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The Internet has become increasingly an important source of information for pupils in learning, entertainment, sharing and exchanging experiences with other peers, meeting with adults and learning about other cultures. The Internet is a major force in the lives of school children and is no doubt having a tremendous influence on their reading habits and information seeking behaviour. With increased Internet connectivity however, concerns are being raised about the widening imbalances of access to ICTs between north information haves and the information have nots countries. This imbalance known as the digital divide has implications in terms of equity access to quality education in an electronic age. In Africa there are limited programmes that address in particular how schools can be equipped to benefit from the digital age and at the same time be used as an important instrument to bridge the digital divide. The concept digital divide was coined to describe the imbalance in access to information and communication technologies by different communities of people between different countries of the world. This phenomenon is today known to exist within individual countries, cities and even communities. Today schools are being seen as one of the most salient infrastructure that can be used to bridge the digital divide in our midst. This paper looks at developments in Africa aimed at bridging the digital divide through schools.

Introduction

The reality and magnitude of digital divide can be appreciated when one considers the fact that two billion people of the world's estimated population of 6 billion have never made a phone call. In addition, seventy percent of the world's poor live in rural or remote areas where access to information and communication technologies including telephone is luxury (DOT Force, 2001). In The United States, The Jupiter Communications 1997 Online Kids Report estimates that there were about 10 million children (ages 2-17) who regularly used the Internet and the World Wide Web. Of this 10 million, about 6 million logged on from home, and about 4 million used the Internet at school. Over 6 million of these children accessed the Internet at least once a week. Additionally, in 1995, there were 18 million public school students (around 40 percent) attending schools with Internet access. At the end of 1998, it was predicted that approximately 35 million students (ages 5-17) in the U.S. would have school Internet access. By the end of the year 2000, that number was expected to rise to more than 43 million, or 90 percent, of public school students (Jupiter Communications', 1997 Online). Comparatively, in Africa, though the number of children on the Web is not currently available, it is none the less quite small if not negligible going by proportion of Africa's online presence, which stands at 0.04 percent of the global presence. The digital divide is therefore real and is exacerbated by among other factors; income level, employment inequity, infrastructure development disparities, racial discrimination, social status, gender inequalities, lack of access to information, geographic location, and political influence.

Today, there is emerging consensus about the need to bridge the digital divide in order to reap the benefits that come with digital connectivity. Several governments individually or collectively around the world are striving to bridge the digital divide by attempting to propel their countries towards an information society. Such society would cater for all including children by providing them with information in many formats, and exposing them to the different technologies used for collecting, manipulating and disseminating the information (Martin, 1995). In an information society, students in remote areas would be availed opportunities to enjoy access to resources in major metropolitan areas.

Similarly, students would experience hands-on learning by sharing information and participating in projects with their peers, as well as experts, all over the country and the world.

Schools are at a vantage position for realising an information society to help children learn the digital literacy that they need to navigate in the information age by facilitating access and teaching of computer skills. In addition, school children as well as adults can gain access to shared computers and Internet resources through libraries and community centres. During 1997 in the United States of America, Tomas Rivera Policy Institute (2002) recommended three learning environments that can enhance digital literacy and help bridge digital divide namely: public schools, libraries, and community centers. It is therefore important to enable every student to gain access to instructional resources including technology and support services in order to enhance academic excellence. Students who do not have access to computers and the Internet (among other technologies) are likely to get further behind their peers who do have such access. Such deprived students would miss the instant links to information, entertainment, and communication. Such students would also potentially miss out on the 70 percent of jobs that require moderate or high amounts of computer knowledge, all of which pay well (Linn, 1999). They probably would end up in that 10 percent of low-paying jobs that do not require technical expertise.

Causes of Digital Divide

The revolution in technology especially the growth of the Internet and the World Wide Web has been documented to increase the digital divide. In fact experts do not refer to it as a divide any longer but as a digital gap because what was perceived as a divide keeps on widening. A recent report by the National Telecommunications Information Administration, NTIA (1999) of the Department of Commerce in the United States revealed that in 1997 and 1998 the disparity in Internet access at home between those at the highest and lowest education levels increased by 25 percent. Further the gap was found to have increased to 29 percent when highest and lowest income households were compared.

