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Introduction:

This report is essentially a sectoral review which contains a brief assessment of other organisations working in the field of computer refurbishment to the developing world and how they differ from Camara. This report is necessary to establish how Camara fares on an international level, how the organisation can be improved, what its weaknesses are and what it is excelling at. The report should give a clear and concise insight into the workings of other similar organisations and what they focus their attention on and why. Also, monetary issues will be unearthed; such as the overall costs to the donor, the organisations budget, the cost to the beneficiaries and the different add-on costs which are necessary for the implementation of ICT in developing countries.

“While supposedly closing the ‘digital divide’ we are opening a digital dump” (Roman and Puckett, 2002)¹. There is plenty of information to support the fact that computer waste is becoming a threat to the environment but also to people living in developing countries. This report will address this issue and try to examine other organisations green agenda. Also the different types of refurbishment processes will be looked at.

The United Nations noted in its statement on Universal Access to basic Communication and Information Services that;

“The information and technology gap and related inequities between industrialized and developing nations are widening: a new type of poverty-information poverty-looms. Most developing countries, especially Least Developing Countries (LDCs) are not sharing in the communications revolution, since they lack: affordable access to core information resources, cutting-edge technology and to sophisticated telecommunications systems and infrastructure; the capacity to build, operate, manage and the service technologies involved; policies that promote equitable public participation in the information society as both producers and consumers of information and knowledge; and a work force trained

¹ Roman,L.S. & Puckett, J. (2002) E-scrap exportation; challenges and considerations. In: Proc. International Symposium on Electronics &the Environment 2002, May 6-9, San Francisco, CA, USA. Pp79-84.

to develop, maintain and provide the value-added products and service required by the information economy”².

Knowledge is power and information communication technologies (ICT) can help bridge the so-called ‘digital divide’ by providing the tools and equipment necessary to attain information easily. However access to this information contains some barriers such as the high level of literacy required to obtain this information, the vast majority of programmes and applications are in English creating a second barrier and the high costs involved in start-up and running expenses. However Camara and other organisations are trying to reduce these barriers by providing low-cost computers, training and maintenance and different software tailored to meet the needs of those living in LDC.

² United Nations Administrative Committee on Coordination (ACC), A Statement on Universal Access to Basic Communication and Information Services. April 1997. Quoted in ITU World Telecommunications Development Report, 1998, p.10.

Computers in Education:

Information and Communication Technologies (ICT) can be an extremely powerful force to bring positive and sustainable development to countries around the globe. We live amidst an unprecedented revolution in the advancement of ICT. We are also, however, surrounded by widespread poverty, gender disparities and economic inequalities. Some scholars may argue the fact that it is not reasonable to invest money in technology for the educational system instead of using the same funds to improve the living conditions of those in dire need. However, it has been proven that the long term solution for the economic problem of the population is to raise the educational level and computers has become a key component in the present day information era, (Kenny, 2003, Negroponte, 1998, Hudson, 2001, Osin 1998). ICT in education allows students in a developing world become educated on a level par with students in a developed world increasing their chance of further education or increasing job prospects. Also, the virtual world provides necessary interactive learning for students in this increasing globalised world. The internet opens libraries, which are helpful in the area of schooling and medicine. ICT can also reduce the time and money spent on long arduous journeys by bringing everything they need to a screen in front of them such as diagnosis of illnesses, news around the world, information on agricultural practises, politicians' stance on particular subjects, air-fare, banking, maps and much, much more. Previously excluded individuals such as girls, people with disabilities, ethnic minorities and rural populations can now, once connected, reap the benefits of technology as there is no identification of each individual's race, colour or sex on the internet which could contaminate the free exchange of ideas.

Developing countries encounter more problems than the developed with regards to education. Many classes are overpopulated and some even reach fifty students per class. Some schools lack appropriate infrastructure especially in rural areas; where the classrooms can be regarded as substandard, with poor and erratic electricity, little or no telephone connection and poor quality lavatories. Also, due to low teacher salaries this causes 'brain drain' with the flight of higher intellectual levels to better paid professions and in some cases non-professional teachers are used to teach subjects where a

credentialed teacher is not available. However this is not the case in all developing countries educational systems. Some have reached a threshold where all of the above factors have been assessed, developed and have matured to a level which they can fully adapt to the technology available throughout the world. But before a school becomes ‘wired’ it is essential that the school is prepared for the introduction of technology and connectivity. This will often require renovations within buildings in the school. Also the building must have sufficient electrical capacity, from available power to a number of outlets, adequate temperature control, ventilation and security. Also, teachers need to be properly trained and ready to impart knowledge on how to use the technology to improve their lives and the lives of their students. This will require teacher training, curriculum adaption and renovation to include technology as a major component, constant monitoring and the opportunity for the teachers to brush up their technology skills at regular intervals via assessment or more training. It is essential that maintenance can be obtained when required. “However, the full realization of the potential of technology for learning is a complex large-scale implementation process that involves professional development, administrator commitment, changes in pedagogy, curriculum and assessment as well as system-wide strategies for equity and partnerships among education and stakeholders”, (Dede, 1998)³.

Computers facilitate a student-centered ‘constructivist’ education model. Constructivism is an educational philosophy that asserts children must construct knowledge for themselves to acquire a deeper understanding of its principles and concepts. Constructivism thus emphasizes the importance of the learner being actively involved in the learning process, unlike previous educational viewpoints where the responsibility rested with the instructor to teach and where the learner played a passive, receptive role. (Von Glasersfeld 1989)⁴ emphasizes that learners’ construct their own understanding and

³Dede, C. (ED). (1998) The 1998 Yearbook for the Association of Supervision & Curriculum Development: Learning with Technology. Alexandria, VA: Association for Supervision & Curriculum Development.

⁴ Glasersfeld, E. (1989). Cognition, Construction of Knowledge and Teaching. Synthese, 80(1) pp.121-140.

that they do not simply mirror and reflect what they read. Computers allow the student to assess their own educational level by challenging themselves from going from basic to intermediate levels in the different educational software which is now available. According to (Von Glasersfeld 1989) sustaining motivation to learn is strongly dependent on the learner's confidence in his or her potential for learning. The critical goal of constructivism from the teacher/ instructors point of view is to support the learner to become an effective thinker and this can be achieved by assuming multiple roles from teacher to instructor to coach to consultant. Teachers are no longer solely responsible for content delivery, they must be supportive of the child's independent inquires

Furthermore, geographical distance is no longer an obstacle to obtaining an education. It is no longer necessary for teachers and students to be in the same place, due to innovations of technologies such as teleconferencing and distance learning, which allow for synchronous learning. The internet can provide a wealth of information in every topic imaginable. Teachers can access teaching resources for the classroom, students can collaborate with other students around the globe, exams can be taken and then instantly corrected-freeing up the teachers time, textbooks are not the sole provider of information and an education in ICT greatly improves ones future chances in gaining employment.

