USING ICT FOR EDUCATION AND SUSTAINABLE DEVELOPMENT AMONG THE UNDERSERVED IN AFRICA

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ABSTRACT

The potential of ICT for education and sustainable development cannot be underestimated. Using cases from some African countries and data from deprived regions in Ghana, this paper discusses the opportunities and challenges in ICT for education and sustainable development in underserved areas in Africa. Much as infrastructural development, illiteracy and financial bottlenecks limits the possibility of fully utilizing emerging technologies, the growth of innovative technology like mobile telephony presents opportunities for using ICT to kick out of poverty through education. In this process the concern should not just be to provide access but to implement development programs that will meet the educational, agricultural, economic and healthcare needs of the people in underserved areas.

Key words: Information, Communication, Technology, Education, Development, Africa, Internet

INTRODUCTION

Information and communication technology (ICT) appears to be a necessary evil for the developing world, it makes and unmakes. ICT has both the potential to facilitate development and create a digital divide as well. This has created divergent views among researchers, policy-makers and development partners. Some think that up-to-date and readily-available information is not a crucial concern for communities which struggle to satisfy more basic needs such as clean water and electricity (Gulati 2008). Others hold the view that ICT has a key role to play in contributing to improving the situation of communities which are already disadvantaged in so many other ways to kick out of poverty and to break the gender divide as well (Bisnath 2004; Gurstein 2007; Bruce, Hagens, & Ellis 2007 ; Abdulkafi 2008).

Bruce, Hagens & Ellis (2007) have noted that a major interest among public policy-makers, researchers, and others is effective use of communications technologies for education and creating wealth and opportunities within rural regions. The authors add that rural people are interested in learning how to incorporate new forms of technology into their lives and their work, and though the Internet is just one potential tool in helping to build rural capacity, it can be a crucial tool for the capacity of rural and remote communities to survive in today's changing social and economic landscapes. New communication technologies such as chat rooms, electronic bulletin boards, video conferencing and others have the potential to be used productively to help meet personal and community goals in today's changing economy. Considering the potential of ICT for education and sustainable development and the thinking that the developing world has more pressing needs than ICT, this study seeks to explore the extent of knowledge and utilization of ICT facilities among the people in some parts of Africa and deprived regions of Ghana to check the possibility of promoting ICT for education and development among them on a larger scale.

1. Method

This study was undertaken using cases from some parts of Africa and survey data from the three deprived regions of Ghana. There are some ICT initiatives being undertaken in areas such as rural Kenya, rural South Africa and Uganda which has been looked at.

Ghana has ten administrative regions. Three of the regions have been categorized as the most deprived. They are Northern, Upper East and Upper West Regions. Using information resources from Ministry of Local

Government and Rural Development & Environment (MLGRD, 2006) a website that gives a broad coverage of all the regions and districts of Ghana and the Ghana Living Standards Survey 4 (GLSS 4, 2000), the profile of each of the regions has been looked at in detail to have an idea of the socio-economic situation of the various areas.

In addition, a survey has been undertaken to find out the ICT situation most specifically knowledge and usage among women and men in the most deprived regions of Ghana. The purpose was simply to test the extent of utilization of basic ICT facilities such as the Internet and search engines to have an idea of how remote communities considering their profile are accessing ICT. This way, one is able to know whether basic knowledge and usage of ICT is trickling down to remote communities or not. The data was analyzed with percentages and discussed in the later part of the paper.

2. Literature Review

2.1 ICT for Sustainable Development

There are divergent views on the use of ICT for education and sustainable development in the developing world and most especially the Least Developed Countries (LDCs). Much as some focus on its digital divide nature to conclude that developing societies should not target it as a prominent facilitating tool for economic growth especially when there are more pressing needs such as jobs, food, water, education, electricity, among others, others are of the opinion that the full potential of ICT should be explored and used as the tool for breaking the north and south divide and in most cases the gender divides to kick out of poverty. There is an opinion that ICT is one of the contributing factors to social and economic disparities across different social and economic groups. As a result the current estimates of the total number of African Internet users are around 5-8 million, with about 1.5-2.5 million outside North and South Africa. This is about 1 user for every 250-400 people, compared to a world average of about one user for every 15 people, and a North American and European average of about one in every 2 people (Asraf, Swatman, & Hanisch 2007; ITU, 2007; Rwangoga & Baryayetunga 2007).

