There Is More To Bridging Digital Divide Than Physical Access To Icts: Advocacy For Botswana

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Abstract: Information Communication Technology (ICT) is one of the driving forces of globalization and provides developing countries with opportunities for development. Great efforts have been given by each government of a developing nation to provide physical access to ICTs in a bid to bridge the gap between the digitally excluded and the digitally included, however this paper argues that digital divide will continue to widen as long as governments of developing countries do not look beyond physical access to ICTs. This study argues that any discussion of the phenomenon of the digital divide must look beyond equitable physical access and take into consideration issues to do with content and capacity, capacity-building, infrastructural development and appropriation of ICT. The research has been done by disseminating questionnaires to Computing and Information systems students at Botswana Accountancy College(BAC) on access to ICTs in their previous schools. The results suggested a huge variation regarding how various schools utilize their ICT infrastructure. The private schools seem to be better in availing opportunities for ICT reach by all students, while certain levels are more preferred than others in public schools. Thus there exist some yawning gaps between the digitally included and the digitally excluded.

Key Words: ICTs, Digital divide, Digital inclusion, digital exclusion, ICT4D

1. Introduction

It is beyond argument to ascertain that the deployment of, and emanating proficient use of ICTs is one of the driving forces of globalization. According to *International ICT Literacy Panel* [1] , ICT is an umbrella term that includes any communication device or applications, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems among others, as well as the various services and applications associated with them, such as videoconferencing and distance learning. C/ESCAP/CMG [10] puts forward that ICT permeates the business environment, underpins the success of modern corporations, and provides governments with an efficient infrastructure. At the same time, ICT adds value to the processes of learning, and in the organization and management of learning institutions. ICT plays a pivotal role in the information age we live in today for it supports the collection of data, aids in data processing, sharing, preservation, transmission and interpretation making digital literacy to become integrated into all aspects of our daily lives.

ICT levels vary from society to society, from country to country, from region to region and [12] has identified four indicators which can be used, and these are

i) ICT infrastructure and access
ii) access to, and use of ICT by households and individuals,
iii) use of ICT by businesses and
iv) ICT sector and trade in ICT goods, as the major ICT indicators.

Whilst proper use of ICTs can provide opportunity for development, there are inequalities between countries and between communities within a country in the access to and utilization of ICTs. For example in Botswana, ICT access is different between public and private schools, between urban and rural schools, between the digitally literate and the digitally illiterate and so on, creating what is commonly referred to as the digital divide. Kuriyan et al[10] define digital divide as the disparity between the “technology-rich” and “technology-poor”, or “have-nots”. Digital divide means certain parts of the population have substantially better opportunities to benefit from the digital age than other parts of the population. Digital divide according to Foley [2] in agreement with [1],[4],[8] can be based on access , use, level of ICT advancement, internet connectivity .To bridge this “digital divide” and participate fully in the knowledge economy [1] advocates that developing countries should create an enabling environment through introducing appropriate policies, capacity-building and infrastructure development.

2. Digital Divide

Efforts have been expended by various authors in trying to address the issue of the digital divide, ranging from the divide across the developed and developing countries, the divide comparing SMEs and large corporations, divide from the perspective of the different states of libraries and the skill sets of librarians manning those libraries. As endorsed in the work of Selwyn [18], digital divide can no longer be viewed or defined in the context of physical access only but entails other factors such as literacy of use among others. The author suggest that the division should rather be ”hierarchical” rather than “dichotomous”, meaning to say a person may have physical access to a computer yet they don’t have the skills to use it. In agreement with Selwyn, [16] states that there is a new concept among researchers on digital divide, called second-level divide, which focuses on the internet and usage, implying that digital divide has long moved from being solely an issue of physical access. A comparative study was conducted by Arendt [19] in which data was collected using face-to-face interviews with SMEs' owner-managers and employees from Spain, Portugal, and USA. Results from the different countries validated the author's earlier claim that the main barrier preventing better utilisation of ICTs and e-business and hence SME digital exclusion is not as much the lack of access to information technology but the lack of proper knowledge, education and skilled labour within the enterprises. The author further infers that there is need to shift focus from the concept of material access to supporting skills access and usage access. It is therefore necessary to develop solutions that will enable skills development for owner managers and employees of SMEs. There is a sharp contrast between [19] study and the situation that obtains in Sub-Saharan African countries. Whilst in developed countries material access is no longer an issue, more basic needs still need to be provided in Sub-Saharan African countries. In his largely

