

# “THE ROLE OF ICTs IN ILLITERACY ERADICATION AND WORKFORCE DEVELOPMENT IN LIBERIA AND UNDER-RESOURCED COUNTRIES”

**Jennifer G. Bailey, Ph.D.**  
**Executive Director, The Bailey Institute, [www.baileyinstitute.org](http://www.baileyinstitute.org)**  
15107 Interlachen Drive #324  
Silver Spring, MD 20906  
202-297-0508 (C); 301-733-9003 (H);  
[jbailey@baileyinstitute.org](mailto:jbailey@baileyinstitute.org)

## ABSTRACT

In 2010, the Bailey Institute used ICTs and achieved 98% success in just over 18 weeks for two pilot educational programs in remote, Maryland County, Liberia, West Africa. The Technology-Driven Education Project (TDEP) which engaged diverse Information and Communications Technologies including computers, Internet, digital curricula, mobile devices and teleconferencing, enabled 174 pre-college students to elevate grade levels from 7<sup>th</sup> to 12<sup>th</sup> in mathematics and English using self-paced digital education. Coming from the poorest of environments, 93% of TDEP students had not previously used computers. In just two weeks students mastered new technologies and started Internet-delivered courses. Importantly, TDEP was transmitted from the US to Liberia, 4600 miles away by a team that never stepped on Liberian soil.

Beyond the success of these ICT-driven pilot studies in Liberia, what is especially noteworthy in this second decade of the 21<sup>st</sup> century is the growth of E-government and the demand for Information Knowledge Management (IKM) workers in developing areas (India, the Caribbean). Also, the unprecedented and widespread use of ICTs in early 2011 to mobilize millions of citizens and engender an “Arab Spring” of social change in relatively poor Middle-eastern nations (Tunisia, Egypt, Yemen, Libya) epitomizes the transformative new roles of ICTs. Early assertions that ICT diffusion is directly related to high GDP (Rodriguez and Wilson, 2005)<sup>1</sup> are dated by their failure to acknowledge growing 21<sup>st</sup> century trends such as the global workforce, the size of remittances to poorer countries, and shifts in popular culture that make ICT possession the new status symbols. For these reasons, the study of the role of ICTs in eradicating illiteracy and delivering a skilled workforce to the world’s poorest nations warrants serious consideration. The issue is timely, the interest is high, and the relevance to human and national development is strong.

**Keywords:** ICTs; Eradicating Illiteracy; Workforce Development; E-Government; IKM; TDEP.

Table 1: Themes to be addressed by this research are schematized in the table below.

<b>Subject</b>	<b>Aspects</b>
<b>Heterogeneity of ICT adoption among populations including the poor</b>	<ol style="list-style-type: none"> <li>1. Proliferation in global usage and exposure to the Internet, computers, smart phones etc.</li> <li>2. Demographics of ICT usage: Age, gender, nationality, income etc.</li> <li>3. Highlights of ICT usage and access in poor, under-resourced areas</li> </ol>
<b>Costs of ICT adoptions</b>	<ol style="list-style-type: none"> <li>1. Human Capital Costs: Personnel displacement and retraining</li> <li>2. Institutional costs: Capital costs for new technology; staff training on new technologies</li> <li>3. Strategic time and resource efficiencies of ICTs</li> <li>4. Other factors: Opportunity costs of shifting resources from other social services to ICT-delivered services</li> <li>5. '<i>Opportunity costs</i>' to governments of not using ICTs to deliver social programs (education, health etc.) in under-resourced areas where poverty and illiteracy are prevalent</li> </ol>
<b>Global business and the search for new markets</b>	<ol style="list-style-type: none"> <li>1. With ICTs, the search for new markets no longer excludes the poor — Haiti, Egypt, India, Sub-Saharan Africa have seen escalated ICT usage since 2000</li> <li>2. Wi-Fi access (Internet for a fee) is available in the poorest communities - Port-au-Prince, Haiti, to Harper, Liberia, West Africa</li> <li>3. Increased demand has pushed down the price of ICTs</li> </ol>
<b>Economic impacts of pervasive ICT diffusion among the poor</b>	<ol style="list-style-type: none"> <li>1. Product innovation has driven down production and distribution costs and makes ICT products more affordable</li> <li>2. Increasingly evolving technology supports diverse applications including education</li> <li>3. The global workforce and higher remittances to the poor</li> <li>4. Reduced obsolescence in the ICT sector</li> <li>5. Ease of access compared with outdated traditional methods</li> <li>6. Lower costs, compared with traditional communications products</li> </ol>
<b>Social impacts of ICT diffusion among the poor</b>	<ol style="list-style-type: none"> <li>1. Status symbol — At relatively low cost</li> <li>2. Trends in popular culture</li> <li>3. Ease of connection to family members locally and globally</li> <li>4. As unemployment pushes the poor to jobs in distant locations, remittances cover the cost of ICT purchases</li> <li>5. New wealth from remittances provide access to purchases</li> <li>6. People world-wide quickly adopt and use ICT devices</li> <li>7. Early ICT adopters—How younger users drive adoption by older users</li> </ol>
<b>Framing a global model for ICT delivery</b>	<ol style="list-style-type: none"> <li>1. Global partnerships to quickly build expertise among new ICT users</li> <li>2. Access to ICTs—Hardware and software</li> <li>3. Training of Trainers (TOT) sessions</li> <li>4. Project management teams</li> <li>5. Defined client populations</li> <li>6. External validation of results</li> <li>7. Assessments that reliably measure progress</li> <li>8. Evaluation reports and continuous improvements</li> </ol>
<b>The Role of Government in ICT diffusion and access</b>	<ol style="list-style-type: none"> <li>1. Role of E-government and IKM to foster efficiencies and shrink the size of government</li> <li>2. Government policies that support ICT adoption to eradicate illiteracy and build an educated population.</li> <li>3. Government-Business collaborations to stimulate business growth, employ educated citizens, and increase GDP.</li> </ol>