Access to relevant information has become one of the discriminating factors between the rich and the poor communities in the world. The world is experiencing an information knowledge revolution that is fundamentally transforming the way in which businesses, citizens and governments operate and interact. Recent studies have found a positive correlation between investment in ICTs and economic growth (Dalvit, Thinyane, Muyingi & Terzoli 2007; Ssewanyana, 2007, UNESCO, 2003). If the Third World wants to experience development, then it cannot ignore the ICT effect. Ssewanyana (2007) notes that since the 1990s, there have been several initiatives around the globe to apply ICT to address issues of education and poverty in developing countries. ICTs are applicable to all sectors, most especially education, livelihoods, healthcare and government which are directly linked to poverty alleviation. Five of the eight MDGs focus on these sectors, which attract a lot of focus in discussions on ICT and poverty alleviation. Studies by Abduldafi, (2008) emphasize that the technological discourse for the adoption of the new media most especially the Internet, has centered on the potential of ICT to accelerate national development efforts, promote socio-cultural changes, and open up public spheres for free and democratic discourse in developing countries. UNESCO (2003) firmed the need to use ICT for developing the third world by stating that 'we would be justified in saying that one of the most potent forces shaping the 21st century is the new ICTs. Their revolutionary impact affects the way we live, learn, work, spend our leisure time, and communicate". ICTs are becoming vital engine of growth for the world economy and the developing cannot be and exception. They have the potential to enable many enterprising individuals, firms and communities in all parts of the planet, to address educational, economic and social challenges with greater efficiency and imagination (Maplecroft maps 2006).

The fast growth in development of ICT is leading to production of easily accessible and cost effective protocols that could serve all including those in endowed

and underserved localities and most importantly its ability to create opportunities for bridging the poverty gap. Ssewanyana (2007) has reviewed some studies that have established correlation between information and poverty, to show that information leads to resources and opportunities that generate more resources. Several empirical studies such as those of Chakraborty and Nandi (2003) and Nandi (2001) cited by Ssewanyana (2007) have established the relationship between just the telephone and economic growth. In a study by Centre for Economic Research in UK [cited by Butler 2005 in Ssewanyana (2007)], it was found that a developing country with an average of 10 mobile phones per 100 population between 1996 and 2003 had a per capita GDP growth of more than 0.59 percent higher than an identical country. Another study also describes how the clockwork radio has been used in South Africa for the rural people to listen to development programs, community education programs and disaster relief efforts. They have been used for broadcasts on weather, health issues, and government policies in Mozambique. To further provide evidence that the use of ICT can contribute to poverty alleviation, Ssewanyana (2007) has undertaken a study to demonstrate empirically the association between ICT and incidence of poverty using data from Uganda. The results show that households without ICT are more likely to be poor relative to their counterparts with ICT. Thus a combination of ICTs with improved education levels is associated with lower incidence of poverty. When ICTs are well utilized, they can expand people's income through better market information, good weather forecasts, agricultural and health advice. It should be emphasized here that ICT alone cannot alleviate poverty, it has to be accompanied by improvements in other development areas such as transport, health education, gender relations, and other socio-cultural influences. The following cases from some countries in Sub-Saharan Africa will throw more light on how ICT facilities have been used to improve the conditions of people in underserved areas.

2.2 Cases

2.2.1 Deployment of an e-Commerce Platform and Related Projects in Rural South Africa

Dalvit, Thinyane, Muyingi and Terzoli (2007) report that an e-commerce platform which can make a contribution to rural development and poverty alleviation was implemented in Dwesa, a rural community in South Africa. Like many rural areas, Dwesa is characterized by lack of infrastructure in terms of road and electricity, widespread poverty, lack of services and isolation which facilitate migration of the youth to cities. The areas where Dwesa has most to offer are tourism, arts and crafts. An ICT system was designed to promote tourism and advertise local arts, crafts and music. In the project deployment of infrastructure, technical support, promotion of the initiative and teaching of computer literacy took place during monthly visits of approximately one week, and involved young researchers from two universities to ensure a synergy between technical expertise and understanding of the local context. Teachers were trained to promote computer literacy in the school and in the community. The novelty of the approach was its sensitivity to the context and its emphasis on the promotion of active participation of the community and sustainability. The authors add that the platform is being extended to e-learning, e-government and e-health capabilities. If proven successful, the model could be exported to similar areas in South Africa and in the rest of Africa which could open up potential opportunities for the still unexplored market for ICT in rural Africa.