survey based paper, Mutula [20] mentions certain attributes of sub-Saharan Africa that make the region peculiar and thus making it imperative for a whole range of customised remedies to address the digital divide. Among other peculiarities that he cites, sub-Saharan Africa presents a whole plethora of complex linguistic challenges by virtue of its diverse cultural groups and values. Besides, no policies have been put in place to promote information flow through community radios, with the governments largely controlling the mass media; knowledge is not adequately shared among the predominantly oral cultural practices. This region has more pressing basic needs, access to basic education, water and power supply, food security than access to ICTs and therefore if any initiatives are to be accepted and adopted with effectiveness, they ought to be integrated into the cultural setting of African communities. Mutula [20] advocates for the partnership between libraries and government in the e-government initiatives, with the libraries making huge contributions to accessibility, affordability and provision of appropriate citizen content. He cites that libraries have well trained information professionals and ICT literate staff and besides they could leverage on the largely donor funded library automation initiatives to easily disseminate content to the population, in a bid to narrow the gap between those who have and those who do not have access to ICTs. Seyed [22] puts the librarians and information professionals at the center of efforts to bridge the digital divide through the acquisition of 4 key skills and knowledge areas namely:

i) The appreciation of research methods to assist them to understand the information user
ii) The appreciation of information resources so they will be able to identify , evaluate and select appropriate information resources
iii) Value added skills like design and development of virtual libraries, user interfaces, e-content.
iv) Understanding of ICT hardware, telecommunications, network and storage technologies, operating systems and the various ICT technologies necessary to support Information acquisition, storage and dissemination.

Gyamfi [15] focusing on Sub-Saharan Africa and in agreement with [21], advocates that the governments should engage in committed strategies to support and compliment physical access. The author proposes the creation of tailor made local content in local languages customized to meet the varied needs of local users. Also due to socio-cultural issues, children may be restricted to use the internet or might be given less hours of access. Interesting results from the study of Broos & Roe [14] exhibited that boys play computer games and use the computer and the internet more than girls. Eventually boys would become more proficient with computers as compared to their gender counterparts. Noted by the same researcher[14] are gender-psychological issues as well. Results suggest that boys are more positive in attitude, about computer use and tend to be less anxious as compared to girls. This observation suggests that gender is another factor to the digital divide issue, hence it should be considered when trying to address the digital divide. Another interesting study was done by Potosky & Bobko [17] where they investigated the influence of a psychological dimension called locus of control on attitudes towards computers. In psychology it is believed that people with an internal locus of control have personal responsibility and they perceive that they control the outcomes of their life and future. On the other hand people who have more of an external locus of control perceive their fate to be out of their control. The results of the study yielded that people with an internal locus of control demonstrate a positive attitude towards ICTs hence they embrace and learn technology. On the other hand, those with a predominantly external locus of control tend to lack the positivity and confidence to embrace new technology. While physical access is the ancient culprit of digital divide, it is clear in [14],[15],[17],[20], that socio-cultural issues, literacy levels, gender, place or region, psychology among others also contribute to digital divide on ICT utilization.

3. Methodology

The questionnaire was administered to Botswana Accountancy College (BAC) Computing and Information Systems students in levels one through three of their studies .BAC is a tertiary education institution offering degrees in the Computing, Accounting and Business fields in Botswana, Africa. The aim was to find out how much ICTs access provision has been done by the government to their former secondary schools. Questions were grouped into three categories namely: About the school information, ICT Education in Schools and National Project Involvement by the government. 250 questionnaires were distributed to students and the response rate was 80%. 200 questionnaires were equally disseminated to year ones and year twos and the rest to third years. The highest response came from the first years who completed the questionnaire during a class session and in the researcher's presence. Only 10 questionnaires were not returned. With the other classes distribution was just random and a lot were not responded to as can be seen from the response table below.