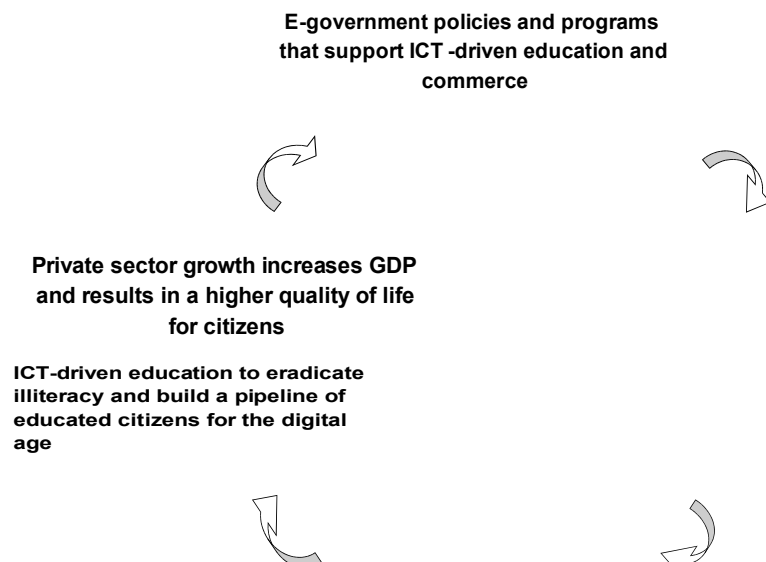
# THE ROLE OF ICTs IN ILLITERACY ERADICATION, WORKFORCE DEVELOPMENT, AND GDP GROWTH IN LIBERIA AND UNDER-RESOURCED COUNTRIES

Jennifer G. Bailey, Ph. D.

## Introduction

The Role of ICTs in eradicating illiteracy explores social, economic, business, and governmental aspects of adopting 21<sup>st</sup> century Information and Communication Technologies (ICTs) to provide expeditious and cost efficient solutions to pervasive global illiteracy and create educated populations to fuel economic growth and improved quality of life in developing countries. The study is presented against the backdrop of growing shifts towards global adoption of E-government and Information Knowledge Management (IKM) initiatives to optimize government productivity, achieve cost effectiveness, shrink the size of government, and support private sector innovation, productivity and profitability, and foster GDP growth. The paper uses a multi-disciplinary approach that covers the heterogeneity and changing global trends in ICT usage and adoption, economics, population demographics, business, government, trends in popular culture, and develops a cycle of opportunity that begins with ICT-driven education, feeds into private sector growth supported by E-government policies and programs, and culminates in higher GDP per nation and a better quality of life for citizens.

**Figure 1:** The Roles for ICTs identifies a cycle of growth opportunity that begins with E-government support for ICT-driven education, leads to better educated citizens who are engines of productivity for public and private sector innovations that contribute to GDP growth.



**Objective:**

- To use ICTs to nurture in developing countries, ICT-educated populations who are better prepared to meet workforce needs of the 21st century;
- To describe the new work environment required to absorb new cohorts of literate, digitally educated populations who generate higher productivity and contribute to higher national GDP which results in a better quality of life for citizens in developing countries.

**Case Study Summary:**

In 2010, a US-Liberian partnership used Information and Communication Technologies (ICTs) and launched two pilot programs in English and mathematics delivered via Internet to 174 pre-college students at a computer lab in rural, southeastern Liberia. The partnership consisted of Liberia's William V. S. Tubman University, the Bailey Institute, a global non-governmental organization (NGO) and Learnscope®, an international provider of self-paced, digital education. The pilot programs referred to as the Technology-Driven Education Project (TDEP), achieved 98% success in enabling students to move from 7<sup>th</sup> to 12<sup>th</sup> grade level in mathematics and English over 12 weeks of self-paced digital education. Notably, 93% of participants had not previously seen or used computers and required two weeks of computer training prior to starting TDEP courses. These pilot studies and the unprecedented and widespread use of ICTs in early 2011 to mobilize millions of citizens and engender social change (Tunisia, Egypt, Yemen, Libya) seem sufficiently remarkable to warrant broader research on the potential of ICTs to play a significant role in re-dressing socioeconomic issues such as illiteracy and poverty among the world's poorest populations. The issue is timely, the interest is high, the relevance to human and national development is strong.

The 2015 deadline for achieving the Millennium Development Goal for education stops at the primary level. Secondary and tertiary education for the poor will remain unfulfilled goals by 2015 and beyond. Given high illiteracy levels in poor countries in 2011, the worldwide shortage of qualified teachers and teaching resources, ICTs provide viable opportunities for eradicating illiteracy and meeting the workforce needs to support GDP growth in the 21<sup>st</sup> century.

## **State of Global Illiteracy - 2011**

### **Shocking facts about global illiteracy worldwide<sup>2</sup> and in the US<sup>3</sup>**

- 20% of people worldwide are illiterate (1 in 5 people)
- 69% of the world's highest illiteracy rates (70 %+ ) are in Sub-Saharan Africa
- 39% of the population of India is illiterate (546 million people)
- The U.S. illiteracy rate is 14% compared to 1%-5% in other industrialized countries
- A sample of US illiteracy rates by states and counties are:

#### **States**

- 24%--Texas
- 22%--Mississippi

#### **Counties**

- 22%--Prince Georges County, Maryland
- 11%--Montgomery County, Maryland

Reliable and comparable cross-national data on the state of literacy are lacking. UNESCO seeks to create viable systems to identify, monitor, and evaluate literacy rates at the national and international level, yet these data are self-reported and accuracy cannot be confirmed. UNESCO's major initiatives<sup>4</sup> for literacy monitoring and evaluation include:

#### **Education for All (EFA) Global Monitoring Report**

#### **Literacy Assessment and Monitoring Program (LAMP)**

**The Global Monitoring Report (GMR) provides in-depth statistics and analysis of all EFA goals, including the goal to increase global adult literacy rates by 50% by the year 2015.**

### **Illiteracy and Its By-products**

Illiteracy does not exist in a vacuum. United Nations Development Program (UNDP) data for 2008, state that illiteracy is directly connected to: poverty, ill-health, and lack of economic prosperity. In 1990, UNDP adopted Pakistani economist Mahbud ul Haq's Human Development Index (HDI) as the monitor of human development because it focuses on more than the rise and fall of national incomes. HDI is about creating an environment where people can develop their full potential and lead productive, creative lives. UI Haq stated the HDI index seeks to recognize that, "People are the real wealth of nations. Development must be about expanding the choices people have to lead lives they

value and to lead long and healthy lives, to be knowledgeable, to have access to the resources needed for a decent standard of living, and contribute to the life of the community.”<sup>5</sup>