The importance of a basic education in ICT in the modern world has provided a consensus between government leaders, academics and international bodies such as the UN and World Bank. The digital divide needs to be halted and reversed and with the help of organizations, (explained in the following pages) providing a platform for countries in need of some help-; the dream of equal access to computers does not seem that far away.

GeSCI

GeSCI was founded by the UN ICT Task Force in 2003 arising from a global call to utilize ICT to address the issues of quality and access in developing country education systems. GeSCI is an international not-for-profit organization providing demand-driven assistance to developing countries seeking to harness the potential of Information Communication Technology (ICT) to improve their education systems. The GeSCI team consists of international experts in education, technology and research. They work with Ministries of Education (MoEs) and leading international organizations to realize the shared vision of a 'Knowledge Society for All' and to make informed strategic decisions about ICT in education.

GeSCI do not donate computers or money nor do they manage any programs on behalf of the government instead they provide a framework to analyze and compare ICT in education in different regions throughout the world. The overall objective of GeSCI's work is to ensure that countries are empowered with the capacity to make clear, strategic and visionary decisions and to develop strategies and plans for the proper use of ICTs in education to advance their overall education and development objectives in the context of the knowledge society.

GeSCI is headquartered in Ireland and receives funding from the governments of Ireland, Sweden, Switzerland and Finland.

A full list of their publications, videos and documents can be found at;
<http://www.gesci.org/documents.html>.

A presentation of a Global Monitoring report on Education for All 2009 and the global differences,
http://www.gesci.org/assets/files/GMR2009_Presentation_generic_annotated.pdf.

Insights into Rwanda, past, present and hopes for the future can be viewed at;

http://www.gesci.org/assets/files/Rwanda_Vision_2020.pdf.

GeSCI's Meta -review research report on ICT in education. This is a global review and there are many references to the developing world - available at:

<http://www.gesci.org/publications.html>.



InfoDev is a global development financing program working with international development agencies and coordinated with the Global ICT Department (GICT) of the World Bank. *InfoDev* acts as a neutral convener of dialogue and as a coordinator of joint action among bilateral and multilateral donors to support global sharing of information on ICT4D and helping to reduce the duplication of efforts and investments.

infoDev's mandate is to help maximize the impact of ICTs in global efforts to achieve the internationally-supported [Millennium Development Goals](#). *infoDev* helps donors and their developing country partners identify ways ICT can contribute to objectives such as improving access, education and health services, making public institutions more efficient and transparent, supporting rural livelihoods, and contributing to economic growth by supporting small and medium-sized enterprises that use ICT for their businesses.

InfoDev's work focuses on three themes;

1. Enabling Access For All
2. Mainstreaming ICT As Tools Of Development And Poverty Reduction
3. Innovation, Entrepreneurship and Growth

A list of all their publications including annual reports, working papers and videos can be accessed at; <http://www.infodev.org/en/Publications.html>.

Guidelines for Monitoring and Evaluation in ICT in education can be viewed at; <http://www.infodev.org/en/Publication.9.html>.

A comprehensive evaluation of ICT in all 53 African countries;
<http://www.infodev.org/en/Publication.354.html>.

UNESCO competency standards for teachers wanting to teach ICT. These standards are globally recognized and are available;
<http://cst.unesco-ci.org/sites/projects/cst/default.aspx>.



G@ID

The Global Alliance for Information and Communication Technologies and Development (GAID), was established in 2006 and is an alliance within the United Nations Department of Economic and Social Affairs (ECOSOC).

GAID mission is to respond to the need and demand for an inclusive global forum and platform for cross-sectoral policy dialogue on the use of ICT for enhancing the achievement of internationally agreed development goals, notably reduction of poverty
GAID focuses on the areas of: Access, Connectivity, Content and Education

GAID objectives are as follows;

- Mainstreaming of the global ICT agenda into the broader United Nations development agenda.
- Bringing together key organizations involved in ICT for development (ICT4D) to enhance their collaboration and effectiveness for achieving the internationally agreed development goals.
- Raising awareness of policy makers on ICT4D policy issues.
- Facilitating identification of technological solutions for specific development goals and pertinent partnerships.
- Creating an enabling environment and innovative business models for pro-poor investment and growth and for empowering people living in poverty.
- Act as a "think-tank" on ICT4D-related issues and as an advisory group to the Secretary-General.

A full list of their publications can be found at;

<http://www.un-gaid.org/Activities/Publications/tabid/914/Default.aspx>.

A link to newspaper articles can be accessed via;

<http://www.un-gaid.org/News/tabid/864/Default.aspx>.

An interesting paper on Information and Communication Technologies (ICT) in Education for Development can be seen at;

<http://unpan1.un.org/intradoc/groups/public/documents/gaid/unpan034975.pdf>.

A study looking at different initiatives around the globe connecting youth to technology can be viewed at;

<http://unpan1.un.org/intradoc/groups/public/documents/gaid/unpan036084.pdf>.

Reusing a computer, 'is some 20 times more effective at saving life cycle energy use than recycling' – UN Report on Computers and the Environment 2004

Providing computers to the developing world and the training of people in the advantages of technologies is a core belief for the following organizations. All organizations are deemed not-for-profit. Interviews were conducted via phone/ email. A full list and link to websites of organizations who did not participate in the survey can be found in the Annex.

The task of the modern educator is not to cut down jungles, but to irrigate deserts.

-C.S. Lewis



Camara

Camara is a volunteer based non-profit organisation that focuses on technology to enhance education in communities throughout Africa. Camara derives its name from Swahili meaning ‘one who teaches with experience’; Camara was set up in 2005 by Cormac Lynch. The company started whilst he was on a trip to Ethiopia There he got talking to some people who asked if he could send some used computers over to Ethiopia. Upon returning to Ireland, Cormac gathered some volunteers and after four months sent his first shipment of 100 re-used and refurbished computers to Ethiopia. Since then the organisation has flourished and has developed hubs in six other countries-Kenya, Zambia, Tanzania, Lesotho, Rwanda and Uganda.

The headquarters in Ireland is the Digital Hub in Dublin and its African headquarters are in Kampala, Uganda. Cormac was driven by two core beliefs; 1. Education is key to releasing oneself from the poverty trap and 2. if ICT is harnessed and utilized correctly in the developing world, this could revolutionise the way education is being taught.

Camara is operated as a social enterprise model and it operates within two distinct lines of business; ‘Education delivery’ and ‘Computer re-use’. Technology is central to both of these.

Camara takes in used computers from both individuals and organisations. The computers which are sent to Africa have to reach a minimum specification;

- Minimum 265 Megabyte RAM

- Minimum 800 Megahertz Processor (Pentium III, AMD Athlon, or better)
- Minimum 8 Gigabytes Capacity Hard Drives
- Monitors with 15”-17” displays
- Any computer mice, keyboards, speakers and head-phone sets.