There are several causes of digital divide that have been documented. In the past the language factor had long been ignored in the digital equation between countries but is now being seen as a major contributory agent of the digital divide. A study by the Tomás Rivera Policy Institute (2002) in the United States established that people with lower educational levels and limited English speaking skills, lag behind their English speaking counterparts in access to computers and the Internet. It is estimated that English in computer-based communication currently stand at a high of 80 percent (Warschauer, 2001). Languages that are not Roman alphabet based, the prevalence of ASCII (American Standard Code for Information Interchange) makes computing in other alphabets or character sets inconvenient or impossible. Within sub Saharan Africa, a large proportion of indigenous people can neither read nor write in English language and as potential users of computers they get increasingly marginalized. Similarly interconnectedness occasioned by the Internet has increased globalisation and opened up local markets for competition. On a large extent privatisation is being implemented in many countries in the region and whenever state corporations get privatised, often this is followed by redundancies rendering some people jobless. Such people often are economically dis-empowered in terms of gaining access to information resources including computer and telecommunication services. In addition Sub-Saharan Africa suffers from various shortages of resources such as lack of qualified or properly trained staff and technological limitations. The lack of basic assets such as PCs, partial Internet access, inadequate telephone lines, limited economic resources, inadequacies in education exacerbate the digital gap. This situation is worsened by high cost of access, inappropriate or weak policy regimes, inefficiencies in the provision of telecommunication networks and services, and lack of locally created content (Acacia, 1997: <http://www.idrc.ca/acacia/outputs/op-eval3.htm>; *DigitalDividends*, 2001; <http://www.digitaldividend.org/>).

In most Africa African countries, the cost of access is prohibitive. In Botswana, a country considered to have some of the lowest access charges in Africa, on average, an initial application fee of about BWP100 (about USD 20) is charged for private dial-up connection with full Internet and e-mail connectivity. Thereafter, the customer pays a monthly subscription of BWP75-100 (about USD 15-20) per month. The initial application fee for dedicated leased line is about BWP250 (USD 50), with a monthly subscription charge of about BWP1, 750(USD 350). For corporate users, the cost of connecting to the Botswana Telecommunications Corporation is BWP3, 500 (USD 700), and a monthly rental of BWP10, 000 (USD 2,000) for a 64KB data line (Eyitayo and Molefe, 1999: <http://www.balancingact-africa.com/news/back/balancing-act30.html>).

Comparatively, in Nigeria, in 1998 the cost of an international leased line was USD130, 000 and the available lines suffered slow speed. Today, most people in Nigeria largely use email because they require less sophisticated infrastructure and are cheap.

The digital divide is also promoted by lack of policies to address the needs of the disadvantaged people in society such as women, children as well as the disabled with visual impairments and hearing problems. In Kenya for example, the ratio of men to women using IT according to recent estimates stands at 70 and 30 per cent respectively. This disparity is partly attributed to perception in the country that IT is a technical subject suitable for men with many females shying away from it. Generally in Africa, women constitute large proportion of the population but their representation in universities both as students, lecturers and administrators is lower than that of men. This has resulted in shortage of women in politics, professional decision-making organs (Kariuki, and Siringi, 2001). Additionally, IT has not effectively been integrated in the development agenda of most African countries. Most governments in Africa are still reluctant to free their telecommunication services to encourage competition and facilitate rollout of the infrastructure to rural areas. Within the Africa continent, only one in every 100 Africans have access to a PC and less than 1 percent of the 750 million people has actually gone online (DPEPA, 2002). Additionally Africa suffers from lack of connectivity to the web, inferior technology, limited e-mail capacity, and limited e-government initiatives.

For a long time, Sub-Saharan Africa has continued to suffer from problem of brain drain of high calibre skills. In Botswana for example, there was an exodus of over 1000 nurses during 2001 to various parts of the world especially to Europe. This occurrence forced some aspects of health care system to be halted in the major hospital of the country. Similarly, in South Africa, a significant number of medics and other skilled personnel have been reported leaving the country in search of decent life overseas especially in Australia, New Zealand, Britain, the United States and Canada. A recent a study by the South African Medical Association showed that a quarter of all South African doctors who graduated between 1990 and 1997 were working abroad. This leaves the country of about 43 million people with about 26,000 practising doctors (Bearzi, 2001). Similarly SADC region was estimated in 2000, to have lost 10,000 teachers to Europe, Australia, Canada or the United States (IRIN, 2001).

Sub-Saharan Africa is estimated to have between 11-13 percent of the world's population, yet the region is reported to surprisingly receive a mere 1 percent of global expenditure on education. Comparatively, the developed world where 21 percent of the world's population live is estimated to receive 84 percent (Johnson, 2001). Additionally, Forty million children of school going age in Sub-Saharan Africa are estimated not to be attending school. Less than one third progress to secondary education and only 3 percent receive any form of tertiary education. In comparison the 15-17 year old in the developed world nearly all are estimated to receive secondary education and more than 50 percent tertiary education. A child in Sub-Saharan Africa has on average USD 49 spent on his education as compared to USD 4636 on average for the a child in the West in a year (Johnson, 2001).