2.2.2 E-government for Uganda

In recognition that governments world-wide are adopting e-government as a means of improving their services to businesses and citizens, promoting economic and social development, and for enhancing the effectiveness and efficiency of government, the government of Uganda has drawn an e-government strategy aimed at changing the design, operation and culture of the public sector to better respond to the needs of Ugandans. Other targets were also set for the Government to consolidate the position of ICTs in the country. Some of the programs have only partially succeeded while others are reported to have totally failed. The limiting factors within the environment that have slowed realizations of the good

intentions have included lack of adequate funding to invest in ICTs, poor network infrastructure, and unaffordable ICT services for the citizens (Rwangoga & Baryayetunga, 2007).

Much as the case of South Africa appears to offer some successful indicators which provide some assurance for scaling up similar interventions in other parts of the continent, the situation is different for the Ugandan e-government program. This leads to the discussion on some of the challenges of using ICT for development in the Third World.

2.3 The Third World Challenge

As shown in the Ugandan case, there are several challenges in using ICT for sustainable development in Africa. The most basic of the challenges are the high level of illiteracy especially among the womenfolk, poor income levels, competing demands on national resources for provision of adequate food, healthcare, agricultural inputs, education, communication networks, and transportation, limited infrastructural development such as electricity and lack of expertise to manage ICT facilities. This could probably be the justification for the view that ICT should not be targeted as the vehicle for development in Africa. Kizza (2007) admits that for Africa's acquisition and development of information technology, the journey from there to now have not been without problems. At the dawn of ICT, Africa's technological imprints were but non-starters compared to the giant steps that were being taken in the rest of the world. Throughout the continent, ICT capacity and infrastructure have been low and in some places non-existent, and equipment acquisition has been sporadic and unplanned. But for him, in spite of all these, Africans have just been deprived but not disabled.

One ICT challenge in the developing world is limited application of ICT compared to the developed worlds. This has further widened the developmental gap. Abdulkafi (2008) indicates that current uses of the Internet and other communication technologies in most developing countries are often restricted to gaming, chatting, emailing, and sometimes information retrieval. Thus ICT is more utilized as an entertainment tool. This stands in sharp contrast to its uses in the West as a means of production such as communication and information dissemination, electronic business and commerce. The extent of business use of the Internet for instance in a technologically advanced country like the United States is estimated to be nearly six times as that for most developing nations in 2006 (World Bank, 2006 in Abdulkafi, 2008).

The domination of the Internet by Western content also forces users in developing countries to rely more and more on foreign languages at the expense of the promotion of local languages and programs. Third World countries are more exposed to foreign products which are often of higher standards, look more attractive and of relatively cheaper prices. It is therefore very challenging for local products to compete with foreign products on the international market. This could probably be addressed if there is a mass production of quality local products that will be promoted online to attract more foreign customers.

One contributing factor to the disadvantaged situation of the developing world is inability to bridge the digital divide with technologically advanced countries, and how the Internet and other network technologies contribute to enhancing development. Quoting James, (2007 p.284), Asraf, Swatman, & Hanisch, (2007) have defined the *digital divide* as "the differential extent to which rich countries and poor countries benefit from various forms of IT". It implies a widening of the gulf between the haves and have-nots with respect to ICT throughout the world. In developing countries, the digital divide occurs where there is a lack of infrastructure such as electricity supply or lack of access to modern technology such as the Internet, computers or mobile phones. The digital divide could also be viewed from other perspectives, such as industrial verses developing countries, rich verses poor countries, North verses South or information rich verses information poor. Statistics suggest that developing countries own less than 4 percent of all computers. Again 75 percent of the world's telephone handsets can be found in the 9 richest

countries, while internet subscriptions in all of Africa were only 6.31 million in September 2001, compared with 34.3 million in the UK. The question is whether developing countries should ignore this digital gap for it to continue to widen or implement strategies that will inch them forward. A way out to respond to the digital divide could be intensifying the development of ICT infrastructure in developing countries such as promoting availability of more computers, widening the telecommunications network, and hastening the growth of Internet service providers (ISPs). Meanwhile providing more computers does not necessarily result in bridging the digital divide. It could even compete with the provision and access to basic needs such as education, healthcare, capital, shelter, employment, clean water and food for those who are not able to process the information. Current concern is access to information and the additional resources that allow people to use technology such as content, language, education, literacy, community and social resources. This makes it critical to develop appropriate content and build people's capacities for effective utilization of ICT in developing communities (Gurstein, 2007).