However, most computers which are dropped into the workshop in Dublin are accepted as all computers including MACs can be harvested for spare parts and recycled here in Ireland. “Our rule of thumb is, if it switches on, we can use it for parts or it will go to a school”.

The computers which meet the specific criteria are refurbished to the highest standard and the hard drives are wiped of all data using the US Department of Defence standards. The computers are then loaded with Camarabuntu and/or Microsoft Authorised Refurbisher. Camarabuntu is a complete software operating system built by Camara on the popular Edbuntu distribution; it includes an office suite, web browser and many educational applications. Camarabuntu is Open Source software which means it can be downloaded free of charge, it can be modified and changed to fit the exact needs of the individuals or schools particular environment. The computers are then loaded with extra educational software such as HIV/AIDS programs, lesson plans, teaching resources and Moodle before being packaged and carefully shipped by freight container to the designated school.

At present, it costs €50 to send one computer to Africa. Camara asks for a donation of €10 per computer to cover some of these costs, Camara itself fundraises a further €20 and then it costs the schools in Africa €50 to buy a computer. However, the €50 used to buy the computer in Africa does not only cover the computer itself but it also covers start-up costs, training to the teachers in the schools, a maintenance contract and a warrantee which states that once the computer has reached its end of its shelf life, it is sent to be recycled in an appropriate manner. The social enterprise model can be seen at;

<http://camara.ie/web/about-2/how-we-do-it/camara-social-enterprise-model/>

The net cost of delivering a fully-refurbished computer to a port in Africa is €21 as of 2010(taxes and charges, further delivery, installation and maintenance need to be included however).

In order for a school to receive computers from Camara they have to complete a vetting process. The vetting process is detailed at; https://docs.google.com/a/camara.ie/Doc?id=dckw7br2_9hrr666c5

A representative from Camara will visit each of the schools to ensure the schools have complied with the agreed vetting processes. If the said school is deemed acceptable a contract is drawn up and both Camara and the school sign.

The Camara team consists of 11 paid employees and their roles range from Monitoring and Evaluation, Volunteer Coordinator, Social Hardware Manager and Administration. Camara also have many volunteers and interns working in Ireland; some long term some short term who work in the workshop; cleaning, testing, installing software, packing and documenting the computers, help at reception and work in the 'media room' researching different topics which Camara deem useful to improve their model. Also, every year Camara sends out a team of volunteers to train African teachers in basic computer literacy and in more specialised software.

Camara needs to improve its system in many respects. The performance of the hubs in Africa are not up to the standard Camara would like them to be at- an M&E report published in April 2010 highlighted the level of inputs in relation to the level of outputs and the discrepancies between the expected return to the actual return. The differences were quite substantial.

Also, the training given to teachers, in Africa in ICT needs to be expanded and improved on a regular basis. The training course lasts two days but sometimes depending on the level of computer literacy more time is required to train teachers fully in all elements of ICT. The most pressing issue for the organisation at the minute is capacity building with people in the seven hubs in Africa.

Camara's plan for the next five years is to try and work with the government and their ministries of education (MoE's) to try and make more PC's available to schools and universities in their respective countries. Camara hope to develop ICT as a core module within the education system and to better train the teachers to motivate and enhance computer literacy with the students.

Some of the better aspects of the company are the deployment of the equipment as it is efficient, it is proving to be good value for money and the equipment is lasting longer-up to 5 years. The Monitoring and Evaluation department in Dublin is proving to be very successful. Also, the quality of training given to the volunteers in Ireland is of a high standard.

Cormac Lynch, Founder and CEO of Camara has greatly expanded this organisation and he himself has won several awards such as the Social Entrepreneurs Ireland Award 2006, the David Manley Award 2007 and the Arthur Guinness Award 2010.

An initiative which began in 2010 is providing low-cost fully refurbished laptops to disadvantaged schools throughout Ireland. Ireland is one of the lowest users of ICT in the developed world and this is something which needs to be remedied. Camara is hoping to provide a solution to this problem.



The interview was conducted with Bronwen Mc Conkey the business development manager at Digital-Links on 14th April 2010.

Digital-Links was established in 2002 by philanthropist and entrepreneur Chris Mathias in partnership with the former Executive Director David Sogan. Digital-Links is based in 3rd Floor Downstream building, 1 London Bridge, London, SE1 9BG. Its radar for collecting computers is the entire mainland of the UK.

The objectives of this organisation are the relief of poverty and the promotion of education and health throughout the developing world which they believe can be achieved through the provision of access to ICT.

The Digital-Links team consists of four paid employees in London. Aissatou Sow is the Chief Executive, Bronwen McConkey is the Business Development manager, Tansy Simpson is the Corporate Relations Manager and Ben Newsom is the Logistics Coordinator. Also, they have two in-country representatives. They rarely employ volunteers however they have made some exceptions in the past.

The overseas headquarters of Digital-Links is in South Africa. They provide computers to 21 developing countries around the globe in Africa, Asia and Eastern Europe but focus on six specifically (Tanzania, Kenya, Mozambique, Uganda, Rwanda and Madagascar). The areas they specialise in range from education- allowing access to a range of materials from English, science and maths; Digital-Links also works with small-medium enterprises and in the area of healthcare.

Digital-Links facilitated the implementation of the Barclays Bank East Africa funded project, 'Inspiring education with ICT' and during 2008 exceeded targets of the number of beneficiaries, the number of school labs and the amount of computers distributed by 40%-150%. Digital-Links collaborated with a project funded by Cadburys to provide computers to IT Teacher Training Colleges in Ghana. Also, Digital-Links worked with a BUPA funded project to distribute refurbished computers to schools, orphanages, hospitals and medical centres in Moldova.

Digital-Links does not have a workshop instead they outsource the computer refurbishment process to electrical refurbishers in the London area- at present they are working with BTR (www.btruk.com). During 2007-2008 the organisation experienced two changes of leadership in six months. Further, the company's major refurbisher during this period ceased operations and another refurbisher which at that time was holding £42,000 worth of stock went into administration. Due to these undesirable operating conditions, total income during that period (2007-2008) was down 44% on the previous year. Overheads doubled during this period and expenses increased such as legal fees, travel and consultancy. Digital-Links aims to remedy their financial position by improving internal operations and focusing on aggressive marketing and communications strategies.

As an organisation they do not provide training to the beneficiary of computers instead they leave it up to the asset management organisation to do so. Their end-of-life computers are sent to Midas in the United Arab Emirates to fulfil their 0% landfill policy. In 2009 approximately 3500 computers were sent to this recycling facility.

It costs Digital-Links £6-12 to refurbish a computer. Their main private investors/ corporate partners include Barclays, Cadburys and BUPA. Their specialist partners whom they work with in order to bridge the digital divide include Digital Pipeline, Microsoft Authorized Refurbisher, Tier1 and Green Works. Digital-Links receive a grant from UNESCO for their work in Gabon.

