based ICT center the NGO setup in Ethiopia in 2002. The center did not have Internet access at the time. Despite the lack of Internet access the center had five networked computers and stored digital library information on the local server. Patrons came to the center to access the digital information.

In 2006, the NGO connected its ICT center to the Internet and increased its networked computers eight fold, to forty computers. The number of patrons and level of service from the center increased correspondingly. By early 2009 the center was serving three-thousand patrons per month. Furthermore, in 2006 the NGO replicated its “small start” of five networked computers without Internet connection to two other locations. This study was informed by the experience from these installations. The Big—Small framework was later proposed as a viable investment for ICT-enabled information access for developing economies (Negash, 2006b).

The Findings report from the World Bank recommended that Africa should engage in what it called “think big, start small, and scale up” approach to overcome its lack of access to knowledge and learning (Parakash, 2003). Internet and ICTs that have energized the digital revolution can serve as a catalyst (Wawerma, Meschi, & Fuss, 2005) to help bridge the access gap.

Big thinking, big breakthroughs, and big ideas are rare and far between. The same big results can be achieved by adding up smaller innovations. Most of the ICT revolution focus in the high-income countries has been to provide anyplace/anytime access to individuals. Miniaturized computing tools like blackberry, i-phone, and i-pod and Internet access to mobile devices are among the ICT revolution that provide individuals with information and network access anytime and anyplace. The same level of individual access is needed in low-income countries. We believe this should be the big idea to aim for—ICT tools and Internet connectivity at the individual level. However, the culmination of high ICT development costs and low personal income levels in low-income countries, as discussed earlier, makes immediate implementation of this individualized approach a challenge.

While the challenges identified above including lack of trained personnel, weak economic strength, high hardware/software acquisition costs, lack of Internet connectivity, lack of access to content, and lack of content authoring persist in rural communities a unified framework that accounts for these challenges is needed. We propose such a framework called the Big-Small model—think big, start small, and scale up—for content and ICT access in low-income countries. The Big—Small model is depicted in Figure 1.

The level of access dimension in the framework consists of community and individual. Community refers to shared access from a common resource such as libraries or community centers. Individual refers to dedicated access to the individual at a residence or workplace. The connectivity dimension, local versus network, refers to the reach of information access. Local refers to information access within the local server. Network refers to information access from a wide area network including the Internet. In advanced economies Internet connectivity for individuals is prevalent shown as “Think Big” or Network—Individual in the 4th quadrant. In contrast, low-income countries (communities) do not own ICT equipments nor
do they have Internet connectivity, hence should “Start Small” with Local—Community content and ICT access shown in the 1st quadrant.

The Big—Small content and ICT access framework has four quadrants. Low-income countries should evaluate their access status and enter the model at the appropriate level. For those without Internet connectivity the proposed framework can help them begin the Big—Small transformation immediately. The four quadrants are discussed below.

1st Quadrant—Start Small: in this quadrant users have Local—Community access, i.e. users that come to the community center can access information stored on the local server or workstations available at the community center. As described above, financial challenges limit individuals in low-income countries from getting access to the vast digital information. This framework proposes to re-direct the limited resources to community access investments. Community centers can reach large numbers of people, making the cost per person nominal, spreading the limited funds to reach more residents. Digital resources including books, journals, multimedia lessons, edutainment, and training programs can be downloaded and stored locally for dissemination. Community access increases ICT awareness. For example, teachers can get reference material for their classes, students can extend their research, and entrepreneurs can benefit from new training services. Community centers easily reach the younger generation addressing vital target groups proposed by Fillip: “Children and youths are a very appropriate target group for ICT initiatives” (Fillip, 2002, p. 4). Community centers can also be expanded to reach schools, community organizations, and other public institutions.

2nd Quadrant—Scale Up-A: The first Scale Up quadrant with Network—Community access is an extension of the 1st quadrant. Local area networks and computers, components of the 1st quadrant, have to be installed to make the 2nd quadrant feasible. As their financial means improve, low-income countries should strengthen their infrastructure to provide broadband connectivity at the community centers, increasing digital access to patrons. The community centers established in the 1st quadrant can provide support services for the 2nd quadrant. Once computers and ICT services are provided, end-user training becomes the next challenge, for example, training teachers on how to use the technology effectively (Fillip, 2002). The community centers established in the 1st quadrant can serve as resources for maintaining the network, providing training, and developing local content; leveraging the initial investment. The 2nd quadrant can also address end-users need through Internet intermediaries (James, 2004).