The issue of gender is another challenge in the utilization of ICT for development. Women all over the world lag behind their male folk in the utilization of ICT and the situation is worse for third world women. Low levels of education and high levels of illiteracy, reinforced by poverty, account in large measure for the problems African women face in accessing and using ICTs. In Uganda and Senegal it is estimated that women Internet users constitute only about 31.5 percent and 12 percent of Internet users, respectively (0.1% of the total population in both cases), while in South Africa women users constitute 19 percent of Internet users (0.3% of the total population). In most parts of Africa, women users form a small part of educated urban elite. Meanwhile there is so much potential in ICT for empowerment of women. If used appropriately, ICT has the potential to vastly improve productivity (Baryamureeba, 2007) among women and bridge the gender gap as well. ICTs offer immense possibilities for reducing poverty, overcoming women's isolation, giving women a voice and advancing gender equality. As a result there have been recent efforts to undertake initiatives that will harness the potential of ICT for empowerment of women. Efforts will have to be intensified to make ICTs accessible to women in rural Africa (UNESCO, 2003, Women'snet. 2005, Hafkin, 2003, Huyer & Sikoska, 2003).

2.4 A Window of Hope

Much as there are challenges in the utilization of ICT in the developing or Least Developed Countries (LDCs), there are cases to show that the ICT situation in the developing world is improving especially in the area of mobile telephony. In a report by ITU (2007) it is indicated that the digital divide is shrinking in most technologies. Developing countries are gaining on OECD countries in terms of fixed line penetration, mobile cellular subscriber penetration, Internet usage and broadband penetration. LDCs are also catching up with developing countries in terms of mobile phones, Internet usage and broadband though they are being left behind in fixed lines. The report emphasizes that mobile telephony holds the greatest potential to bridge the digital divide. The number of mobile cellular subscribers around the world is growing rapidly. Low-income countries are making important gains in mobile telephony, with mobile phones outnumbering fixed lines by seven to one in LDCs, and by as much as nine to one in Sub-Saharan Africa which is a good example of technological leapfrogging. ITU has therefore estimated that by the end of 2008, more than half the world's population is expected to have access to a mobile phone. Interestingly most of the new investment is coming from companies based in Africa itself (ITU, 2007; Vainio, T., Oksman, Wiglius, Markova, & Kulju, 2007). This is a promising opportunity for developing countries. The advantage in the mobile telephony is its cordless nature with make it possible to be accessed in the remotest parts of the continent.

There has also been a dramatic decline in the cost of computer hardware in LDCs as elsewhere including, among other devices, the One Laptop per Child initiative (Gurstein, 2007). To further bridge the gender digital gap; efforts have been concentrated on women-specific

initiatives that will lead to the empowerment of women. ITU, UNESCO and other development organizations have embarked on collection of gender disaggregated ICT data (Bisnath, 2004; UNESCO 2003, Women'snet, 2005) which will inform and direct policies for mainstreaming of ICT interventions.

3. A Case of Deprived Regions of Ghana

3.1 Profile of Study Areas

Ghana has ten administrative regions. Three out of the ten regions which are all from the northern part of the country have been categorized as the most deprived in all aspects of development most especially infrastructure though they are relatively endowed in natural resources. The population for the study was sampled from these regions.

3.1.1 Northern Region

The Northern Region is the largest of the 10 regions of the country in terms of landmass, occupying 70,384 square kilometers and accounting for 29.5 percent of the total land area of Ghana. The population of the region is 1,820,806, representing 9.6 percent of the country's population. Compared to the two other regions in northern Ghana, the Northern Region constitutes a significant and important constraint on the siting of feasible and sustainable community facilities such as schools, health infrastructure, potable water supply, and most importantly ICT infrastructure. Thus infrastructural development is relatively low compared to the entire country but higher compared to the two other northern regions. About 77 percent of households use the kerosene lamp as source of lighting, while 22 percent use electricity. The low coverage of electricity could influence access to internet facilities, television and radio and, therefore, access to information that may have direct impact on health, education, economic and other developmental activities.