Further, Digital-Links have established a 'digital-loan system' which combines micro-finance and technology for development. Under this scheme, low-income groups, such as students, teachers, civil servants, nurses and doctors will have access to micro-loans to purchase low cost, high quality new and refurbished PC's and software. This in turn will provide independence, information and incorporate the importance of technology to bridge the digital divide.



IT Schools Africa

This interview was conducted with Tim Barnes the program manager with IT Schools Africa on the 21st April 2010.

Michael Radcliff established IT Schools Africa in 2004 after he visited Africa and saw how African schools needed computers. Radcliff had made some money through an insurance company and decided to invest some of his time and money into this organization. IT Schools Africa is partnered with Computers for Schools Africa. The team consists of five full-time staff, Tim the program director, a person responsible for logistics, one for sourcing which encompasses telemarketing, a technical advisor and a workshop manager. At present they have approximately 12 volunteers; six who work in the workshop, 4 in the warehouse and 2-3 who specialize in data erasure which is essential for obtaining PC's as there needs to be absolute confidence that all data is wiped to the US Department of Defense standards.

The criteria for deciding who receives computers from IT Schools Africa is changing, historically they focused on providing technology to state secondary schools now things are shifting and they are distributing computers to both primary and community schools. They do not have head-quarters in the developing world; they instead work with local charities and NGO managers in the four countries they specialize in. Each country has 3-4 technicians, a workshop, warehouse and office. IT Schools Africa works in conjunction with the Ministry of Education in each of the countries which have set up programs such as Computers for Zambian Schools (CFZS), Computers for Malawian Schools (CFMS), Computers for Tanzanian Schools (CFTS) and Computers for Zimbabwean Schools (CFZiS). IT Schools Africa is expanding and has developed individual links with Niger,

Sierra Leone, Kenya and Ghana. Prior to the deployment of computers, IT Schools Africa provides training to the teachers in the form of a week long course. Once the training has been completed to their satisfaction and the teachers of the schools have a good knowledge of the technology, computers are distributed to the respective schools. Also, IT Schools Africa provides maintenance post-installation when a technician visits the school, checks and fixes computers.

At present it costs £42 to refurbish a computer however this doesn't include shipping costs. Donors do not have to pay a fee for providing computers to IT Schools Africa however the organization needs to generate more money due to financial restraints are looking into other options such as charging £10-20 to African schools who can afford to pay it. They are limited by logistics and can only collect up to 150 mile radius. They use a 'man with a van' approach and it costs 70p per mile.

IT Schools Africa refurbishes the computers via two methods- around 20% takes place in the workshop in Cheltenham and the rest is sent (400-500 computers per month) to UK prisons. They will only accept computers with Pentium III or above. The hard drives are removed upon arrival at the warehouse, then they are attached to a wiping station and are wiped using defense standard software-KILLDISC, then they are inspected to ensure all sectors of the drive only contain random data. The computers are cleaned, checked and fixed if necessary. In Zambia and Malawi old versions of Windows 2000 are installed however they are having difficulty in providing this. Also, Tim mentioned 'Microsoft Authorized refurbisher' which is a scheme established in November 2007 that lets computer refurbishers offer rebuilt computers which have a higher value by providing Windows XP Home Edition or Windows XP Professional and this in turn, will help prevent e-waste. However, this scheme has flaws particularly in relation to ICT4E such as; to register as a community (charities, NGO's etc) will costs \$5 per machine. Therefore, IT Schools Africa uses Open source software such as Linux.

IT Schools Africa distributed 4,000 computers to African schools 2008-2009. This was better than the previous year but not their best year. They are compliant with WEEE

standards and in Africa they send their 'end-of-life' computers to DESCO which is IBM's official recycling facility in southern Africa. Around 1,500 computers were sent there last year and Tim felt this was an improvement due to computers lasting longer in the schools.

IT Schools Africa at present do not receive any funding from any national or international body and have a private trust fund with their main private investor remaining anonymous. They run an International Computer Driving License course at their workshop and there is some government funding for people who wish to do this course however ICDL is not proving very successful and it is not generating enough funds.

IT Schools Africa does not publish their annual reports.



Close the Gap

The interview was conducted with David Leysens via phone on the 19th May 2010.

Close the Gap was founded in 2003 at the Vrije Universiteit Brussel by Olivier Vanden Eynde as an international non-profit organization focused on socially responsible entrepreneurship. The headquarters is in Brussels and it is active in the Netherlands, France and Germany. The radar for collecting redundant computers is the entire mainland of Europe.

Close the Gap does not offer direct aid to any project, but rather gives them the tools they can put to good use themselves and that can help with the further development of their community and country. In the industrialized world computers are seen as a commodity and people tend to forget that one of the basic assets provided by a PC is access to all kinds of information, ranging from basic tools about water purification processes to educational and leisure information. Close the Gap provides hi-Tec, low cost computers to institutions such as the social sector, health sector, governments, micro-finance and education. A list of all the projects Close the Gap have provided computers to can be found at; <http://www.close-the-gap.org/pages/frontend/ProjectOverview.aspx>

Close the Gap has distributed 40,000 computers and computer assets which in turn supported 436 projects in over 40 countries all over the world.

Close the Gap team is made up of five paid employees- General Manager, Operations Director, Head of Projects, Office Manager and a Secretary. Deloitte provide 8 people to contribute their time and to help with internal audits and legal support. Close the Gap is partnered with Flection, a European IT recycler and refurbisher and more information can be found at; (www.flection.com). Close the Gap prices computer refurbishers in Europe to get the cheapest quote every three years. It costs Flection anywhere between €40-100 to refurbish, transport and install the required software. All the computers contain

Window XP, Ubuntu and have a warrantee but a variety of software is available depending on the type of project they are going to. In total, 15,000 computers were sent to the developing world last year. This was worse than previous years due to a delay with the Ugandan project over legislation regarding the import of second-hand computer equipment. Close the Gap have a 0% landfill policy, therefore once the computer/computer equipment reaches its end-of-life, it is sent back to Flection to be recycled in an appropriate manner.

In order to apply for computers, a project proposal must be submitted and if successful, a contract will be drawn up.

Close the Gap within its project management makes a distinction between infrastructural and charity missions. *Infrastructural missions*; Close the Gap provides IT solutions for educational, social, medical, good-governance and civil society projects. Close the Gap installs the equipment; gives follow up on the projects on a regular basis and ensures the systems are up to date. The beneficiary is usually charged but this is at a subsidized rate. *Charity missions*; are very similar to infrastructural missions but apart from sending and installing hard and software, Close the Gap supports charitable organizations by means of communication, logistic expertise and/or financial resources. The majority of computer equipment on these missions are distributed free of charge; instead Close the Gap tries to establish partnerships to develop links with the developing world.