Many countries in Sub-Saharan Africa still suffer from the problems of poor infrastructure, poor planning and mismanagement of resources, high tariffs, and limited access to ICTs in rural areas. Most of infrastructure development is concentrated in urban centres especially capital cities. Access to telephones is still very scarce - with only about 14 million fixed telephone lines installed – fewer than the number of phones in Manhattan or Tokyo. In 1995 ownership of computers was 0.31 per a hundred people (Jensen, 1999). Some countries have well developed infrastructure while others have rudimentary infrastructures. In addition, there is large disparity in telematics in Africa. For example of the 4.5 million estimated Internet users in Africa about 2.5 million are in South Africa with another 1 million taken up by Egypt. Further in 2000, African-produced content accounted for less than 0.05 percent of global Web content and today, African online services amount to about 0.04 percent of the world services. If South Africa is excluded, the web content contribution of the rest of Africa reduces to an appalling 0.02 percent (Taylor, 2002). Adam and Wood (1999) in their research on the impact of ICT in Sub-Saharan Africa established among other things under utilization of existing technology, inappropriate education, lack of awareness, lack of academically qualified managers, undeveloped legal framework for information sharing, infrastructure problems, poor connection to global network, maintenance problems, weak research and development, high taxes, over dependency on donors and poor access to credit.

Universal access to education has been elusive to many countries of Sub-Saharan Africa. In South Africa for example schooling is compulsory for ages 7-15, but while about 1.3 million enter the gates of school in grade one every year, 570,000 make it to grade 12. South Africa in addition has about 12 million learners, 8 million in primary and 4 in secondary schools. At universities 1 in 3 drop out. The other problem is lack of accessibility to school by disabled children. It is estimated that 280,000 disabled school going children in South Africa are not going to school for various reasons including lack of transport and insufficient schools which are estimated at 380 in number (Ludski, 2001). Similarly, within the universities in the region, there is low research capacity and information technology is not widely embraced. Though the rate of scientific publications has grown phenomenally in the past two decades globally, a recent ranking of the publications per capita did not include single country in Africa among the top 15. Additionally, universities are generally poorly funded and are constrained by lack of access to ICT due to various problems such as lack of tax concessions (Kariuki, and Siringi, 2001).

Africa has limited local content that is appropriate to the demands of the diverse interests. Within school curricular little content is provided that encourage learning and use of ICTs. In addition, Africa has generally a problem of insufficient reading materials and this hampers effective learning. According to (Warschauer, 2001) literacy development, the ability to read and write, is correlated to the presence of books in children's homes and to the presence of readers in their lives. The problem of undeveloped children book infrastructure is exacerbated by the fact that though the Internet has increasingly become a source of children information resource, it is not widely used in schools in Africa. A look at the Web reveals great amount of children literature, but by and large this has focus on American and European audience. Yahoo Search engine for example offers a great Children's Authors page with links to pages about the authors of children's books. Similarly, the International Association of School Librarianship, IASL (2002: <http://www.iasl-slo.org/chlitres.html>) maintains lists of several children resources on the Net giving their URLs. However, these resources are largely produced in the United States and Europe and have orientation to serve these regions.

These problems that exacerbate digital divide in the wider society are reflected in schools in various manifestations such as lack of computers in the classroom, lack of Internet access; insufficient or lack of training for teachers, limited bandwidth, misalignment of technologies with the curriculum, and inappropriate software that meet student needs. (Trotter, 1999).

Bridging the digital divide in Africa: Current developments

Worldwide, there are various initiatives at national, regional and international levels aimed at addressing the digital divide phenomena. In Botswana for example the national development strategy known as Vision 2016 is the blue print for propelling the country towards an information society by 2016. It has several themes among them 'educated and informed nation'. The sub theme espouses the following principles that by the year 2016, Botswana will have entered an information age on equal footing with other nations; sought and acquired the best available information technology; become a regional leader in the production and dissemination of information; and developed its own capacity particularly in the electronic media, radio and television. In addition, all schools will have access to computer and computer-based communications such as Internet (Presidential Task Group, 1997).

