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Promoting Sustainable Development through ICT in Developing Countries

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Abstract
This paper outlines how ICTS in general will promote sustainable development in developing countries. This can be promoted through acquiring ICT skills in various ways which include: software development commercial outfit, computer training maintenance, networking and internet service as well as enhancing teaching and learning activities. Also the paper revealed the possibilities for locating independent working environment through ICT facilities such as economic sustainability, social sustainability, and political sustainability. It also looks at the possible challenges of implementing ICT such as lacks of maintenance culture, budgetary constrain, and infrastructure related problems. Finally the paper emphasized that proper utilization of ICTs is necessary for promoting sustainable development in developing countries
Keywords: Information Communication Technology (ICT) skills, sustainable development, prospects and challenges.

INTRODUCTION

One of the problems that are facing developing countries today is sustainable development. Information and Communication Technologies (ICTs), which include radio and television, as well as newer digital technologies such as computers and the internet have been touted as potentially powerfully enabling tools for educational change and sustainable development. When used appropriately, different ICTs are said to help expand access to sustainable development. Strengthen the relevance of ICT in education; organization (both private and public sectors) will lead to the success of achieving goals and objectives for self-reliance. ICTs stand for information and communication technologies which can be defined as a "device set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information" These technologies include computers, the internet, broadcasting technologies (radio and television), and telephony. (Blurton, 2011)

The term "ICT" describes the use of computer-based technology and the internet to make information and communication services available to a wide range of users. The term is used broadly to address a range of technologies, including telephones. Central to these is the internet, which provides the mechanism for transporting data in a number of formats including text, images, sound, and video. Additionally, ICT deals with the application layer, the systems that enable information to be collected and distributed, analyzed, and processed. ICT is an integration of the technologies and the process to distribute and communicate the desired information to the target audience and making the target audience more participative in nature. The term ICT also refers to: *information channels* such as the *World Wide Web,* online database, electronic documents, management and accounting systems, intranet, etc. communication channels such as e-mail, electronic discussion groups, electronic conferences, the use of cell phones, etc. hardware and software used to generate, prepare, transmit, and store data, such as computers, radio, TV, computer programmes/tools, etc. (International Institute for Sustainable Development, 2007)

CONCEPT OF SUSTAINABLE DEVELOPMENT

According to Ayodele, (2007), sustainable development can be broadly defined as the ability of the economy to support the needs of the people of a country over a time, taking into consideration the economic, social and ecological constraints of the country. The fundamental concept is "sustainable requirement," namely that the fulfillment of the needs of the present generation should not compromise the ability of future generations to meet their own needs. (The Bruntland Report, WECD, 43). Furthermore, ICT for sustainable development on the other hand represents a catalytic process for social change that seeks to foster through education training and public awareness-the values, behaviours and lifestyles required for sustainable future. It is about learning needed to maintain and improve our quality of life of generations to come. It is about individuals, communities, groups, business and government to live and act sustainably; as well as giving them an understanding of the environmental factor, good moral behaviours and economic issues involved (Ayodele, 2007).

OBJECTIVE OF ICT FOR SUSTAINABLE DEVELOPMENT

Some of the objectives of ICT in sustainable in development countries include[2]:

- To develop high-end entrepreneurship using IT methods, tools and infrastructures.
- To network agencies, academic institutions and organizations to create a support system for ICT skills development.
- To act as a policy advisory body for ICT development
- To facilitate and conduct various information services relating to promotion of ICT skills.

Furthermore, according to Saidu et al (2008), the objectives include:

- To actively facilitate e-leaning and teaching in the manner that the goals of sustainable development could be promoted.
- To encourage creative and integrative teaching and learning which ensures that learning becomes student focused and ideas as well as individual initiatives are directed towards various learning pathways so as to achieve the national development goals of developing countries
- To ensure easy access to educational materials, high quality data, information and knowledge as well as research findings relevant to the problems of developing countries.

PROSPECTS OF ICT FOR SUSTAINABLE DEVELOPMENT

Web site design*:* Young school leavers can be fully engaged in web design thereby bringing market information closer to the rural dwellers through the use of local language that is understood by the people.

Programming: Many Small and Medium Enterprise (SMEs) today employ the use of database in their daily business transaction. Young programmers can adequately earn a living by coding the programs that will run these SMEs.

Maintenance: One of the major requirements in the ICT world is the technical skill to service the computer and other ICT facilities. Youths can develop themselves in this area and then becomes self-reliant as they can even serve as consultants to the governmental and non-governmental organization

Commercial Computer Outfits: There is great demand for printed document in today's society. Thus youth can empower themselves with the necessary computer skills that can make them self-employed in meeting this demand.