**The Human Development Index (HDI) is based on three elements of human life measured by:**

- Life Expectancy
- Adult Literacy
- GDP/Capita adjusted for differences in purchasing power

**UNDP Notes in its Human Development Index Report (HDI 2003-2008), that:**

- *50 of the countries with the lowest HDI also have the highest illiteracy rates*
- *69% of these countries are in Sub-Saharan Africa*

**Common Characteristics of Emerging Nations with High HDI include:**

- *Unequal distribution of income*
- *Technological dualism: Hi-tech firms use low-tech methods*
- *Majority of the population works in the non-innovative, unprofitable agricultural sector*
- *Disguised unemployment—2 people do the job of 1*
- *High unemployment*
- *High population growth ranging from 2.5% to 4% annually*
- *High illiteracy/weak educational facilities*
- *Malnutrition and health problems are widespread*
- *Political instability*
- *Exports focus on a few raw materials with low market value*

### **Pillars of Economic Growth —The Importance of Skilled Labor and Technology**

Historically (Harrod-Domar idea), economic growth was identified as solely a function of one input, capital — money, commodities, physical treasures such as gold, silver, land, houses, factories. Robert Solow (1956) overturned this idea when the Solow model saw growth as determined by capital and labor — for which he earned the 1987 Nobel-prize. Subjected to scrutiny and broader research over time, the labor-capital formula accounted for only 40% of economic growth. The other 60%, known as “total factor productivity”, encompasses technology development and anything not captured by capital and labor outputs, such as culture and institutions.<sup>6</sup> Thus, Dambisa Moyo (2011) states, the canonical economic models point to these three essential ingredients which determine economic growth: capital, labor, and total factor productivity (Largely technology and including culture,

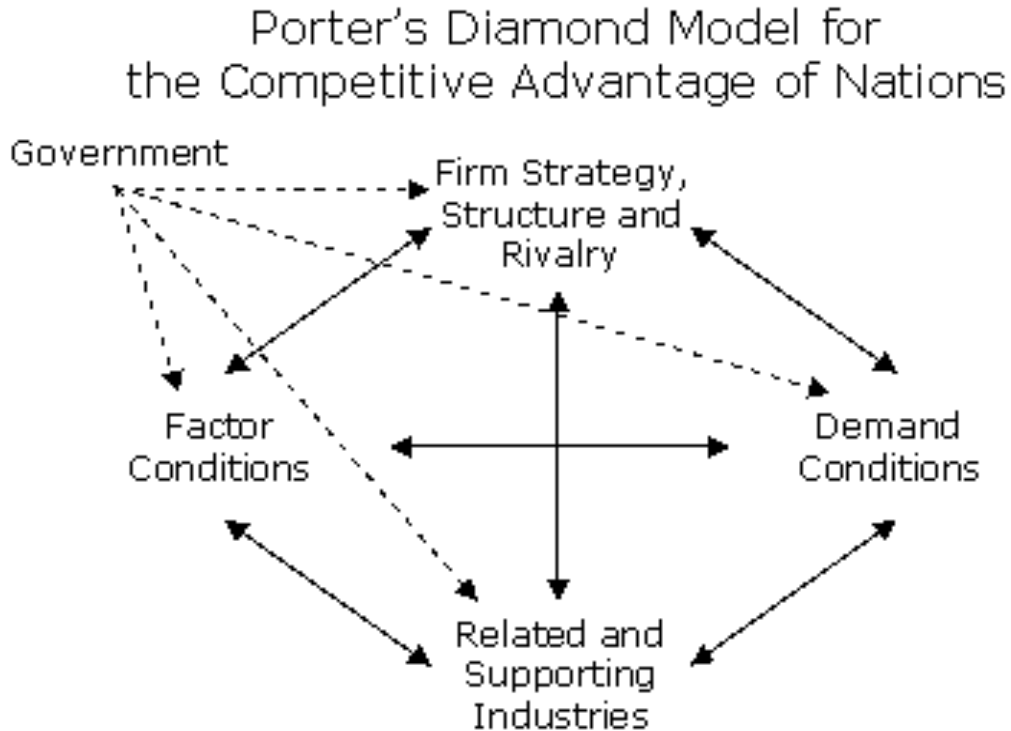
institutions). According to Moyo, “Nothing illustrates the might, the sheer potency of these three components coming together than the American moon landing in July 1969.”<sup>7</sup>

Michael Porter’s widely referenced Diamond Model for development highlights the importance of skilled labor institutions and infrastructure, and by inference, also emphasizes the importance of a literate, highly skilled population as central to growth and competitive advantage. For emerging nations, ICTs shorten distance on the journey to development by simultaneously producing outputs of educated citizens and engines of growth prepared for the digital world.

Porter highlights the importance of human capital in the “Competitive Advantage of Nations” (Porter, 1990)<sup>8</sup>. Porter’s Diamond Model overturns conventional economic theory, which emphasized traditional factors such as: land, location, natural resources, labor, and local population size. Whenever we challenge conventional wisdom things get interesting. Porter maintains that traditional factors make only a passive contribution towards national economic opportunity because they can hardly be influenced. Porter has created a “Diamond” framework that points to four interlinked factors that drive competitive advantage in countries or regions:

- **Firm Strategy, Structure and Rivalry:** Competition compels firms to improve productivity and innovation in order to succeed
- **Demand Conditions:** More demanding customers drive the desire of firms to improve
- **Related Supporting Industries:** Spatial proximity of upstream or downstream industries facilitates continuous exchange of ideas and information and fosters innovation
- **Factor Conditions:** Key factors or *specialized factors of production* are created not inherited: Specialized factors are *skilled labor, capital, and infrastructure*. *Non-key factors such as un-skilled labor and raw materials* can be obtained by any company, and hence do not generate sustained competitive advantage.