There is a wide gap in educational attainment between the country as a whole and the region. The highest educational level attained by majority of the educated in the region, is the primary school, 43.6 percent of males and 53.5 percent of females. About 22 percent of the population 15 years and older are classified as literate. The proportion of the literate is 12 percent higher among males than females. With this low level of literacy, general interest in ICT protocols in the Region could be very low.

The level of education has affected the economic activities. Agriculture, hunting, and forestry are the main economic activities in the region. Together, they account for the employment of 71.2 percent of the economically active population, aged 15 years and older. Less than a tenth (7%) of the economically active people in the region are unemployed. Only 5.7 percent of the workforce is made up of professionals, administrative or clerical staff. The rest (23.1%) are in sales, services, and transport and production. Nearly 68 percent of the economically active population is classified as self-employed, while 22.9 percent are unpaid family workers with only about 6.1 percent being employees. The bulk, (83.4%) of the population is employed in the private informal sector. This shows that majority of the people operate in the informal sector which has a incidence of poverty (Ghana 2003).

Much as one may see the Northern region as relatively well endowed compared to the two other regions in the north, infrastructural development such as electricity, levels of education and lucrative jobs are not encouraging which could influence income levels, a substantial element of ICT use.

3.1.2 Upper East Region

The total land area is about 8,842 sq km, which translates into 2.7 percent of the total land area of the country. The population of the region is 920,089, which is less than one twentieth (4.9%) of the national population. The population is primarily rural (84.3%) and scattered in dispersed settlements. With only 15.7 percent of the population living in urban areas, the region is the least urbanized in the country. The majority of the people live in huts built of mud and roofed with straw or zinc. Only 21.2 percent of the population (15 years and older) are literate in either English only (12.9%), both English and Ghanaian language (6.6%) or Ghanaian language only (1.7%). The regional level of illiteracy (78.1%) is much higher than the

national average of 45.9 percent. This proportion is higher for females (76.4%) than for males (66.8%). The main occupations in the region are agriculture and related work (65.9%), production and transport equipment work (14.5%), sales work (9.5%) service work (3.9%), and professional, technical and related work 3.8 percent. The five together make up 97.6 percent of all occupations. The rank order of the five occupations is same for males and females.

In terms of electricity, about 13 towns are on the national grid. Fuel wood for cooking is scarce and the dried stem of sorghum and millet are mostly used as fuel for fire.

Postal services are available in large settlements. Telecommunication linkages are also available in some areas. Linkages of district capitals are poor and in some cases not operational. Private communications centers have sprung up. Teledensity (phones/per 100 populations is very low in the region (0.1) compared to the national density of 0.7).

The data indicate that the occupational structure of the region is thus not very diverse. Industrial activity in the region is generally low, with only one industry in operation. Economic and social activities of the region are not the type that attracts foreign labour, being almost entirely rural. Having a teledensity (phones/per 100 populations) as low as 0.1 in the region compared to the national density of 0.7 is not encouraging either. All these have implications for availability, knowledge and utilization of ICT facilities among males and females.

3.1.3. Upper West

The last of the three northern regions, Upper West Region covers a geographical area of approximately 18,478 square kilometers. This constitutes about 12.7 percent of the total land area of Ghana. The total population of the region is 576,583. This represents 3 percent of the national population. The sex composition of the districts favors females. In each district, females form a little over one-half of the population. The region has 17.5 percent of its total population living in urban localities and is second to the Upper East Region as the least urbanized. There are only six urban localities in the region, almost all located in the regional and district capitals.

In the region, 69.8 percent of the population, aged 6 years and older, has never attended school (65.1% males and 73.9% females). The rather large proportion of the educated population of the region attained only primary and Middle/JSS, as the highest level (68.9%). It is noted that at the tertiary level, the proportion of males (5.7%) is slightly higher than that of females (4.6%). Like the other regions, the major occupations in the region are agriculture and related work (72%), production and transport equipment work (12.1%), sales work (5.2%), service work (4.0%), and professional, technical and related work (4.0%). Unemployment is slightly higher for males than for females in the region. Infrastructure development in the region is nothing to write home about. With this kind of profile one will expect access to and utilization of ICT facilities in the region to be very challenging and minimal.