One of the weaknesses Close the Gap would like to improve is the African managerial structure. David mentioned how they rely strongly on their project partners in Africa and how at times the implementation was weak and certain professionalism was lacking. However, Close the Gap support organizations locally and believe mistakes need to be made to learn and develop.

Close the Gap goals for the next 6 months are to fulfill their distribution partnership with Uganda, Rwanda and Burundi and to finalize a business plan for e-waste in East African countries.

The organizations plan for the next five years is to;

1. Continue to diversify-provide other equipment and enhance networks.
2. To engage fully in an e-waste management system which is proposed and will hopefully be based in Uganda?



The interview with Ruth Leacock, Board Chair for Computers for Schools Africa; took place on the 22nd of April 2010.

Computers for schools Africa began when Tim Leacock realized one day just how many computers are thrown to landfills in the USA every year (around 30 million). That particular evening he went to dinner with a Jesuit missionary and they came to the conclusion that instead of throwing away these computers they he could refurbish them send them to Africa and then they could teach people how to use them. Computers for Africa was born.

In 2002 Computers for Schools Africa became a registered not-for-profit organization and they have 501C3 certificate which allows them to make tax-deductable contributions. The work involved in acquiring not-for-profit status is detailed on their website.

Computers for Africa are based in Omaha, Nebraska, USA and their offices are based in their home. Their radar for collecting computers is approximately 50 miles. They generally do not accept donations from individuals as collecting the computers is easy but refurbishing them is not and they believe it is easier to repair computers from the same model. Their main donors would be banks, hospitals, universities, insurance companies and the military. Computers for Africa does not charge anyone for providing computers and any computers which cannot be refurbished, are dismantled and the re-usable parts are taken out then the rest is sent to the Electronic Recyclers 1528 North 16th Street, Omaha, NE. Computers for Africa is partnered with Computers4Africa-UK.

The Computers for Africa team consists of 12 people on the Board of Directors, approximately 100-120 volunteers who refurbish the computers and the majority of these

volunteers come from Creighton Preparatory and Marian High Schools which are in Omaha, Nebraska. The only paid employee is the Head of Operations in Uganda- Herbert Busiku. At present, they do not have any interns working in the organization but this is something they are looking into as they would like to improve the model.

The headquarters for Computers for Africa is in Uganda and they have provided computers to over 120 schools, universities, and health and training centers in Uganda and have also established links in Kenya, Tanzania and Zimbabwe. Computers for Africa have in the past focused mainly on providing computers for education particularly in high schools however they are evolving.

At present, Computers for Africa is only supplying computers for schools in Northern Uganda. Before receiving computers, the institution has to have a constant energy supply, strong administration department; the institution needs to be in overall good shape (both inside and outside, good sanitation, well maintained grounds) and then the teachers will have to undertake a two week intensive training course. This course focuses on how to teach IT to students but also how to take care and fix computers if they become broken. There is a follow up course and it is interesting to note that approximately two thirds of the Computers for Africa budget is used for follow-up services.

The minimum specification for donation is Pentium III and the monitors must be 15-17” and must not be more than 6 years old.

The cost of refurbishing a computer with Computers for Africa is \$35. The shipping costs vary from \$20-30 per computer. They almost always use sea freight containers as they find air transport too expensive. A shipping container holds 400 computers at a time and they will wait until one is filled before it is shipped to the recipient. The recipient in order to receive a computer has to pay a fee of \$75; this covers the cost of refurbishment, shipping costs and 20% of the follow up costs. The software installed on the computers prior to shipping has changed. Once upon a time they used Open Office however technicians in Africa believed it wasn't a good and so would charge institutions to

remove it thus incurring more problems and slowing down the process of dispersing information. Nowadays, Computers for Africa install Microsoft Authorized Refurbisher and they have found it to be better.

In 2009 they shipped 400 computers to East Africa. This was better than the previous year. The main private investors for Computers for Africa are public donations and family contributions. Yahoo has provided a grant to Computers for Africa the past three years and Ruth Leacock won the 'Go the extra mile' award in 2009. They publish their annual reports.

An initiative which began just last year titled 'Mouse on a Mission' has really gained momentum in Omaha. This initiative is trying to advertise that from as little as \$25, this can change a person's future by providing them with basic computer skills. Upon receiving donations, the donor is provided with a certificate of recognition and has the option of buying either t-shirts or mugs. Ruth and Tim Leacock have gone so far as to refurbish three cars into the shape of mice and drive around Nebraska in them to try and spread the word!





One Laptop per Child

The first OLPC prototype was unveiled by Nicholas Negroponte and the then-United Nations Secretary-General Kofi Annan on November 19, 2005, at the World Summit on the Information Society (WSIS) in Tunis, Tunisia.

This organisation was formally established in 2005 and is now run by Nicholas Negroponte, Chairman and Charles Kane, President and Chief Operations Officer. It is a U.S. non-profit organisation which was set up to provide an affordable educational device for use in the developing world. . The OLPC mission statement is “To create educational opportunities for the world’s poorest children by providing each child with a rugged, low cost, low power, connected laptop with content and software designed for collaborative, joyful, self-empowered learning”(www.laptop.org). OLPC has five core principles:

1. Child ownership
2. Low ages- Both hardware and software are designed for primary school children aged 6-12.
3. Saturation
4. Connection
5. Free and open source

The XO laptop developed by OLPC reflects top class engineering and powerful hardware and software development. The shell of the machine is resistant to dirt and moisture and all key parts are designed to fit behind the display. The display measures eight inches diagonally and it contains a rotating dual-mode display (monochrome for outdoors and colour for indoors). With relation to powering the machine, it can be configured to use either two or four rechargeable C-size batteries and by using two batteries, users can also insert a hand-cranked charging device to recharge the machine on the go. Mr. Negroponte said he hoped the laptop would run at least 10 minutes for each minute of cranking.

When a user is near an electrical socket, the laptop can be plugged in using a power cord that doubles as a carrying strap. The machine has moveable Wi-Fi antennas with wireless mesh networking that allows students to collaborate on activities and to share internet access from one connection. The laptop has a sealed rubber membrane keyboard that can be customised for different languages. It runs on just 2 watts of electricity- which is around a twentieth of a typical laptop's needs. It was developed jointly by the MIT Media Lab, OLPC and Quanta, a Taiwan-based original design manufacturer and is manufactured by Quanta in Songjiang, China. The software for the XO consists of a pared down version of the Fedora Linux operating system and specially designed graphically user interface called Sugar. All of the software on the laptop is free and open source. It was developed to explore concepts related to learning, openness and collaboration. A full list of all the software components can be found at: http://wiki.laptop.org/go/Software_components.