**Figure 2: Determinants of National Advantage – Michael Porter, Diamond Model (1990)**



Porter derived his *Diamond model* after having done research in 10 leading nations and his work is regularly referenced in discussions on business, trade, and economics. It is pertinent here since it gives purpose, beyond humanitarian reasons, for eradicating illiteracy. Porter's emphatic focus on "Skilled Labor" as a building block for a nation's competitive advantage, fuels enlightened self-interest and inspires the survival instincts of any nation to not merely increase literacy, but also to build infrastructure around sound educational institutions at the primary, secondary, and tertiary levels.

### **Summary of ICT Success in Harper, Liberia in 2010**

**THE PROBLEM:** Liberia lost most of its educational and national infrastructure over 14 years of civil conflict that ended in 2003. Today, the illiteracy rate is 80%; unemployment is 90%.<sup>9</sup> Admission reports from William V.S. Tubman University indicated that 90% of Liberia's high school graduates applying to the university in 2010 tested below 70% in English and mathematics on standardized WAEC tests and were not prepared for university work. Liberia urgently needs to support access to tertiary education to increase the pipeline of educated professionals essential to fuel the nation's economic progress.

**THE SOLUTION:** In 2010, the Bailey Institute-Tubman University partnership launched the Technology-Driven Education Project (TDEP), a self-paced, program of Internet-delivered mathematics and English courses for 174 students who could not gain admission to Tubman University because their 2009 WAEC scores in mathematics and English were below the required 70%. Over 12 weeks (April – September 2010), TDEP students raised English and mathematics scores from 7<sup>th</sup> to 12<sup>th</sup> grade level and earned admission to Tubman University in September 2010.

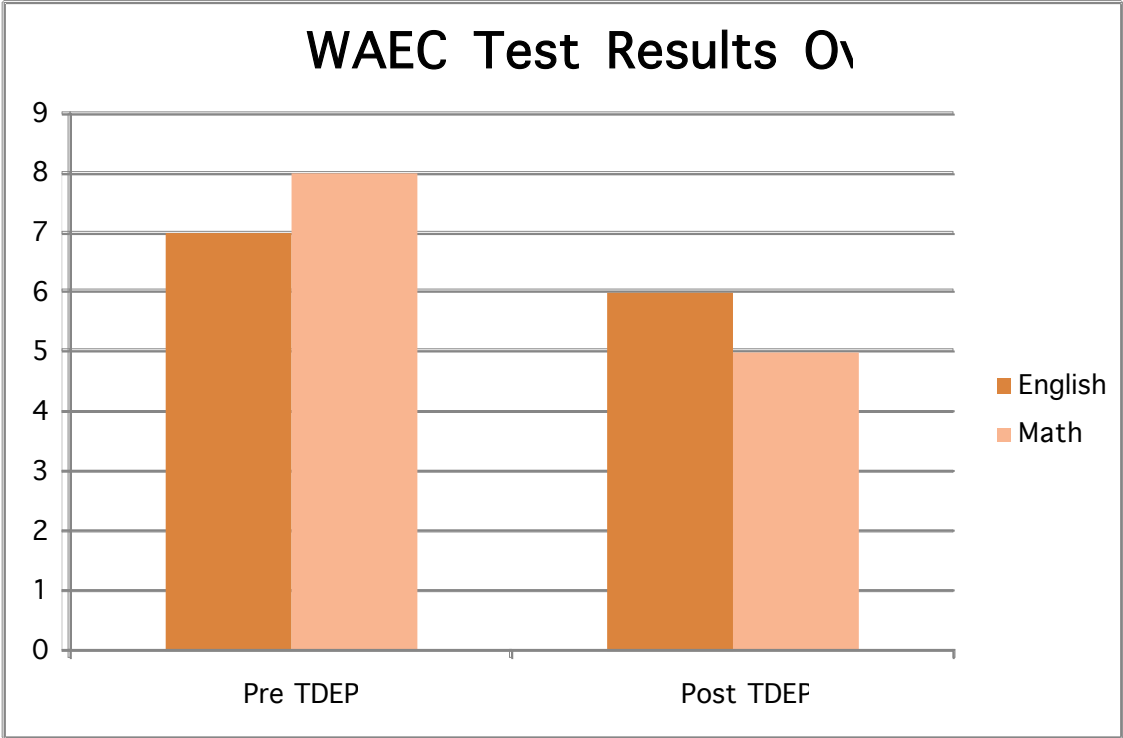
**PARTNERSHIP - THE FOUNDATION FOR SUCCESS:** The Bailey Institute-Tubman University partnership was the key to the successful outcomes. Bailey Institute launched the TDEP digital curriculum from the U.S., with staff providing online training on innovative ICTs to TU faculty and staff, registering students, mentoring, training, and conducting assessments. TU staff managed TDEP on-the-ground in Liberia managing scheduling, computer literacy testing and training, student assessments, and project management. Both staffs collaborated on weekly transatlantic meetings using GoToMeeting and project evaluations, strategic planning, and final evaluations and reports.

**VALIDATING TDEP's RESULTS:** To validate TDEP's remarkable results, a random sample of 84 TDEP graduates re-took the 2009 WAEC test in English and mathematics on November 27, 2010. Overall, TDEP participants raised mathematics scores three levels and English scores two levels. Notably, females raised mathematics scores three levels and English scores 2 levels. Males raised mathematics scores two levels and English scores one level.

**CONCLUSION:** Undoubtedly, the Technology-Driven Education Project (TDEP) is among the quickest and most cost-effective ways to raise Liberians' readiness for work and post-secondary education, and build a highly-skilled workforce for the digital age. As this paper will demonstrate, ICTs have penetrated diverse sectors of community and government to improve lives and foster economic growth in unprecedented ways. Figures 3 and 4 on the following pages show results from the TDEP project at Tubman University, Harper, Liberia, in 2010.

**Background:** A random sample of 84 (33% female; 67% male) of 144 TDEP graduates at Tubman University, Liberia, re-took the 2009 \*WAEC test in November 2010 to validate the role of the Learnscape® curriculum in raising academic performance. TDEP graduates completed 12 weeks of self-paced, Internet-delivered mathematics and English courses in summer 2010. Sample reflects a 5% margin of error and 95% confidence level.