3.2. Survey

The study covered a total of 223 respondents from all the districts in the three regions. Out of the total 103 responses were obtained from the males and 120 from the females. The survey instrument covered 13 questions such as *do you know what ICT is, do you use the Internet, where do you access the Internet, how long on average do you stay on the Internet, how many times per week do you use the café, how much do you pay per hour, what do you use the Internet for, are you aware of search engines such as Google that you can use to access web sites, how often do you use the search engines per week, do you use search engines to access educational materials, are you aware that Internet can enhance your knowledge in any area of your choice, do you own a personal computer, would you like to own one, would you pay a flat fee of GH¢20-30 per month for Internet connection, would you want to have Internet connection in your School, Work or Home?*

In response to the question whether they knew what ICT is, 80.6 percent of the males as against 60 percent of the females indicated that they knew what ICT is. As to whether they use the Internet, 58.7 percent of the females

and 36.6 percent of the females responded in the affirmative. In finding out where they access the Internet, apart from the café where over 70% of both males and females access the Internet, not many of them indicated to use the home and the office. From the results, 22.2 percent of the women and 9.7 percent of the men indicated that they have access in their offices. Only 4.4 percent of the women and 1.6 percent of the men indicated that they have access in the home. Apart from the Internet café, the office appeared to be the next convenient place for the women to access the Internet which could be explored for widening access for them. Find the details in Tables 1, 2 and 3.

This was followed up with a question on how long on the average they stay on the Internet. Again there were gender variations in the response. A higher percentage of the females, 55.6 percent indicated that they stay on the Internet for up to 30 minutes as against 17.7 percent of the men. However the female percentage reduced as the time increased. For those who indicated to stay on the Internet for up to an hour and a half, the majority was men, 48.4 percent and only 26.7 percent were women. While 8.1 percent of the men indicated that they stay on the Internet for over two hours, none of the women did.

Sex		Do you know what ICT is?		Total
		Yes	No	
Male	Count	83	20	103
	% within Region	80.6%	19.4%	100.0%
Female	Count	72	48	120
	% within Region	60.0%	40.0%	100.0%

Table 1. Q1- Do you know what ICT is?

Sex		Do you use the Internet?		Total
		Yes	No	
Male	Count	61	43	104
	% within Region	58.7%	41.3%	100.0%
Female	Count	45	78	123
	% within Region	36.6%	63.4%	100.0%

Table 2. Q2- Do you use the Internet?

Sex		If yes,where do you access the Internet?				Total
		Home	Office	Internet Cafe	All of the above	
Male	Count	1	6	48	7	62
	% within Region	1.6%	9.7%	77.4%	11.3%	100.0%
Female	Count	2	10	32	1	45
	% within Region	4.4%	22.2%	71.1%	2.2%	100.0%

Table 3. Q3- If yes, where do you access the Internet?

Table 4 provides the details. One may conclude that unlike their male counterparts, the multiples role played by women work, home care, communal mobilization and other domestic roles affect the leisure time that they could find to stay on the Internet most especially when research has shown that Africans mostly use the computer and Internet as an entertainment tool than for development purposes (Abdulkafi, 2008). This implies that women will have to be supported or relieved of some of these multiple roles to enable them find time and space to engage in other empowering activities on the Internet.

Linking to this was the issue of the frequency of browsing per week as indicated in Table 5. Again the males had higher figures than females. From the results, 42.4 percent of the males and 30.2 percent of the females responded that they go on line once a week, 6.8 percent of the males and 4.7 percent of the females also indicated that they use the Internet more than thrice a week. This is not encouraging enough though one may take consolation from the fact that they operate in a very challenging environment.

The amount paid for the use of café also varied across gender. More women indicated to pay lower amount for the use of the café than men while more men indicated

Sex		If Yes, how long on average do you stay on the Internet?					Total
		Up to 30 min	31 to 59 min	1hrs - 1hrs 30 min	1hrs - 31min 2 hrs	Above 2 hrs	
Male	Count	11	10	30	6	5	62
	% within Region	17.7%	16.1%	48.4%	9.7%	8.1%	100.0%
Female	Count	25	6	12	2	0	45
	% within Region	55.6%	13.3%	26.7%	4.4%	.0%	100.0%

Table 4. Q4- If yes, how long on average do you stay on the Internet?