Table 1: Showing response rate

	administered	Returned	Response rate
Year 1	100	90	90%
Year 2	100	77	77%
Year 3	50	34	68%
Totals	250	201	80.4%

The researcher also consulted Botswana Export Development and Investment Authority (BEDIA) for more information regarding the current e-readiness position (ranking) of Botswana on the overall index and in the sub-Sahara region. The analysis was based on gauging what is provided for and how various schools are putting the infrastructure to use.

4. Findings

Of the 201 responses, 73 of the students went to private schools from form 1 (students in the first level of secondary education) through to Form 6 (last level of secondary education) while the remaining went to public schools. Private schools extended computing lessons to forms one

through to six as can be seen in Table 2. This is not the case with many public schools were predominantly pupils in forms 4 and 5 were doing computers. This actually presents a gap of three years of exposure between the private and public schools students. Another point to note is that students at private schools did the Cambridge syllabus in addition to the local syllabus. The Cambridge syllabus is designed for the developed world; as such computer literacy is a learning outcome right from the first form in total contrast with the local curriculum administered to public schools. A summary of computing education access per form is shown on the table 2 and illustrated on Figure 1.

Table 2: Showing the numbers of respondents who did computing during their secondary school education per form.

	Form					
	1	2	3	4	5	6
Access to computing	70	70	73	180	180	77

It is clear that computer literacy is low at lower levels in secondary schools sitting at 36%, thanks to the effort by private players participating in offering secondary education to Batswana.

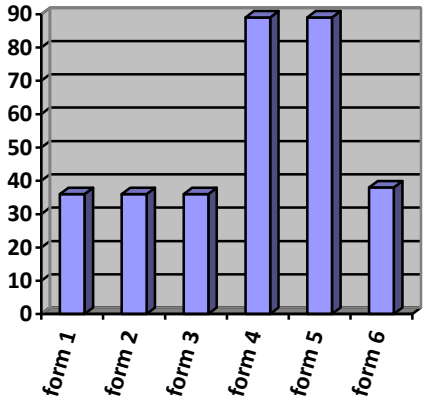


Figure 1 Showing Percentage access to computing lessons per form.

The digital divide in computer literacy is narrowed more at forms 4 and 5, but there is still a lot of catch up to match those who would have done it from the lower forms as highlighted in Figure 1 above.

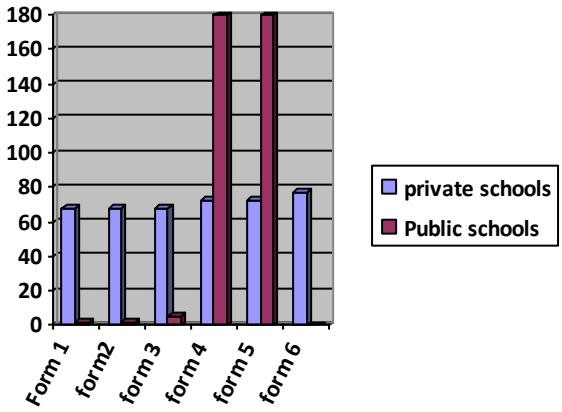
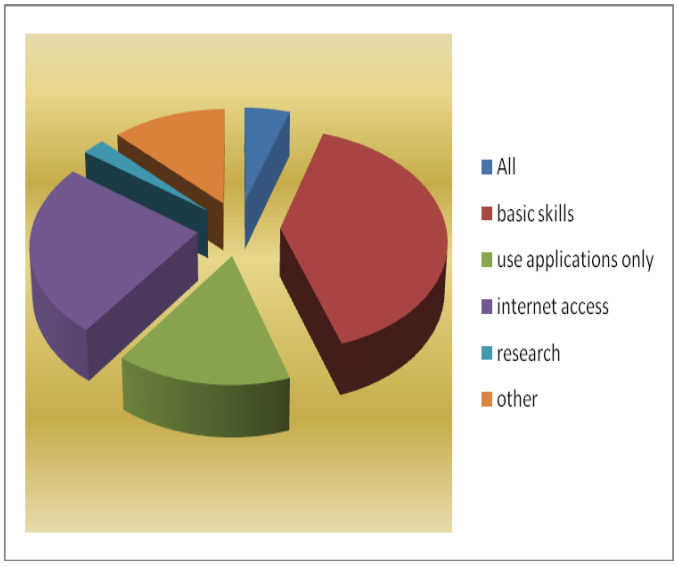