Further, the government of Botswana is involved in equipping all Community Junior Secondary and Senior Secondary Schools with computers (Republic of Botswana, 2002). UNICEF on the other hand is in the process of establishing information resource centres in schools across the country and equipping them with computers. Similarly, Botswana Technology Centre (BOTEK) is carrying out a pilot project at three centres [Gumare-Northwest district, Hukunsi-Kgalagadi district and Letlhakeng-Kwneng district] for the establishment of community user information system to enable rural communicate gain access to ICTs services (BOTEK, 2001). The Ministry of Education on the other hand through the Revised National Policy on Education of 1994 is to establish school libraries and resource centres in all primary schools in Botswana. The policy also addresses the promulgation of a National Information and Information Communication Policy, which are essential for the development of information sector. The Carnegie Corporation of New York is involved in funding the revitalisation of public library system in Botswana and other countries such as Kenya, South Africa and Tanzania. The program among other things aims at improving the provision of networked library and information service, improve information and communication technologies, market and promote library services in order to ensure optimum use by increasing public awareness; supporting the infrastructure and physical developments (Priestley, 2001).

In South Africa, the government is involved in establishing multipurpose community centres across the country as part of its e-government strategy. The government has completed a pilot project to install Public Internet Terminals (PITs) in most post offices across the country's nine provinces to help people to gain access to government services online. The initiative launched in 1998 has PITs with multimedia capability to allow communities to access the Internet, email services and government information through desktop kiosks (Ngobeni Wa, 2001). The centres are expected to offer integrated delivery of services to community within their areas of residence. These centres will provide government services, public telephones, Internet, email and photocopying, as well as act as learning resource centres. Similarly, Translate.org.za an NGO is making great efforts to translate computer applications in local language to overcome language barrier in using computers. So far the computer applications covering the full desktop, web browser, word processor, spreadsheet and email have been translated into a number local languages (Martindale, 2001). This initiative aims at encouraging people who have no English literacy to use computers. Plans are underway to have all the 11 official languages of South Africa translated into the computer experience (Martindale, 2001). On the other hand, Linuxlab.org.za another South African NGO has initiated some plan to provide disadvantaged schools with refurbished computers and freely available software (Martindale, 2001).

Telkom South Africa with partners successfully rolled out an undersea fiber optic cable, which links the country with Malaysia. The Malaysia link covers 15000 Km of submarine cable through West Africa, another 13800km South Africa far east-Malaysia cable, through Reunion and Mauritius including India. The whole length of the cable will accommodate 4.8 million telephone communications at the same time and 8000 digital TV transmission. The cable became operational in May 2002. Telkom has also increased connectivity to all 14 SADC member countries and other parts of Africa and the world. South Africa has become a conduit for telephone traffic within Africa and with the outside world. The consequence is that the volume of telephone calls from South Africa to the whole continent has increased recently by an estimated 240 percent whereas calls from the continent to South Africa have increased by more than 1000 percent (Matlou, 2001).

Within the Southern African Development Community, SADC region, the member countries have enacted an IT protocol on goals and principles for information society which outlines what individual countries can do to attain information society within the region. The SADC IT protocol identifies the following goals for developing an information society in Southern Africa, namely; improving and broadening equitable access to information and communications technology; reducing costs related to IT; developing SADC wide infrastructure; encouraging the growth of software and hardware facilities in SADC; and improving human resource capacity (SADC Secretariat, 1998).

On the other hand the Africa Information Society Initiative (AISII) is the framework for achieving an information society for the countries of Africa. The AISII action framework calls for: implementation of national information and communication infrastructure; building institutional frameworks- human, information and technological resources in all African countries; pursuit of priority strategies, programmes and projects for the sustainable information society in African countries (Amoako, 1996). Similarly, the New Economic Partnership for Africa, NEPAD among other things aims at enhancing security, improving infrastructure, democracy and eradicating poverty in order to place the African countries individually and collectively on a path of sustainable growth and development.

Globally, the Digital Opportunity Task Force (DOT FORCE) of G8 and the forthcoming World Summit on Information Society (WSIS) during 2003 in Geneva, Switzerland and 2005 in Tunis, Tunisia respectively are important instruments for defining the way forward toward an information society. The WSIS aims at promoting services and applications for economic, social and cultural development. In the area of education, WSIS sees ICT as tool to leverage education change for enhancing teacher-student environment and providing opportunity for access to education by employed workers. (ITWeb, 2002: <http://allafrica.com/stories/200201100296.html>; United Nations, 2002: <http://www.itu.int/wsis/basic/basic01.htm>).