Sex		If Yes, How many times per week do you use the cafe?					Total
		Once	Twice	Thrice	More than Thrice	Occas ional	
Male	Count	25	15	14	4	1	59
	% within Region	42.4%	25.4%	23.7%	6.8%	1.7%	100.0%
Female	Count	13	19	8	2	1	43
	% within Region	30.2%	44.2%	18.6%	4.7%	2.3%	100.0%

Table 5. Q5- If yes, how many times per week do you use the cafe?

to pay higher amount for the use of the Internet than women. This implies that the higher the amount to be paid for the service the lower the female patronage and vice-versa. This signals the need to subsidize the fee for uses of Internet services to enable more women utilize the services. From the results 18.8 percent females and 8.9 percent males indicated to pay GH.0.50 and 28.1 percent of the females as against 12.5 percent of the men indicated that they pay GH1.00 for the use of the Internet per hour. As the amount increased to GH1.20, 1.8 percent of the men and none of the women indicated that they pay for the same service.

The study was interested in finding out what respondents use the Internet for. In Table 6, 54.8 percent of the females and 18 percent of the males indicated to use it for sending emails, 26.2 percent of the women and 11.5 percent of the males indicated that they use it to chat with friends while 42.6 percent of the males and 11.9 percent of the females responded that they use the Internet for sending emails, chatting with friends and other Internet-related activities. The results reveal that much as women dominate in the use of the Internet for monotonous activities such as sending of mails and chatting with friends, the men appeared to make multiple use of the Internet. A way to intervene is to introduce the women to other ways in which the Internet could be useful for their empowerment.

The low level of the women's knowledge of search engines such as Google confirmed that they don't' appear to be multiple users of the Internet. From Table 7, while 57.8 percent of the men indicated that they are aware of search engines such as Google, only 27.11 percent of the women responded in the affirmative. The low knowledge of the women reflected in the number of times they use the search engines per week. The results in Table 8 shows that 40.7 percent of the men and 33.3 percent of the women indicated to use the search engines once a week while 16.7 percent of the men and none of women indicated to use the search engine more than thrice a week. Though initial responses have revealed that the women's knowledge of the search engines were low, a high percentage knew that one could use the internet to access educational materials. From Table 9, 82.1 percent of the men and 80.6 percent of the women indicated their knowledge of the use of the Internet for accessing educational materials. Further to this 92.2 percent of the males and 77.2 percent of the females indicated that they were aware that ICT could enhance their knowledge in any area of their choice.

Ownership of personal computers was however very low among both male and female respondents though the men were relatively higher than the women. From the

Sex		What do you use the Internet for?				Total
		Send emails only	Chat with friends	Other	All of the above	
Male	Count	11	7	17	26	61
	% within Region	18.0%	11.5%	27.9%	42.6%	100.0%
Female	Count	23	11	3	5	42
	% within Region	54.8%	26.2%	7.1%	11.9%	100.0%

Table 6. Q6- What do you use the Internet for?

Sex		Are you aware of search engines such as Google that you can use to access web sites?		Total
		Yes	No	
Male	Count	59	43	102
	% within Region	57.8%	42.2%	100.0%
Female	Count	32	86	118
	% within Region	27.1%	72.9%	100.0%

Table 7. Q7- Are you aware of search engines such as Google that you can use to access web sites?

Sex		If yes, How often do you use the search engines per week?					Total
		Once	Twice	Thrice	More than Thrice	Occasional	
Male	Count	22	16	7	9	0	54
	% within Region	40.7%	29.6%	13.0%	16.7%	.0%	100.0%
Female	Count	10	15	3	2	0	30
	% within Region	33.3%	50.0%	10.0%	6.7%	.0%	100.0%

Table 8. Q8- If yes, how often do you use the search engines per week?