3rd Quadrant—Scale Up-B: The second Scale Up quadrant with Local—Individual access moves the level of access from community to individuals. This is an extension of the 2nd quadrant where community level Internet access is extended.
to individuals. Characteristics of the 3rd quadrant are when a critical mass of the local community is able to access most of the community center resources from work or home. The 3rd quadrant differs from the 4th quadrant in that all its end-user access goes through the community center, i.e., the individual is connected to the wide area network through the community centers. While this provides individuals greater access it does not incur the costs of connecting individuals to broadband services.

4th Quadrant—Think Big: in this quadrant users have Network—Individual access, i.e., end users have Internet access from home or work and can gain direct access to the global digital information. Characteristics of a community achieving 4th quadrant level can be signified by the critical mass of the local community having direct Internet access to the global digital information, a corresponding decline in the number of Internet intermediaries will be observed.

Many rural communities may not advance beyond the 2nd quadrant. However, the Big—Small framework will avail access to the global digital information without having to advance beyond the Network—Community level. Many of the specialized needs from rural community may be satisfied through Internet intermediaries (James, 2004). Therefore despite the ICT challenges in low-income countries we posit that the Big—Small model allows them to participate in the digital revolution and spur economic activities.

**SUSTAINABILITY**

Sustainable development is a key goal of decision makers (Islam et al., 2003). Proposed sustainable models for educational programs include substitution model, partnership model, and segmentation model (Dholakia, King, & Baraniuk, 2006). Substitution models propose to fund the new open education program by using monies saved from the costly platforms that preceded the new project. While this is viable in high-income countries the low-income countries (communities) targeted in this study often do not have legacy infrastructures to replace, hence, the substitute model does not apply.

Partnership model proposes that rural communities attract new philanthropic and governmental funding. Economically strong partners can energize Africa’s economy (Blyden & Davidson, 2005). Partnerships can give ICT development strong foundations. Success in ICT projects requires complementary skills including strong partner institutions, strong project manager, and an attitude to think big, start small, and scale up (Prakash, 2003). Partnership alone cannot lead to success. Strong local management and positive attitude are needed.

While partnerships are vital for initiating ICT projects, long-term success requires a revenue model for sustainability. Segmentation model proposes the creation of content that can be customized to add value that can be offered for a fee. The community undertaking the project should identify a revenue or cost-recovery model to sustain its projects. Partnerships can be coupled with endowments where the economically strong partner can establish an endowment to sustain the development. While the endowment retains its seed money the operation of the development project can be funded by the interest income from the endowment.

For the proposed Big—Small framework the partnership model may be the first step to jump start rural communities. As the rural community progresses in their Big-Small initiatives efforts should be focused to move from the partnership model to segmentation, endowment, and/or other appropriate revenue models (Dholakia, King, & Baraniuk, 2006).

**CONCLUSION**

This study has proposed a Big—Small model for ICT enabled content access in low-income countries. We recognize the challenges that
hinder low-income countries from accessing the vast education resources available digitally. The high cost of ICT projects makes it difficult for low-income countries (communities) to take advantage of the digital revolution. The proposed Big—Small model provides a framework to start small while aiming big.

We encourage more research that allows low-income countries (communities) to transition despite the economic and human resource challenges. Further research is needed to test the proposed model, introduce new models, and evaluate sustainable models. Such endeavors help advance our collective understanding.

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Solomon Negash specializes in ICT for economically developing countries, e-learning, and business intelligence. He is the 2005 recipient of the distinguished eLearning award from his department and recipient of the 2007 Distinguished Graduate Teaching Award from his university. His work is published in Information & Management, Communication of the ACM, Psychology and Marketing, Communication of AIS, and at conference proceedings in the US, Canada, Spain, Ethiopia, Kenya, and Malaysia. Prof. Negash is the program coordinator for the Bachelor of Science in Information Systems (BSIS) program at Kennesaw State University.