Several countries in Sub-Saharan Africa are liberalising and privatising their telecommunications systems and effectively reducing tariffs. South Africa, Botswana, Kenya, Malawi, Nigeria, Angola, Mozambique and Zambia are some of the countries that are undertaking privatisation process or have plans underway. Consequently, sub-Saharan Africa has now achieved a teledensity of 1 percent considered as the basic minimum for economic development. Additionally, the African economy has had an upswing and is starting to show signs of positive recovery. This development is enhancing

the uptake of ICTs in the countries involved. For example in 1995 it was reported for the first time that Africa's economic growth was 3.4 percent and reached 5 percent in 1996 with almost 60 percent of countries in Sub-Saharan reporting positive per capital increases (Global Communications, 1998).

The Leland Initiative is encouraging Internet connectivity in a number of African countries. The Initiative is a five-year, USD15 million project designed to extend full Internet connectivity to up to 20 African countries. Some of the countries in this initiative include Botswana, Namibia, South Africa, Kenya, Tanzania, Zambia and Zimbabwe. The initiative aims to facilitate and encourage Internet use by Africans to achieve sustainable development and create an enabling environment in the project countries to facilitate electronic networking and access to global information infrastructure (USAID, 2001: <http://www.usaid.gov/regions/afr/leland/index.html>).

Developments through Schools in Bridging Digital Divide in Africa

There are a number of initiatives of bridging the digital divide through schools that are being implemented on the African continent. In Kenya UUNET Multinational Service Provider is planning to provide free cyber cafe services to selected rural based colleges and secondary schools as a social responsibility if the government licenses use of VSAT. This would help students to carry out research through Internet besides giving them an opportunity to easily communicate with the rest of the world. Further, 73 schools in Western, Nyanza, Coast and Central provinces of Kenya have started using computers as teaching and learning aids in an innovative project supported by the British Council, UK's Central Bureau and the UK-based Global Action Plan. Partner schools in the UK have donated computers and also built classrooms, dormitories, science rooms, etc. The schools have acquired thousands of textbooks and sports and laboratory equipment. The initiative is expected to break the barriers inhibiting global integration and enable the schools to join the information superhighways. The partnerships are also operational in South Africa and Nigeria (Wekesa, 2001).

In Uganda and Zimbabwe, IDRC/ITU and UNESCO through World Links are supporting the establishment of School-based Telecenter (SBT) to serve as multi-purpose community centres for rolling out Internet connectivity to the rural areas. The broad mission of the MCTs is to study the efficacy of use of ICTs to promote rural community development. The cost of the services is shared among the schools with each paying USD200 per month. World Links is contributing the other USD 200 per month per site for a two-year period. The schools raise funds from charging students tuition fees and other community user fees. On average, each student pays USD18 per year. A typical secondary school has between 800 and 1000 students around the year. The MCTs have been quite successful in bringing communication facilities closer to remote and nomadic communities in Uganda. The model also ensures sustainability of the service. Similarly the World Bank has been involved in training teachers in 261 Africa schools in using Internet (Mayanja, 2001).

ITU is involved in a number of projects to bridge the divide- infrastructure supply and financing, local capacity building, and private-public sector development partnerships. ITU is developing training centres in some countries in Sub-Saharan Africa and in other developing countries to provide students and telecom/IT professionals with access to affordable and relevant training in mentored e-learning environment. In addition, ITU has launched youth forum to enable exceptionally talented university students from all ITU member states to access ICT sector. Such students will be connected to ITU networks and form relationships with ITU member states. About 104 students will benefit from Africa (Utsumi, 2001).

In South Africa's Eastern Cape Province, Nokia has put up at Nongeke Senior Secondary School in rural Bizana electricity generator, water catchment system, classrooms, workshop, library and computer room as part of their social responsibility to the community (Bongani, 2001). Similarly in South Africa, the Digital Partnership - a union of large companies that regularly update their stock of desktop computers with software makers, networking companies and aid agencies is readying the machines for use in schools, village telecentres and prisons. Through this project, computers will be used to help children in the country to become computer literate. Through this project the first few thousand computers have already been installed in schools in the country. During 2003, the project hopes to transfer 170,000 computers to about 4,000 government schools in the country. A network of workshops is being set up in South Africa to refurbish the donated computers and locals are being trained to do the work. In addition, telecentres full of computers are being set up in the schools and teachers are being trained in the ways to use the machines in lessons (Ward, 2002). Similarly, in Dikhatole, a township just east of Johannesburg, a non-profit Organisation for Rehabilitation and Training