Sex		If yes, do you us search engines to access educational materials		Total
		Yes	No	
Male	Count	46	10	56
	% within Region	82.1%	17.9%	100.0%
Female	Count	25	6	31
	% within Region	80.6%	19.4%	100.0%

Table 9. Q9- If yes, do you us search engines to access educational materials

results in Table 10, only 22.1 percent of the men and 16 percent of the women indicated that they owned personal computers. This might not be that surprising considering the limited infrastructural development in the regions. Interestingly the desire to own personal computers was high among both the male and female respondents. From Table 11, 100 percent of the male respondents and 97 percent of the females indicated that they would like to own a personal computer. So though relatively poor, the little exposure of the respondents from the deprived regions of the country had informed their desire for personal computers, a resource that if fully utilized could possibly kick them out of poverty. In the same taste, a high percentage of both the male (98%) and female (94.1%) respondents indicated

Sex		Do you own a personal computer?		Total
		Yes	No	
Male	Count	23	81	104
	% within Region	22.1%	77.9%	100.0%
Female	Count	19	100	119
	% within Region	16.0%	84.0%	100.0%

Table 10. Q10 - Do you own a personal computer?

Sex		If no, would you like to own one?		Total
	Count	78	0	78
Male	% within Region	100.0%	.0%	100.0%
	Count	96	3	99
Female	% within Region	97.0%	3.0%	100.0%

Table 11. Q11- If no, would you like to own one?

Sex		Would you want to have Internet connection at you School, Work or Home?		Total
		Yes	No	
Male	Count	99	2	101
	% within Region	98.0%	2.0%	100.0%
Female	Count	112	7	119
	% within Region	94.1%	5.9%	100.0%

Table 12. Q12- Would you want to have Internet connection at you School, Work or Home?

Sex		If yes, Would you pay a flat fee of GH ¢20-30 per Month for Internet connection?		Total
		Yes	No	
Male	Count	65	33	98
	% within Region	66.3%	33.7%	100.0%
Female	Count	77	39	116
	% within Region	66.4%	33.6%	100.0%

Table 13. Q13- If yes, would you pay a flat fee of GH ¢20-30 per month for Internet connection?

that they would want to have internet connection in their school, work place and home. On top of this 66.4 percent of the females and 66.3 percent of the males responded that they will be willing to pay a flat fee of GH 20-30 per month for the Internet connectivity. Find details in Tables 12 and 13.

One may conclude that though they find themselves in a relatively underserved part of the country, both the male and female respondents had been exposed to the potential of ICT and its related Internet services and were utilizing it as well. Though women did not appear to be multiple users of the Internet, they showed some high level of interest in the utilization of the Internet. However probably as an influence of their multiple roles in society which is to the extreme in that part of the country, compared to their male counterparts, they could not spend much time on the Internet. The majority could not go beyond 30 minutes. As a reflection of their desire to use the resources of the Internet to empower themselves a high percentage of both the male and female respondents expressed the willingness to own personal computers and pay a flat fee of GH 20 -30 per month for Internet services. A possible intervention for improving women's condition is to support them to find the time and space to access educational information. The office was found to be a place that a high percentage of the women could browse the Internet probably because they could find the time and also use it for free. How then could development practitioners regularize this so that there could be workplace connectivity and educational programs for women to make some time on regular basis to equip themselves. Considering the relative high exposure of the men to the Internet resources, workplace peer support/education among the males and females could be encouraged so that women could become multiple users of the Internet most importantly for productive purposes.

Conclusion

This paper has explored the possibility of using ICT to promote education and sustainable development among the underserved. In the process literature has been reviewed to check the possibilities and the

challenges in using ICT for education and sustainable development. Much as there are challenges with infrastructural development, literacy and financing, the rapid growth of innovative technologies like mobile telephony supported with solar powered systems creates opportunities. Cases from various countries in Africa and the results from users in the deprived regions of Ghana have demonstrated the possibility of promoting ICT use in underserved areas among both males and females. The office was found to be a suitable place for females to access the Internet which gives an indication that given a convenient place, women will be willing to utilize the Internet and other ICT protocols for educational and other developmental purposes. Much as the developing world is more of consumers than producers the findings help to clear the perception that ICTs for development strategies are basically useful for middle income and developed countries (World Bank n.d; Birch & Sankey, 2007; Abdon, Raab & Ninomiya, 2008).

One may not have to worry so much about the cost of technology and other limitations, the most important step is to provide the ICT systems and provide access that meets the education and production needs of the people. Once this is done, people who have the means will find a way of utilizing these opportunities. The benefits of it will definitely trickle down to even those who cannot have direct access or might initially be restricted by illiteracy or poverty. The communal living, sense of responsibility to aged relatives and other forms of communal values in the African society will commit the *haves* to support the *have nots*.

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