OLPC are constantly thinking of new and better ways to improve their model and below shows a roadmap released 22nd December 2009 of the evolving nature of this machine.

| |
|--|
| <p>“The new versions of the XO laptop will be as follows:</p> |
| <ul style="list-style-type: none">• XO 1.5 – The XO 1.5 is the same industrial design as the XO 1.0. Based on a VIA processor (replacing AMD), it will provide 2x the speed, 4x DRAM memory and 4x FLASH memory. It will run both the Linux and Windows operating systems. XO 1.5 will be available in January 2010 at about \$200 per unit. The actual price floats in accordance with spot markets, particularly for those of DRAM and FLASH. |
| <ul style="list-style-type: none">• XO 1.75 – The XO 1.75, to be available in early 2011, will be essentially the same industrial design but rubber-bumpered on the outside and in the inside will be an 8.9”, touch-sensitive display. The XO 1.75 will be based on an ARM processor from Marvell that will enable 2x speed at 1/4 the power and is targeted at \$150 or less. This ARM-based system will complement the x86-based XO 1.75, which will remain in production, giving deployments a choice of processor platform. |

• XO 3.0 – The XO 3.0 is a totally different approach, to be available in 2012 and at a target price well below \$100. It will feature a new design using a single sheet of flexible plastic and will be unbreakable and without holes in it. The XO 3.0 will leapfrog the previously announced (May 2008) XO 2.0, a two-page approach that will not be continued. The inner workings of 3.0 will come from the more modest 1.75” (<http://blog.laptop.org/2009/12/22/xo-3-roadmap/>)

With relation to production, sales and distribution OLPC originally estimated that it would ship 100-150 million XO laptops by the end of 2007 however the program has clearly fallen short. Under more modest goals, production was supposed to reach five million laptops by the end of 2008. “By contrast, industry analysts report that Quanta’s manufacturing effort began only in December 2007 and reached a total of 370,500 units by the third quarter 2008”(O’ Donnell, 2008). OLPC initially aimed to sell the low-cost laptops in lots of one million to governments in developing countries for \$100 each. Once sold to the governments the laptops would be distributed to the pupils by the ministries of education. The laptops once distributed would remain the property of the child. However OLPC has had difficulty in convincing governments to commit to the bulk orders. Uruguay is the only country to have completed the OLPC objective. Over 1.2 million laptops have been distributed in total to the developing world October 2009.

In November 2007, OLPC launched an initiative called ‘Give One Get One’. This allowed people within the US, its territories and Canada to buy two low-cost laptops for \$399. Donors received an XO-1 laptop of their own and the other one was sent to a child in a developing country. The first program was very successful with 167,000 units sold but the second G1G1 which ran in November of the following year resulted in a mere 12,500 units sold-this was a 93% decline from 2007.

OLPC has had difficulties especially with the US economic downturn in 2008 and the increased net-book competition from Intel who in 2006 introduced a similar product called the Classmate which sells for \$230-300. Intel has secured deals to sell hundreds of thousands of Classmates in Libya, Nigeria and Pakistan, some of the very countries

OLPC was counting on. This and an amalgamation of other factors has forced OLPC the not-for-profit to reduce its annual budget from \$12million to \$5 million and this in turn caused a major restructuring in January 2009. The Sugar operating sector with OLPC saw significant cuts with 50% of the staff losing their jobs and the remaining 32 members receiving salary reductions.

OLPC has, due to the massive media frenzy and high profile announcement of the \$100 laptop, has caught the industry's attention and therefore incurred some criticism.

Firstly, the target of \$100 per laptop has not been reached and in fact the cost per unit to the government remains at the \$188 which for some countries is still out of reach.

Further, some have criticized the centralized, top-down design and distribution of the OLPC and have even referred to it as 'imperialistic'.

Leading companies retorted the XO laptop as a useless toy. Intel's Craig Barrett called it "a gadget", saying people wanted the full functionality of a PC (Reuters, 2005). Bill Gates said ".....geez, get a decent computer where you can actually read the text and you're not sitting there cranking the thing while you're trying to type" (Hiser, 2006).

Sir Paul Judge, Chairman, Digital-Links International responded to article written in the Economist on 8th January 2008 comparing the cost and benefits of providing a refurbished PC to the developing world to that of the OLPC scheme.

http://rss.economist.com/blogs/theinbox/2008/01/the_laptop_wars_january_8th

It is evident that expecting a laptop to cause massive revolutionary change showed a degree of naiveté, even for an organization with the best intentions, intelligent people and exceptional creativity.

World Computer Exchange

bridging the global digital divide

Tim Anderson founder of World Computer Exchange answered some questions via email about his company.

The company is headquartered in Hull, Massachusetts, USA. It is a non-profit organization and its mission is to reduce the digital divide for youth in developing communities; to use its global network of partnerships to enhance communities in these countries; and to promote the reuse of electronic equipment and its ultimate disposal in an environmentally responsible manner.

World Computer Exchange has over 25 locations across the U.S. The same system is applied to all workshops in these locations and it is interesting to note that World Computer Exchange has over 700 volunteers. Only two members of staff are paid- the president (Tim Anderson) and the Director of Operations.

World Computer Exchange works closely with its 570 Partner organizations in 71 developing countries, a consortium of 25 Strategic Allies, and a number of Informal Allies throughout Africa, Asia, Latin America, the Caribbean, Eastern Europe, and the Middle East. Its Partners operate 2,650 computer labs connecting over 1 million youth.

Funding is one of the most pressing issues for the company. By the end of 2009, less than 1000 computers had been refurbished and distributed to the developing world. This was a particularly bad year however 2010 looks brighter. Next year's work plan includes initiatives such as; Expand Sponsor Campaign, Improve Marketing, Expand Capacity Building Services, Expand eCorps Services, Expand eWaste Services, Develop University Services.

The minimum specification that can be donated is Pentium 3 PC's or laptops. Prior to deployment a modified partial Ubuntu and open office and some other materials from

their strategic allies are installed on the computers. The computers are transported via ferry in 20-40 foot containers.

WCE volunteers provide ongoing online help related to project planning, partnership development, fund raising, tech support, content support, teacher training and responsible disposal of e-waste. WCE sends teams of volunteer university students or tech professionals after the computers have been installed. They provide help with troubleshooting, upgrading the networks, and training in the use of the Internet to improve education.

More detailed information about World Computer Exchange budget can be found at;
<http://www.worldcomputerexchange.org/financials>



CARE

This interview was conducted with Jib Hagan, Founder and Global Development Director on May 19th 2010.