Figure 2: Comparison between private and public schools to computing access.

From Figure 2, it is clear private schools have a constant approach to offering computing lessons throughout the forms 1 to 6, whereas greater participation in bridging the "digital divide" gap is seen at upper levels in public schools. Currently schools have come up with a host of activities that can be ICT supported. For example computers in schools are used to a lesser extent for researches. They are also used to accomplish basic skills and for connecting and browsing to the Internet as well as being utilized for the teaching and learning of computer applications. The survey reveals that there is no balancing of computer usage in relation to these identified activities. The following pie-chart shows what computers are used for in schools:



According to the survey basic skills only involved keyboard skills and mouse operation and simple computer operations including switching on and off. As can be seen from the diagram about 15% of the respondents would work on applications only for their curriculum. These included word processing, spreadsheet, powerpoint and drawing tools. It is good to note that internet access was evident to about a quarter of the respondents. Only 5% of the students said they were doing a wide range of computing aspects including doing algorithms and computer programming.

Mainly these were students studying computer studies with Cambridge University curriculum. Another revelation was the fact that these schools lack on the number of teachers who are qualified to teach ICT skills. The study, however showed that at least there is one computer literate teacher at each school. In fact most respondents said the syllabus studied was designed by a team of teachers with some know-how on the use of computers, otherwise few indicated they either pursued a National government syllabus or the syllabus developed by the Board of Education. Asked on whether they know about e-learning in schools, all respondents gave a flat NO answer. All respondents also concurred on that there is digital divide within schools themselves with many students having to wait to get exposed to computers when they are chosen to study it at say form 4 and above. Their comments ranged from schools having old computers, not having enough time to do computing in schools to not having enough resources for all in these schools. Table 3 below shows the times (Minutes) student indicated as time allocated computer lessons per week.

Table 3: Time allocated for computer lessons

Time (min)	60	120	180	240
No. of Students	56	92	40	13

From the table we note that there is generally no serious time allocation for computing in the schools, perhaps this is evidence that there is no enforcement on the part of the school authority or lack of the government ICT policy implementation. As indicated by the majority of the respondents, 120 minutes per week remains far short to really nurture the computing culture and let alone mastering the several computing skills. Only 13 students had a privilege of studying computers for 4 hours. This study whilst it is not conclusive in itself, there are lessons to draw from it. This is just a microcosm of the bigger problem out there. The national agenda therefore must look beyond just supplying schools with computers. Considering the March 2009 fiscal budget, Botswana has had sterling efforts in bringing opportunities to Batswana through the support of ICT related initiatives. For example it was noted that, “Out of the P743 696 069 allocated for development projects in the Ministry of Communication, Science and Technology, the ICT Hub project has been allocated P360 Million—50% of ministry budget. ICT hub is a government arm mandated to drive ICT projects and innovation. To date 228 junior secondary schools out of 235 have been connected to the Internet” [Minister of technology quoted in Mmegi 13/03/2009] Furthermore, BEDIA an autonomous public sector organisation responsible for supporting business initiatives carried out a study of the level of provisioning of ICT infrastructure by the government and as far back as 2007, the following came out (see table below).

Table 4 Showing Government’s Effort in providing ICT.