(ORT) has set about equipping members of the community with basic computer, internet and business skills. ORT in partnership with the South African branches of Hewlett-Packard (HP), Microsoft and Macsteel are to create a learning centre, a place where the digital divide could be bridged and people could be equipped to compete in a fast changing world. Dikhatole Digital Village the result of this partnership is the largest facility of its kind in the country with more than 90 Internet enabled workstations. HP donated the computers and hardware needed to network the computers and connect to the Internet, while Microsoft sponsored the software. The building, which houses the training centre, was loaned to the project by Macsteel, who renovated it and provide on-going infrastructure support. Through the project, teachers in the area will be trained to deliver ICT lessons to their primary and secondary school pupils. Computers will be donated to schools in the area for this purpose. It is envisaged that the project will last three years, and by then the community is expected to be trained and experienced enough to make the centre self-sufficient. Community members will be trained in basic Internet use for networking and support, and in starting up and managing a small business, operating systems, Windows, MS Word, MS Excel, MS PowerPoint, and Outlook Express.

South Africa government in partnership with private sector has set up 28 digital villages for community use. Digital villages are computer resource centres managed by members of the community who are trained in the necessary IT and management skills. One such digital village is in Alexandra, a low-income suburb in Johannesburg. The village is funded by Microsoft South Africa in partnership with Hewlett-Packard South Africa and the Ministry of Local government. Microsoft and HP contributed towards infrastructure development by linking 20 HP workstations, 2 HP servers and 2 HP printers on local area network and enabling Internet connectivity. (Microsoft Corporation, 2002, <http://www.microsoft.com/southafrica/press/press-501.htm>).

In Namibia the government has invested in ICT to promote digital literacy in Schools. through SchoolNet project. Schoolnet was established in February 2000, and the organisation has begun bridging the digital divide by introducing computer technology and Internet access to schools with the help of a number of local and international stakeholders. Communities that do not have money and to afford computers are being helped by SchoolNet through collecting redundant computer equipment from the public and private sector, locally and internationally, and serves as an outsourcing agency to disadvantaged schools in the country. So far SchoolNet has provided computer equipment and/or Internet access to over 120 mostly rural disadvantaged schools and thousands of children have now become Internet savvy. SchoolNet has set itself the target of connecting every school in Namibia to the Internet by the end of 2005 (Jensen, 2001).

Microsoft is planning to follow the example of Linux and offer free computer software in schools in South Africa and elsewhere to enhance digital literacy and assist bridge the digital divide. Through this program free alternatives to proprietary software will be given away to schools across the developing world. This will help poorer countries to gain access to free software because they are unable or unwilling to pay for licences to use. Similarly, Sun Microsystems has donated more than USD 6 billion worth of its StarOffice software to schools in Asia and Latin America. Sun's giveaway is being expanded to include South Africa and some parts of Europe.

Telisa, (the Technology Enhanced Learning Initiative of Southern Africa) conceived by the Centre for Lifelong Learning in cooperation with several partners such as World Bank and UN Economic Commission for Africa is aimed at facilitating the establishment of ICTs centres throughout SADC region and a series of information servers to provide appropriate support material to existing institutions, lecturers, teachers and businesses. Telisa concept has five major areas of action namely: Internet connectivity, information clearing house, institutional connectivity, educator training, and projects. One such centre is established by the Kgautswane community in Mpumalanga province of South Africa that was set up with the assistance of Old Mutual companies and Safmarine. The centres provide payphones, photocopying, document lamination, scanning of documents, Internet access, community information and access to computers (West, 2000, http://www.pgw.org/telisa/Concept_Document/concept_document_9807.htm).

Benefits of Bridging Digital Divide in Schools

Bridging the digital divide has a number of important benefits. According to (Teaching the News, 2002, January 11, bridging the digital divide), it so important to recognize and address the digital divide in order to promote social justice so that every man or woman, no matter his or her race, age, background, religion, ability or disability, should have the same opportunities. Those that have the technology - both physical access to it and the exposure and training to know how to use it — can use the technology to make more money, buy more or better technology, etc. Over 60 percent of today's jobs require technology skills. Lack of access to the tools of today's workplaces leads those without the technology to be stuck in place, to never be able to make enough money to afford the technology and training that would make employment in areas requiring the use of technology even possible. Additionally, web-based portals are being set up that will host up to date textbooks and educational material that should help schools save money and pay for the maintenance of the machines