CARE (Collect and Recycle Ecologically) was conceived when PHOEBE HAGAN, a then 7 year old British girl, visited her father's native country, Ghana, for the first time in February 2002 with her parents. During their short holiday, she together with her little sister Alice decided to join their cousin, Felicia Arko-Nsarful, to her school, Mount Olivet Methodist Academy. Back home in Worthing, England she wanted to send emails to her cousin and the new friends she had made but was distraught to learn that they have no access to PC's (at school or at home) so she could not communicate as she wanted. This did not go down well with her and she wished something could be done to change it. When her school, Chesswood Middle School was upgrading their computers, she asked the Head Teacher if perhaps her Dad could take the redundant ones and send them to a school in Ghana to allow her friends to have access to PC's like she does. The first batch of computers was distributed. Upon hearing how successful the project had been, BOC Edwards- the company her father worked for at the time donated a second batch of computers and these computers were donated to another school in Ghana. Before long, word had spread and many UK businesses were donating their redundant computers. CARE became a registered charity in March 2006.

CARE mission is to advance the education of pupils in schools in Ghana by providing computers recycled from UK schools, health services and businesses. CARE also promotes the conservation, protection and improvement of the physical and natural environment by recycling and ensuring the safe disposal of computers when they become irreparable

What CARE does specifically is collect redundant computers, wipe all the Hard Drives to British Ministry of Defense standards (i.e. completely wipe off all programs from the Hard Drive) using IBM Security Data Disposal (SDD), before loading on the appropriate software and shipping them to Ghana. For Pentium 2 and 3 computers Linux Red Hat Millennium is installed whilst on some newer models such as some Pentium 3 and 4 Ubuntu, Open Source is installed. The refurbishment process takes place in the workshop in Worthing, West Sussex. The team consists of 4 trustees and 12 volunteers.

CARE distributed nearly 1000 computers to the developing world last year (421 in March and 450 in October). This was better than previous years. It costs CARE £35-40 to refurbish and transport a computer to the developing world so a fee of £10 is required to cover costs upon donating any equipment. The beneficiary has to pay £40 per computer. This fee covers installation, maintenance and helps technicians in Ghana explain to both teachers and students how to work the technology. CARE has started to send volunteers to help the technicians and help out in schools. The majority these volunteers are gap year students and they spend 3 months on average in Ghana.

Prior to deployment of computers, the school has to fill out a survey and has to be checked to ensure proper infrastructure is in place such as air-conditioning-to ensure the computers won't become overheated, a burglar alarm to provide security and a steady source of electricity. CARE works closely with the government and Ministries of Education in Ghana to ensure the computers are utilized correctly and are disposed of in a safe manner. When the computers have reached their end-of-life, they are transported back to the UK to be disposed of in a safe, appropriate manner and fulfill their 0% landfill policy. An article by a newspaper in Ghana describes this process; <http://news.ghananation.com/templates/?a=16641>

CARE is also trying to promote an environmentally conscious generation. Jib noticed that there is no recycling at all in Ghana and this worried him. One of the obvious sources of litter was the plastic sachets of filtered water. These plastic sachets would clog drains which would increase flooding during the rainy season and provide a breeding ground for

mosquitoes. Around 220million sachets are disposed of every single day and the most common methods are burning or burying them which are not environmentally friendly. Jib brought it to the attention of the Head Teachers in all of the schools he provided computers to, of a recycle centre in Tema, Accra, Ghana. The pupils in these schools have now become eco-warriors and protecting the environment is now a core subject. Also, in helping clean up the schools they are also providing valuable money as the recycle centre will pay for plastic.

CARE three most important goals are the improvement of the quality of education in Africa; to reduce blackboard and chalk and encourage change and; to promote the development of environmental consciousness.

However, there are some weaknesses in the organization. Around 3 years ago an entire container being transported by DHL was stolen at a port in Ghana and this transport company was not taking proper care with the computer equipment as promised so Jib decided in order to ensure all the equipment reached the said destination, he would have to be there for every consignment of computers and ensure they reached the beneficiaries. Also, he changed transportation companies from DHL to Merlin Shipping Co. Jib believes one of the most important parts of this project is to follow up and ensure that the computers are put to use and try and rectify any problems schools may have with them. He referred to several cases (not within the organization) in which computers were sent to developing countries and left in boxes and unused. This is a problem which he does not want to have.

The organizations plan for this year to send another assignment of 420 computers which are fully refurbished in the workshop to Ghana in the coming months. Also, CARE is going to collaborate with IT Skills for Rural Kenya-which is another not-for-profit focusing on delivering technology to the developing world. The aim is to distribute 20,000 computers for the next 5 years. <http://www.itskills4ruralkenya.org/>



Computers for Charities

This information was provided by Simon Rooksby, Founder and Chairman of Computers for Charities via email.

Computers for Charities became a registered charity in 1998 and are based in East Sussex in the UK. The organization collects from the entire mainland of Britain and Northern Europe. In total, there are 20 people in the team and the entire refurbishment process is done on-site in Sussex. None of the people who work with this charity are paid-it is 100% voluntary. It remains independent from main grant sources.

Computers for charities have provided computers to 105 countries in the world. The organization varies with relation to its areas of focus from NGO's to churches to government departments.

Education has been the key request for assistance. Since 1995, African Schools Online Program is an initiative which aims to help schools and local communities by identifying and addressing limitations of educational and skills opportunities in overseas schools and communities, through the development of appropriate and sustainable programs with a big emphasis on ICT. This project by Computers for Charities key requirements are commitment, transparency and viability. Computers for Charities take full responsibility for the computers prior deployment and after installation. The criteria for deciding who get the computers is based on a skills assessment of location which includes a site assessment, skills analysis and the agreement of participants to maximize the usage of resources by allowing the use of the resources to neighboring schools and people in the community.

It costs £20 to refurbish one computer within this organisation-this does not include shipping costs. Computer donors do not have to pay a fee however donations of 10+ computers are required. Over 95% of Computers are donated by universities, government departments, hospitals and banks and insurance companies. The beneficiaries of the refurbished computers overseas do not have to pay a fee and full training and maintenance is provided and the end-of-life computers are catered for in house. 2000 computers were sent there last year. Also, refurbished computers are available for sale in the UK to schools, charities and churches.

Approximately, 10,000 computers were distributed last year. However, this was down on previous years due to the recession and increased shipping costs. Only branded equipment with a minimum Pentium 4 and Ghz processor type will be accepted and/or distributed. The software installed is determined by the recipient so it ranges in format from Linux to Microsoft and Apple Macs.



United Nations
Educational, Scientific and
Cultural Organization

UNESCO Bangkok

UNESCO Bangkok website launched the Asia-Pacific ICT in Education program. This program aims to promote the utilization of appropriate technologies in education, so as to tap their potential for knowledge dissemination, effective learning and the development of more efficient education services.

The website links other projects and activities which promote the effective use of ICT in education; the website shows how ICT are being integrated into education systems in the Asia-Pacific region and all over the globe. The website is aimed at education policy makers and planners, education managers, supervisors and schools administrators, curriculum and software/ material developers, teachers and non-formal educators, education researchers, development workers and anyone planning to implement an ICT project. The website provides a wealth of information regarding ICT in education, how to make ICT a central component in education systems, effective techniques to integrate ICT into the education systems, how to measure the real impact of ICT in education and how to provide the necessary training to teachers and policy makers for ICT in Education.