**Figure 3: Overall, after TDEP, all students raised their \*WAEC scores an average of three levels in mathematics from 8-5 (50-74%); and an average of two levels in English from 7-5 (66-79%).**



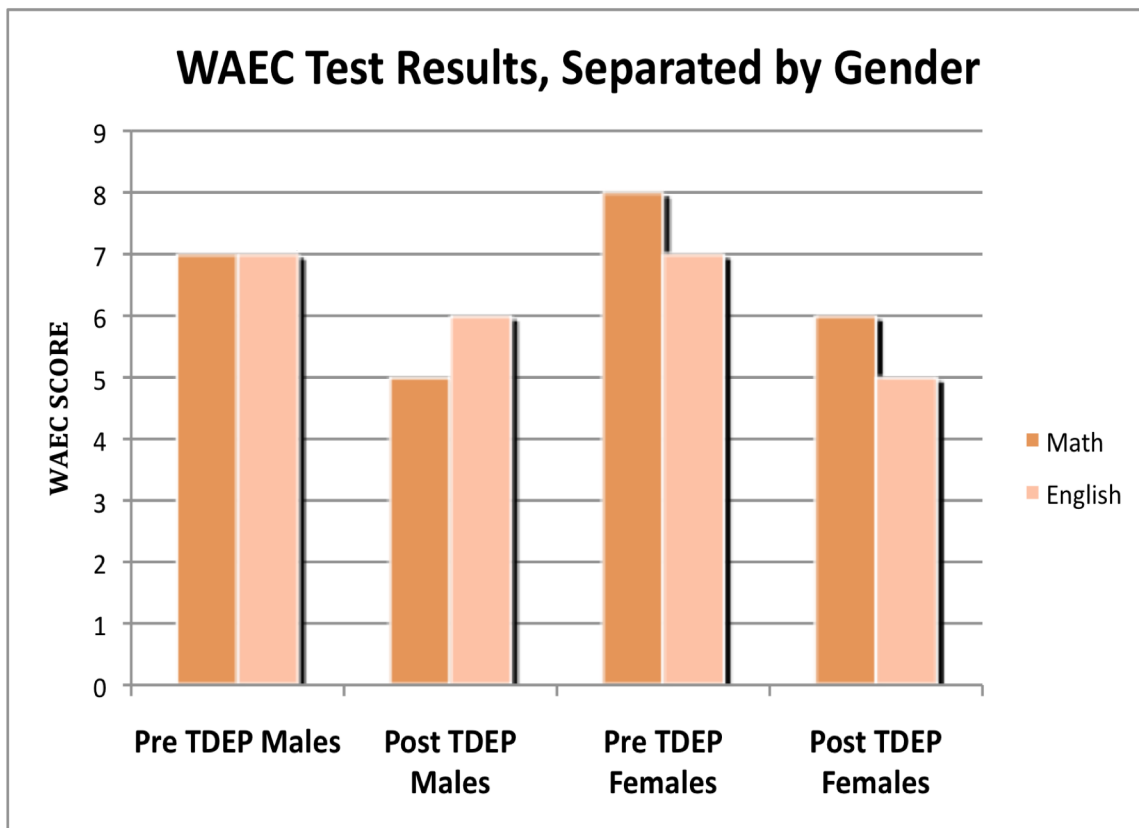
**Table 2 Below: Numeric values for \*WAEC scores.**

WAEC Stanine Score	English %	Mathematics %
1	95-100	90-100
2	90-94	85-89
3	85-89	80-84
4	80-84	75-79
5	75-79	70-74
6	70-74	65-69
7	66-69	60-64
8	60-65	50-59
9	0-59%	0-49%

**\*The West African Examination Council (WAEC) conducts the official examinations in Liberia to assess the knowledge of students at the end of secondary school education. Ref. [www.LiberiaWAEC.org](http://www.LiberiaWAEC.org)**

**Figures 3 and 4: \*WAEC rankings by student performance using a Stanine Score in the range of 1-9;**

**Figure 4:** Comparative Analysis of Pre and Post-TDEP Scores on \*WAEC tests, broken out by Gender. Liberian females made notable strides on \*WAEC mathematics and English tests following Bailey Institute’s Technology-Driven Education Project (TDEP) 2010



\*The West African Examination Council (WAEC) conducts the official examinations in Liberia to assess the knowledge of students at the end of secondary school education. [www.LiberiaWAEC.org](http://www.LiberiaWAEC.org). The TDEP pilot program was conducted in partnership with William V. S. Tubman University, Harper, Liberia, West Africa.

\*WAEC ranks performance using a Stanine Score in the range of 1-9. 1=Excellent; 2=Very Good; 3=Good; 4, 5 & 6=Credit; 7=High Pass; 8=Pass; 9=Fail

Average Female Post-TDEP, WAEC scores rose 3 levels in mathematics from 8 to 5 (50-74%), and 2 levels in English from 7 to 5 (66-79%);

Average Male Post-TDEP, WAEC scores rose 2 levels in mathematics from 7 to 5 (60-74%) and 1 level in English from 7 to 6 (66-74%).

### **Practical Applications of ICT-Driven TDEP Results Garnered at Tubman University in 2010**

The lessons of the TDEP successes have practical applications of considerable significance. These results provide a platform for placing ICT—driven education within the broader sphere of its relevance to future national development and progress for Liberia and other developing countries. Increased literacy boosts education and knowledge-seeking, and establishes the urgency for government and the private sector to create outlets for new cohorts of talented, ICT-educated citizens who might have otherwise been left out of the equation for economic growth.

With the growth of E-government and Information Knowledge Management (IKM), the world is in the midst of an ICT revolution. From 1990-2011 it has witnessed unprecedented access to and diffusion of ICT products worldwide. The heterogeneity of usage, broken out by demographics, is painting a vastly different picture in 2011 and beyond in the type of usage — cell phone, traditional land line phones, computers, and digital TV have transformed the communications sector. It is important for policy makers to review the roles of government, non-governmental organizations (NGOs), and education in this revolution.