There are vast array of services that one can currently find online. These services are constantly growing, some of which are of general nature while others are specialised for pupils. Reference information on the Web that pupils can find of use includes news, weather, sports, movies, encyclopaedias, cartoons, games, etc. Pupils that are accessible to the Web are increasingly able to communicate through electronic mail (E-mail) with family and friends around the world. Other pupils use the public message board chat areas to make new friends who share common interests. It is possible for pupils to use the Internet to watch video and listen to audio programs. As an educational and entertainment tool pupils can learn about virtually any topic, visit a museum, or play an endless number of computer games with other users or against the computer itself. Additionally, pupils can use the Internet in a number of ways: through electronic mail, they can exchange messages very rapidly with people anywhere in the world. Usenet groups, or newsgroups, which are electronic bulletin boards, can assist keep in touch with people who share an interest in a particular subject. Pupils with Internet access can now use chat with other people, in chat rooms, normally by typing messages that are sent, received and viewed more or less simultaneously. By linking a microphone to a PC it is also possible to use the Internet to make telephone calls or speak to other people who are also online.

Web cams (special cameras that work with computers) are becoming cheaper and easier to acquire and use. Using web cams, people can even see each other over the Internet and conduct conversations. Live video-conferencing as well as TV and radio broadcasts from stations all over the world are also becoming more and more accessible to people as the Internet capacity grows and telephone call charges continue to fall. It can be a way of picking up or exchanging information or files, helping with homework or the pupils school projects. The Internet is a medium, which adults and children can share to their mutual advantage. It is already being widely used in schools and across the educational system to enable pupils do their homework, but also for all kinds of fun and games and to communicate with their friends. Most young people seem to have had no difficulty adapting to the Internet.

Basic and advanced telecommunications technologies - including the telephone, computer networks, and the Internet- when used appropriately, enable school children to conduct research, improve their performance in core competencies, and hone their computer literacy.

Challenges and issues of Bridging Digital Divide through Schools

As efforts continue to be made to integrate technology into schools a umber issues need to be addressed. Today in Africa as the Internet becomes more pervasive, many school going pupils are increasingly getting online either at home or elsewhere. The Internet holds tremendous promise for the schools but also raises difficult issues, which need to be urgently addressed. Pupils in schools and children in general are known to visits sites that may not be acceptable to parents. Who should be well placed to determine the resources on the Net that children should gain access to (parents, teachers, or publishers)? Censorship goes counter the right of access to information, which is enshrined, in many international conventions and charters, but are children able to make well-informed judgement about useful sites that they can visit? Parents have an important inalienable role to mould their children and therefore have great say in the type of information resources that they should have access to. But in Africa where the great proportion of the population is computer illiterate how can this parental role be fulfilled? How do we determine children Internet resources that are acceptable and suitable in particular learning setting? How easy is it in an African environment with complex cultural

diversity to determine suitable learning resources for the children? How do we ensure that we do not censor what in actual fact is important learning experiences for the youth?

The Internet is a huge technological achievement promising great benefits to society in general and to children and young people in particular, especially in the fields of education and entertainment. However, as with many new or emerging technologies, the Internet has brought a number of unfamiliar problems in its wake. Parents and carers therefore first need to know about the possible hazards to children and young people on the Internet and, in turn, they need to know how to deal with them. Going online is a travelling experience for anybody including children and often one meets a wide array of people. Most of the people on the Internet are decent and respectful, but some may be rude and insulting. Children get a lot of benefit from being online, but they can also be targets of crime and exploitation in this as in any other environment. Children need both parental and their teachers supervision and advice on how to be sure that their experiences in cyberspace are happy, healthy, and productive. Although there have been some highly publicized cases of abuse involving the Internet and online services in Europe and the United States, reported cases in Africa are relatively infrequent. It is possible that the low use of Internet in Africa is the reason for this but it is also possible that like most crimes against children, many cases go unreported, especially if the child is engaged in an activity that he or she does not want to discuss with a parent or the teachers. The fact that crimes are being committed online, however, is not a reason to avoid using these services. A better strategy would be to instruct children about both the benefits and dangers of cyberspace and for them to learn how to be wise in order to better safeguard themselves in any potentially dangerous situation.

ISPs and online services generally do everything they can to provide their subscribers with an enjoyable, safe, and rewarding online experience, but it's not possible for these companies to police everyone who uses their service. Besides, once you're connected to the Internet, you're able to exchange information with people who are signed on with other ISPs and online services. The Internet is not governed by any company or government. Anyone anywhere can publish material on the Internet. An ISP links you to these sites, but cannot control what is on them. It's up to individuals to make sure that they behave in a way that's safe and appropriate.