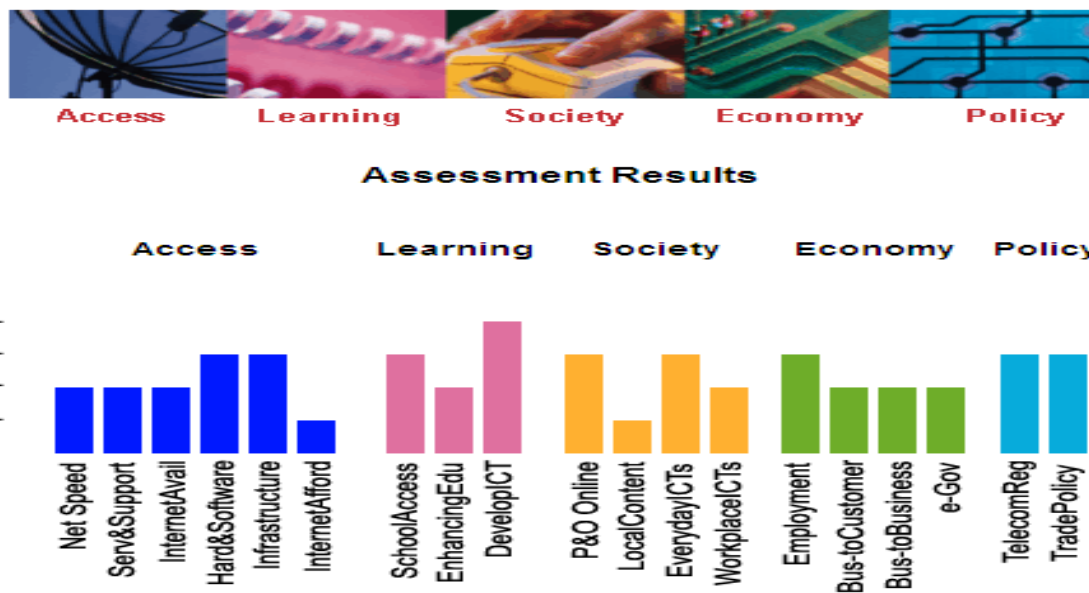
The *'Monitoring and Evaluation of ICT in Education Projects: A Handbook for Developing Countries'* is a good resource. It details among other aspects the core indicators for M&E and pro-equity approaches to M&E. Chapter 7- Do and Don'ts in Monitoring and Evaluation compiled by Tim Unwin and Bob Day is a fantastic overview of the right and wrong approaches to M&E. The full report can be assessed at;

http://www.unescobkk.org/fileadmin/user_upload/ict/e-books/MonitoringandEvaluation/ME ICTEducation_draft.pdf

A link, which may prove useful for schools or communities who are trying to assess the ICT infrastructure already in place and/or the necessary refurbishments to fully utilize the benefits of ICT can be found on the UNESCO website.

<http://cyber.law.harvard.edu/readinessguide/accesstest.html>

This is a webpage set up which shows graphically whether or not the schools, communities or institutions are ready for ICT. It takes into account five areas of network readiness; access, learning, society, economy and policy. Each area is divided into 2-5 questions which will assess the level of readiness. This resource could be used to evaluate how developing countries visualise their e-readiness. The graph once completed will look like;



A section on UNESCO Bangkok website deals with indicators for assessing M&E.

<http://www.unescobkk.org/education/ict/themes/measuring-and-monitoring-change/>

The section provides a thorough insight into M&E in ICT in Education. The ‘assessment tools’ link looks at over 20 methods tried and tested on how to enhance M&E. It provides a template for M&E describing the pros and cons of each method, depending on the specific areas one wishes to evaluate.

A good link describing the advantages and disadvantages of Open Source software can be found at;

<http://www.unescobkk.org/education/ict/technologies/computer-software/open-source/>.

Camara which uses OSS may find this link useful as it details case studies and there are further links to OSS groups which Camara could use to develop Camarabuntu and enhance its overall performance.

An informative, fun online game which has been developed is EVOKE. It is a social networking site. It set in the year 2020 and is a graphic novel showing some of Africa's best and brightest trying to solve some of the world's problems such as food insecurity, gender disparity and war. The game allows players to create a profile and solve problems individually or as a team. The game is free to play online and it has proved to be very successful only being released this year and getting over a million hits in one month.

A fun slideshow by Mike Trucano, ICT and education Specialist can be assessed at;
[http://www.unescobkk.org/fileadmin/user_upload/apeid/Conference/13th_Conference/PP T/Mike_Trucano_ppt.pdf](http://www.unescobkk.org/fileadmin/user_upload/apeid/Conference/13th_Conference/PP_T/Mike_Trucano_ppt.pdf)

Further Reading;

- Heeks, (2009) The ICT4D Manifesto: Where next for ICT's and International Development?

http://www.sed.manchester.ac.uk/idpm/research/publications/wp/di/documents/di_wp42.pdf

- Open Educational Resources-An article on WikiEducator;

<http://www.elearningeuropa.info/files/media/media16681.pdf>

- Different indicators used to Monitor and Evaluate ICT in Education;

<http://www.unescobkk.org/education/ict/themes/measuring-and-monitoring-change/guidelines/examples-of-ict-indicators/>

- The Pan Africa (PanAf) network was established to contribute to the development of African countries and people by increasing knowledge on the pedagogical integration of ICTs in African schools and education systems - so you might find their newsletter helpful as it provides a lot of research literature on ICT use in the African context, available at:

http://zunia.org/index.php?id=11728&tx_dgcontent_pi1%5btt_news%5d=298832&cHash=6ccf697b75

- Commonwealth of Learning is an organization set up by Heads of the Commonwealth to encourage the development and sharing of open/learning distance education.

<http://www.col.org/Pages/default.aspx>

Concluding Remarks:

ICT is taken for granted in the developed world. Digital-Links state that less than 1% of the population of Africa have ever used a computer and this is something which needs to be addressed. The organisations detailed in this report are providing a service, a product, a library, a communication tool, an education and a brighter future for the few people they help learn how to use the technology. There are greater opportunities available to people with basic computer literacy than to those without.

The stark contrast between the organisations structure is interesting. Some, like Camara refurbish their computers on-site, others use an asset management company, some have a specific week/ week-end and get help from the local high-schools and people in their local area whilst IT Schools Africa outsource 80% of the refurbishment process to prisons in the region. The costs of refurbishment vary greatly from £6-€100. However, it is evident that all organisations are aware of their environmental responsibility and try to dispose of their end-of –life computers in a safe and environmentally sound way.

More research needs to be done in the importance and benefit of ICT in education and priority given to developing the curriculum globally integrating ICT in all subjects.

An education in ICT is an invaluable tool which if nurtured properly can sustain and develop nations.

ANNEX