### **Heterogeneity of ICT Adoption**

As recently as 2006, an ICT-driven project, *Building Institutional Capacity in Higher Education in Liberia and Sierra Leone* (Bailey 2006)<sup>10</sup>, when presented at an international development conference in Capetown, South Africa, was considered impractical, unattainable, and out-of touch with the needs and priorities of Africa. The project was established through institutional partnerships between Bowie State University - Maryland, USA, Njala University - Sierra Leone, and AME Zion University - Liberia, from 2006-2007. Its outcomes and empirical results proved otherwise. The project

brought digital mathematics curricula, digital calculators, projectors, and laptops to each university and provided Training of Trainers (TOT) sessions that taught faculty and staff to use the new technologies. From 2006-2007, more than 5000 students, faculty and staff participated in mathematics programs and increased interest in mathematics at both universities by 35% in just one year. Additionally, IT faculty used the same hardware to teach database building and the Microsoft Office suite. These added skills increased workforce recruitment of graduates from one university (AME Zion, Liberia) by 25%.

In 2011, Tubman University, Harper, Liberia has three computer labs with a total of 68 working computers, Internet access, and six trained staff, faculty, and lab assistants. TU's ICT capabilities fostered increased institutional capacity and enabled hosting, transmission, and delivery of Bailey Institute's Technology-Driven Education Project (TDEP) for 174 students. In 2011, 500 pre-college students await access to TDEP to qualify for university admission. In 2011, Wi-Fi is available on the streets of Harper, Maryland County, geographically remote, yet technologically connected to the vast world of knowledge and opportunity. Numerous independent initiatives in Liberia and other SSA countries are making ITCs available to educators.<sup>11</sup> The African School on Electronic Structure Methods and Applications (ASESMA) is a biennial school launched in 2010 for students and early career lecturers in the sciences from multiple African countries by the African Institute for Mathematical Sciences (AIMS). ASESMA attracted 40 participants in 2010 and depends on ICTs and networking to run its computer labs and achieve its goal to create tighter ties among researchers across the African continent.<sup>12</sup> Much more must be done to make ASESMA a year-round institution for the advancement of electronic technologies with access to the most advanced digital and Internet-accessible knowledge bases.

In just under five years, the perception of Africa's readiness for ICT infusion to address educational and other societal needs has changed to allow the outcomes described in the forgoing examples. Ahead, lies the work of policy-makers and civic groups to advocate for institutionalized ICT adoption at the governmental level driven by the demands of business and citizens who require a 21<sup>st</sup> century education to meet demands of the digital age.

### **India: Smart+ Connected Communities Initiative**

Cisco's Smart+Connected Communities Initiative<sup>13</sup> reflects the growing shift of world populations to urban areas where community leaders seek answers to overcrowding, pollution, budget and resource constraints, inadequate infrastructure, and the need for continuing growth. Smart+Connected Communities is a visionary answer: It uses intelligent networking capabilities to weave together people, services, community assets, and information into a single pervasive solution.

“Smart+Connected” acknowledges the essential role of the network as the platform to help transform physical communities to connected communities.

“Smart+Connected” also encapsulates a new way of thinking about how communities are designed, built, managed, and renewed to achieve social, economic, and environmental sustainability. It pursues solutions along seven tracks: Smart+Connected Real Estate, Smart+Connected Utilities, Smart+Connected Transportation, Smart+Connected Safety & Security, Smart+Connected Learning, Smart+Connected Health, and Smart+Connected Government. The foundation for the city *and the nation* of the future will be the network and the information it carries, enabling the delivery of vital services from transportation utilities and security to entertainment, education, and healthcare.

**Everything will be connected, intelligent, and green:** From office buildings and appliances to hospitals and schools, citizens and businesses will enjoy unprecedented levels of collaboration, productivity, and economic growth without compromising the environment. Managing and operating such a smart, connected community will be efficient, coordinated, and secure.

### **Caribbean: Trinidad & Tobago (T&T)**

Trinidad and Tobago plans to become the ICT hub for the Caribbean and Latin America. In support of the Information and Communications Technology (ICT) vision for Trinidad and Tobago, a series of breakfast meetings were held since 2008 by the e-Business Roundtable in partnership with the Trinidad and Tobago Chamber of Commerce to engage the key stakeholders and private entrepreneurs in the shared vision directed towards this vision.<sup>14</sup>

Members of T&T’s e-Business Roundtable and representatives from the ICT Division of the Ministry of Public Administration and Information have been collaborating. In October, 2008, the first ICT Business and Innovation Symposium, the single, largest, ICT-business networking, information sharing, promotion, and awareness initiative was staged in Trinidad and Tobago.<sup>15</sup> The Symposium was geared towards raising awareness and promoting uptake of the new tools available in the global knowledge-based economy; it also highlighted investment opportunities in Trinidad and Tobago and the region while setting an agenda and vision to invigorate the business and public sectors to fully embrace opportunities presented by Information Communication Technologies or ICTs.

### **Role of ICTs in the Cycle of Sustainable Economic Development**

**Sciencentric News** (February 9, 2009)<sup>16</sup> takes the sanguine and proactive position that developed countries must invest in information and communications technologies (ICT) in the developing world, not only to close the so-called digital divide, but to encourage sustainable economic development and to create new markets for international commerce.<sup>17</sup> D. Steven White and colleagues at the University of Massachusetts-Dartmouth have now developed a contemporary map of the global digital divide, which they say provides a baseline measure of the investment in ICTs needed on a per country basis in order to close the gap as it currently exists. Because ICTs are constantly changing and developing, each new technology can widen the global digital divide so it is important that any investment takes into account the diffusion of new ICT technologies.

The U-Mass-Dartmouth model-based cluster analysis identified cohorts of countries based on three variables: personal computers per 100 population, internet users per 100 population and internet bandwidth per person. The results indicate that the global digital divide consists of four tiers rather than the simplistic two of the rich-poor, have-have nots.

Based on this model, all of the developed countries lie within the first tier. Surprises within the first tier include at least 18 countries that outperform the US, based on internet access and bandwidth availability. In the top tier are Jamaica, Antigua, Estonia, Hungary, Slovak Republic, Aruba, Barbados, Brunei, Chile, Latvia, Lithuania, Qatar, Slovenia, and the United Arab Emirates. This contradicts the notion that GDP per capita is the main predictor of internet access. At the top of the second tier are Columbia and Uruguay. Brazil, Russia, and China are at the bottom of the second tier cluster. African nations account for the majority of the members of the lowest tier, indicating the disadvantage for the continent as a whole in terms of lack of computer use, internet access, and bandwidth.