There are some risks for children who use the Internet or online services. Teenagers are particularly at risk especially when they often use the computer unsupervised and because they are more likely to participate in online discussions regarding companionship, relationships, or sexual activity. Some sites provide information about Teen Safety on the Web (National Centre for Missing and Exploited Children, 1994: www.missingkids.com). Children also face the risks of exposure to inappropriate material that are sexual, hateful, or violent in nature, or those that encourages activities that are dangerous or illegal. Children may fall prey to security through being lured to some encounters that could risk their safety. In a few cases, paedophiles have used E-mail, bulletin boards, and chat areas to gain a child's confidence and then arrange face-to-face meeting. It is possible through the Web for the child to encounter E-mail or chat/bulletin board messages that are harassing, demeaning, or abusive. Children have been known for example to give out a parent's credit card number or doing something that violates another person's rights.

The Way Forward

It is important for schools to promulgate acceptable use policies that detail what children can and cannot do on the computer. The child and the parent must sign this acceptable use policy. Additionally, schools should put in place filtering software that prohibits school children from visiting sites that are deemed unacceptable to them. A Microsoft study in the United States showed that increased time on the web by school children was related to improved grades in examinations.

One of the issues relating to use of schools in bridging the digital divide is the problem of sustainability. To help pay for the upkeep of the computers, schools can be encouraged to open up their computer rooms to local communities and charge for courses in technology skills, for printing out documents or hosting e-mail accounts on their behalf. It important that governments get involved to provide financial help or pass laws that can guarantee cut price net access for schools.

Local communities must be involved in making decisions regarding technology deployment and use in order to create conducive environment and mobilise the consensus of all. Multiple technologies should be allowed to compete so that the most cost effective can be chosen. It is important for research initiatives that aim at developing and adapting foreign and new technologies to local situations. Additionally, efforts must deliberately be made to enhance the training of teachers in ICTs and also promote Internet awareness among the youth in schools. Efforts should be made towards e-governance to help achieve a critical mass of online content and offer free access to such content.

VSAT technology could be used extensively for the transfer of signals (data and voice) using small satellite dishes, which are ideal for arid and semi-arid areas where phone lines are non-existent or would be too expensive to put up and maintain. Investing in wireless networks would help overcome terrestrial distances. Content creation should involve multimedia and multilingual instructional materials that cater for all shades of interests. The provision of local content should address alternatives to people with impairments. Local content development should be interdisciplinary and its development should be achieved through a number of ways that include involving local elders, digitalisation of information and images, translation, editing, and production. The materials developed can be used to produce or make radio programs.

Governments should encourage social responsibility obligations to be extended to schools to create cyber culture among the youth. Teachers should be provided with training and also be involved in software selection process. It is also important to provide adequate technical support so that the teachers can be equipped to provide equipment troubleshooting and minor repairs, software installations, and other operations that require only moderate amounts of technical knowledge. These teachers could then help their peers, reserving calls to coordinators for more serious cases. The technology should be integrated into instruction, and teachers should be encouraged to engage in tele-collaborative projects via e-mail, the web, and video conferencing. Schools should be encouraged to periodically assess their ICT programs regarding infrastructure, student usage of technology, and the provision of training and technical support to teachers. The evaluation should centre around infrastructure in relation to where hardware and other equipment can be located, and where Internet access can be provided - libraries, labs or classrooms? Student usage should also be evaluated along the lines of which students have access to technology? Does it vary for example by race, ethnicity, gender or income level? Do students in special programs have equal access? Which kinds of student activities predominate? Evaluation should also look at technical support and questions such as: who provides technical support? How long do teachers usually wait for it? Are they allowed or encouraged to do some things for themselves? Decision should be made among teachers about who should be trained- those already knowledgeable about technology or those new to it?

Governments should be lobbied to waive duty and other taxes on computer software and hardware to make them more affordable and accessible to the schools. Additionally governments could offer rebates and subsidies to educational institutions to acquire ICTs and they could also explore ways of providing telecommunication services in the rural areas and under-served areas through issuing of small medium and micro-enterprises licenses. With increasing initiatives to enhance connectivity in Africa, it is possible that more and more schools will come on board to implement ICTs in their curriculum. It is important that governments should provide conducive environment for this process to bear fruits while the private sector should facilitate the adoption of best practices in the industry to promote wide adoption and use of ICTs. Relevant policies, institution frameworks and enabling and sustainable models need to be adopted to make progress towards bridging digital divide through school achievable.

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