Indicator	**1995**	**1998**	**2002**	**2003**	**Mid 2004**
Main Lines in operation	59673	102016	142362	131774	136000
Cellphone subscribers	n/a	151190	415000	470000	528000
International internet bandwidth	n/a	n/a	14Mbps	26Mps	30Mbps
Public payphone	636	2449	1142	-	_
Number of personal computers	15000	40000	65000	70000	72000
Internet users	1000	10000	15000	20000	22000

[Source: http://www.bedia.bw/news, 2007]

Botswana has made significant strides in the provision of ICT as can be seen from the indicators in Table 3, however it’s still to be seen if the citizens are fully utilizing the ICT infrastructure. Public payphone numbers have gone down mainly because of the growth in the mobile communication industry. Botswana progressed one rank to come out 77th in the overall index and third in Sub-Saharan Africa. Major improvement over last year was posted in the environment component due to progress in the infrastructure pillar. But, relatively the low levels of usage by individuals and businesses, linked to poor individual and business readiness remained as areas of weakness [13]. A closer look at any of these developments shows that Botswana is doing everything to make things in ICT e-readiness well. The question of equitable physical access has been richly considered in Botswana. However we witness that the problems are around individual or organisational uptake. This is where all arsenals must be targeted at now.

5. Recommendations

The organisation BRIDGES [7], argues that ICT needs to be affordable; people must understand how to put it to use and not be discouraged from using it; and the local economy must be able to sustain its use. All of these factors combine to form, what is called at BRIDGES, ‘real access’. It moves beyond ‘physical access’ and creates opportunities for people to use technology effectively to improve their lives [7]. Now to achieve this real access there need to make a quick survey of why most of the times this remains a dream for many governments. Most of the cases we have inadequate infrastructure preparation. The schools for instance may have been built with the intention of accommodating technology facilities. So there is a challenge on the lighting, flooring, room size and ventilation. This makes the environment less conducive. School and local communities may not be involved. This can result in lack of cooperation, commitment and accountability from all stakeholders. Using inappropriate technology is another cause for failure or lack of proper ICT integration into our traditional systems. Old, used or refurbished computers and

computers without sufficient capacity are common features in failed ICT projects. Such computers have proved unreliable for curriculum delivery. Another cause for bad performance of ICT project is lack of project management experience. Many professional educators do not have project management skills or experience needed to sustain an ICT project. In the light of all these factors the research therefore recommends that:

i) The curriculum needs revision to incorporate ICT education as a learning outcome at secondary education level.
ii) Government should invest in training of the ICT educators for sustainability purposes.
iii) there is need to employ professional project managers to incubate the project till it is able to be self-sustaining.
iv) There must be standardized, individualized project plans. The project plan must be standardized but with the flexibility to allow for individualized plans written for each school or ICT Centre.
v) Implementation must be phased and to allow a review and revision of the plan
vi) Develop project plans in consultation with schools and all other stakeholders.
vii) Decisions should be based on well considered plans and projects should be evaluated as part of an overall project portfolio.

These approaches may go a long way towards decentralization of ICT services even to the deprived. If all concerned parties are mindful of these steps, our country will be on the right path to having an educated and informed nation through using ICTs as an enabler. The government or the ICT service provider must look beyond mere physical access and provisioning of ICT resources.

6. Conclusion

ICT for development policies might lack coherence if they only focus on the early parts of the value chain such as looking at foundations, that is, at issues of readiness and availability alone. Government should not just lay down the railway tracks and buy the trains but also ensure that someone uses them, and that the railway helps national development [23]. To bridge the digital divide, we have to think in terms of 'socially responsible connectivity' which allows citizens to use ICT as tools for development purposes that not only strengthen their ability to work, but also help them solve their most critical needs, enable the realisation of their full human potential and lay the foundation for the consolidation of democracy and prosperity. The digital divide gap can be narrowed by formulating policies that are geared to empower the generality of the population. School situation indicated in the study are just a glimpse into the real issues that deter the majority from benefiting from the ICT infrastructure provided to them. The study revealed that there is not proper use of ICT resources available and not every child in school, for instance, has access to the ICT infrastructure. There are new forms of divide: the usability and empowerment divides which the government or policy makers must strategically plan to combat.

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