### **Africa: New Roles for ICTs**

This paper suggests new roles for ICTs in Africa based on the premise that the continent is on the road to significantly increasing bandwidth availability in the very near future. Remote communities such as the port city of Harper in southeastern Liberia, population of 3,000 already has Wi-Fi Max which puts Harper in the first tier based on internet bandwidth per person. In fact since Africa has already lost the *“Race to the bottom”* in the global manufacturing sector now dominated by Asian countries, its only growth trajectory is up, driven by ICT adoption, diffusion, and usage.

The author suggests ICT diffusion is also fueled by qualitative and quantitative factors:

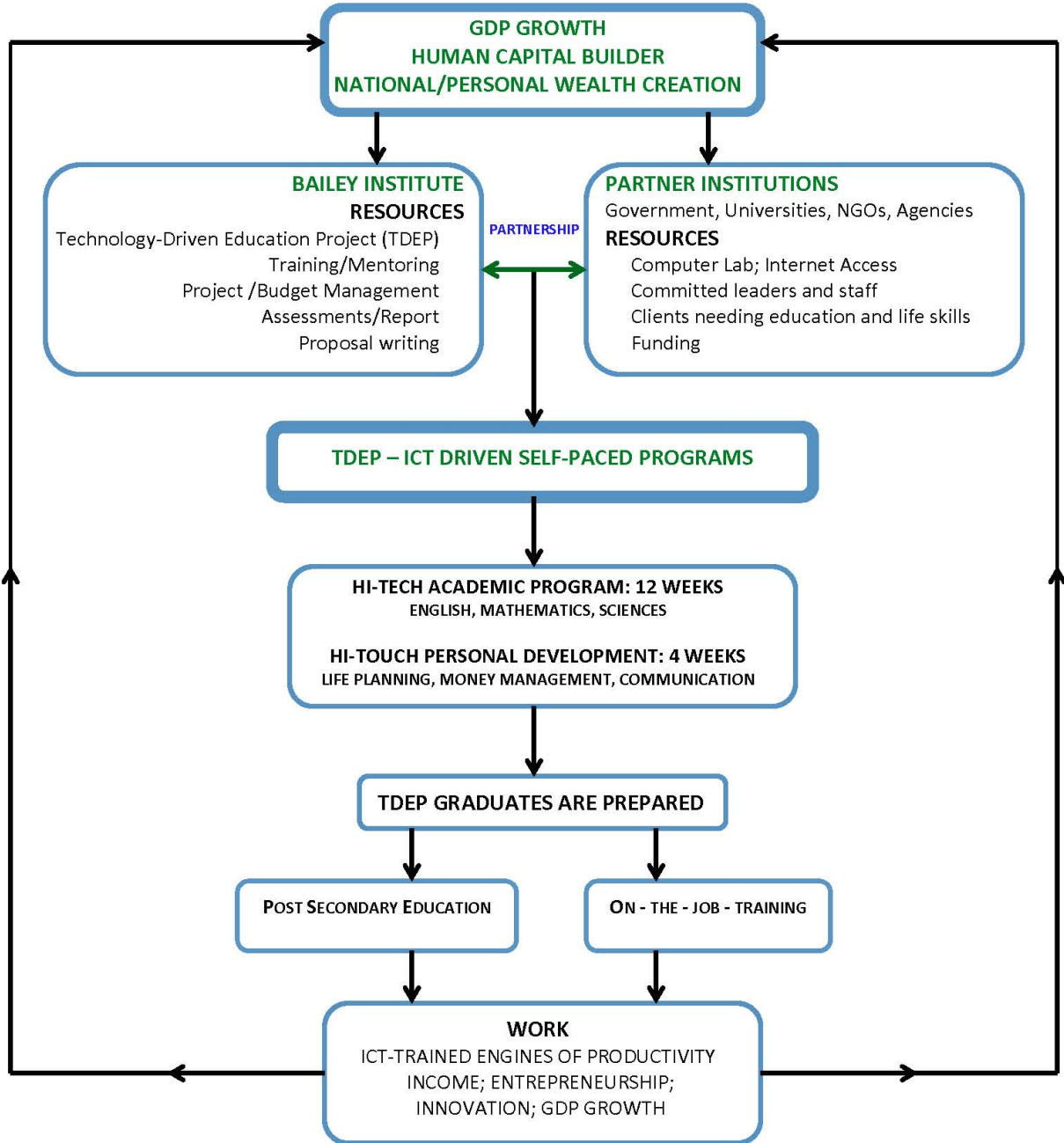
- Lower product prices as businesses target new populations in developing countries;
- Frequent product innovations that stimulate purchases;
- A global workforce that provides remittances to fund ICT purchases;
- Social needs to connect with loved ones in distant locations;
- ICT's are becoming the new status symbols of the poor;
- Popular culture that pushes ICT users to be trend makers, not followers, among peers;

### **Framing a global model of ICT-driven Education (Global TDEP Model)**

The Bailey Institute has amassed data and reviewed trends over six years (2006-2011) to frame a global model for using ICTs to advance education, eradicate illiteracy, foster workforce development, economic prosperity, and GDP growth. Major components follow:

1. Global Partnerships to quickly build expertise among new ICT users
2. Access to ICTs—hardware and software
3. Training of Trainers (TOT) sessions
4. Project management teams
5. Pairing hi-tech academic training with hi-touch personal development skills
6. Defined client populations
7. A focus on science and technology-driven innovation
8. External validation of results
9. Assessments that reliably measure progress
10. Partnerships with E-government and the private sector
11. Evaluation reports and continuous improvements

In the broader context of E-government, E-Commerce, the competitive advantage of highly skilled workforce, the need for Information Knowledge Management, new roles for ICTs should show shifts in ICT usage from mainly social, recreational, and entertainment to education, economic growth, and prosperity. Strategically, its efficacy and cost-effectiveness validate ICT usage as the best return on investment (ROI) for educating challenged populations in urban areas or hard to reach, under-resourced communities in Sub-Saharan Africa. In the digital age, none of these challenged populations ought to be omitted from the economic prosperity equation. Bailey Institute's ICT-based global model for workforce development and GDP growth follows on page 17.



**Bailey Institute Contact:** Dr. Jennifer G. Bailey, Executive Director and Project Manager, Technology-Driven Education Project (TDEP); 301 – 733 – 9003, [www.baileyinstitute.org](http://www.baileyinstitute.org); The Bailey Institute is a 501 (c) 3 non-profit organization whose vision is to eradicate illiteracy; [jbailey@baileyinstitute.org](mailto:jbailey@baileyinstitute.org); [baileyjg@gmail.com](mailto:baileyjg@gmail.com) The TDEP Global Model® was framed in 2011 by Jennifer G. Bailey, Ph.D.

## REFERENCES

1. Bailey, J. G. (2010), "**Illiteracy and Economic Development**," in *A World Imbalanced: Change and Challenge in the Global Village*, pp. 121-154, Xlibris, IN,
2. Bailey, J. G. (2010), "**Global Issues in Eradicating Illiteracy in Liberia—A Technology-Driven Approach**," *International Journal of Global Management Studies Quarterly (IJGMSQ)*, Volume 3 Issue 1, spring 2010
3. Bailey, J.G. (2010), "**Technology-driven Project (TDEP)—Reducing Illiteracy in Liberia, West Africa, A pilot Study**," Presented at the 2010 International Association of Global Management Conference (AGMS), Las Vegas, NV., February 23-24; (Published in peer-reviewed conference proceedings)
4. Bailey, J.G. (2007), **Building Institutional Capacity in Higher Education in Liberia and Sierra Leone**, Closeout Report, UNCFSP-USAID
5. Bobb, Evert. **Haiti Re-Wired**, haitirewired.com/profiles/blogs, Feb 2010
6. CANA News, October 27, 2008, <http://www.cananews.net/news/158/ARTICLE/31047/2008-10-27.html>
7. IGovernment, Feb 26, 2011, <http://www.igovernment.in/site/smartconnect-many-solns-rolled-one-39324>
8. International Adult Literacy Survey (1998)
9. Liberia's Poverty reduction Strategy:  
[http://planipolis.iiep.unesco.org/upload/Liberia/Liberia\\_PRSP.pdf](http://planipolis.iiep.unesco.org/upload/Liberia/Liberia_PRSP.pdf)
10. Moyo, Dambisa (2011), **How the West Was Lost: Fifty Years of Economic Folly and the Stark Choices Ahead**, Farrar, Straus and Giroux, New York
11. National Adult Literacy Survey (2002)
12. Partnering to Drive the Nation Forward Through ICT, Fast Forward (Downloaded Feb 27, 2011)  
the<http://ebusiness.fastforward.tt/business/MediaRoom/Articles/PartneringtoDrivebrnbspnbsptheNation/tabid/222/Default.aspx>
13. Physics Today, "**Raising the Scientific Level and Networking in Africa**," January 2011, pp 28-29
14. Porter, Michael, E. (2000), **Competitive Advantage of Nations**, The Free Press, N.Y.
15. Rodriguez, Francisco and Wilson III, Ernest J. (2000), Center for International Development and Conflict Management, University of Maryland, College Park, MD;
16. ScienceCentric, The International Digital Divide, February 9, 2011  
<http://www.sciencecentric.com/news/11020922-the-international-digital-divide.html>
17. UNESCO Institute for Statistics (1970-2015)

18. UNESCO Institute for Statistics: LAMP Literacy Project
19. UNDP data on Illiteracy; <http://undp.org/en/humandev/>
20. USA Pathfinders-World Literacy Statistics; [www.libraries.iub.edu/index](http://www.libraries.iub.edu/index)
21. Wiens, G. Elmer, Egwald Web Services, Downloaded Feb 28, 2011, The three factor **Cobb-Douglas** production function is:  $q = A * (L^{\alpha}) * (K^{\beta}) * (M^{\gamma}) = f(L, K, M)$ .

## NOTES

---

<sup>1</sup> Rodriguez, Francisco and Wilson III, Ernest J. (2000), Center for International Development and Conflict Management, University of Maryland, College Park, MD.

<sup>2</sup> *Source for International data: United Nations Development Bank, 2008*

<sup>3</sup> *Source for US data: National Assessment of Adult Literacy—2008 (Persons 16+)*

<sup>4</sup> UNESCO Institute for Statistics (1970-2015)

<sup>5</sup> <http://hdr.undp.org/en/humandev/>

<sup>6</sup> Cobb-Douglas production function is a representation of this relationship

<sup>7</sup> Moyo, Dambisa (2011), *How the West Was Lost*, Pages 8-10, Farrar, Straus and Giroux, N.Y.

<sup>8</sup> Porter, Michael, 1990, *The Competitive Advantage of Nations*, The Free Press, N.Y.

<sup>9</sup> Equip 2-2006 , Report commissioned by the United States Agency for International Development (USAID) on Education in Liberia;

<sup>10</sup> Bailey, J.G., Project Director, *Building Institutional Capacity in Liberia and Sierra Leone, 2006-2007*, Funded by UNCFSP-USAID

11. B. W. Harris Episcopal High School, Monrovia, Liberia, Alumni donated projectors, electronic white boards and audio books to the School in Liberia in 2010;

<sup>12</sup> Physics Today, January 2011, pp 28-29, [www.physicstoday.org](http://www.physicstoday.org)

<sup>13</sup> IGovernment, Feb 26, 2011, <http://www.igovernment.in/site/smartconnect-many-solns-rolled-one-39324>

<sup>14</sup> Partnering to Drive the Nation Forward Through ICT, Fast Forward (Downloaded Feb 27, 2011) the <http://ebusiness.fastforward.tt/business/MediaRoom/Articles/PartneringtoDrivebrnbspnbspthetheNation/tabid/22/Default.aspx>

<sup>15</sup> CANA News, October 27, 2008, <http://www.cananews.net/news/158/ARTICLE/31047/2008-10-27.html>

<sup>16</sup> <http://www.sciencecentric.com/news/11020922-the-international-digital-divide.html>

<sup>17</sup> The International Divide, February 9, 2011

<http://www.sciencecentric.com/news/11020922-the-international-digital-divide.html>