Computer Training Centres: young people are increasingly being engaged in the training of other youths (i.e. train the trainers) in acquiring computer literacy thereby getting their source of livelihood from running the training centres.

Computer Networking: this play an important role for easy and effective dissemination of information in industries, organization, institutions and almost all governmental parastatals. Hence, young generation can be empowered with IT skills on how to do computer networking.

Cyber Café: young men are being employed to manage various cybercafé throughout the world there by giving them job opportunities for self-reliance.

Economic Sustainability: ICT play an important role in sustaining the economy of a country. Through internet GSM, radio, television etc. Different transactions takes place all over the world in 24 hours. With the use of credit card you can make transaction anywhere in the world without waste of energy and time. Banks also use ATM card for withdrawal of money in 24 hours. Therefore, the process of e-banking and e-commerce is very important in promoting the economic development of a country in the context globalization.

Social Sustainability: ICTs equipments give people access to listening and reading news as well as entertainment. It is possible to chart with a friend through internet both audio and visual. This is also applicable to GSM also allows teleconferencing (more than two people communicating at the same time).

Political Sustainability: This is the greatest weapon that politician use in doing their campaign. Television, radio and internet play very important role here. With these equipments they reach everybody in the whole world during campaign. Sophisticated software is used in casting and counting vote which minimize injustice during election. In fact, in the 2008 US election, Obama relied heavily for his success in the polls on the internet through which millions of dollars were collected as donations for his campaign.

Enhancing Teacher Training: ICTs have also been used to improve access to and the quality of teacher training. For example, institutions like the Cyber Teacher Training (CTTC) in south Korea are taking advantage of the internet to provide better teacher professional development opportunities to in-service teachers. The government funded CTTC, established in 1997, offers self-directed, self-paced web-based courses for primary and secondary school teachers. Courses include "computers in the information society," "Education Reform," and "future society and education." Online tutorials are also offered, with some courses requiring occasional face-to-face meetings. In china, large-scale radio and television-based teacher education has for many years been conducted by the China Central Radio and TV University. (Carnoy, et al. 2001),

[2] http://dst.gov.in/neb-highlights.pdf 14-02-2011

The shanghai Radio and TV University and many other RTVUs in the country. At Indira Gandhi National Open University, satellite-based one-way video-and two-way audio-conferencing was held in 1996, supplemented by print materials and recorded video, to train 910 primary school teachers and facilitators from 20 district training institutes in Karnataka State. The teachers interacted with remote lecturers by telephone and fax. (Carnoy, et al., 2001),

Active learning: ICT enhanced leaning mobilizes tools for examination, calculation and analysis of information, thus providing a platform for student inquiry, analysis and construction of new information learners therefore learn as they do and, whenever appropriate, work on real-life problems in-depth, making learning less abstract and more relevant to the learner's life situation. In this way, and in contrast to memorization-based or rote learning, ICT-enhanced learning promotes increased learner engagement. ICT-enhanced learning is also "just-in-time" learning in which learners can choose what to learn when they need to learn it.

Collaborative learning: ICT-supported learning encourages interaction and cooperation among students, teachers, and experts regardless of where they are. Apart from modeling real-world interactions, ICT-supported learning provides learners the opportunity to work with people from different cultures, thereby helping to enhance learners' teaming and communicative skills as well as their global awareness. In models learning done throughout the learner's lifetime by expanding the learning space to include not just peers but also mentors and experts from different fields.

Evaluative learning: ICT-enhanced learning is student-directed and diagnostic. Unlike static, text-or print-based educational technologies, ICT-enhanced learning recognizes that there are many different learning pathways and many different articulations of knowledge. ICTs allow learners to explore and discover rather than merely listen and remember. Direct class teaching, where broadcast programming substitutes for teachers on a temporary basis; school broadcasting, where broadcast programming provides complementary teaching and learning resources not otherwise available, and general educational programming over community, national and international stations which provide general and informal educational opportunities.

CHALLENGES OF ICT FOR PROMOTING SUSTAINABILITY DEVELOPMENT

ICT is one of the tools that used in promoting sustainability development in both developed and developing countries. Nevertheless, there are some challenges facing the integratio0n of ICT effectively. The significant challenges are outline below:

Lack of Maintenance Culture: ICT facilitate needs regular maintenance in other to sustain it maximum life span: But unfortunately, most of the developing countries neglect maintenance culture and this seriously affects ICT equipments.

Lack of Time and Resources: Staff lacking the time to deal with the challenges of sustaining ICT facilities, which is time-consuming. IT departments already face increasing demands from their institutions, without a commensurate increase in staff. Many of the programming changes required to implement sustainable ICT require considerable technical skill to implement. This constraint will become less pressing as staff becomes more familiar with the issues.

Budgetary Constraints: Many government parastatals and tertiary institutions feel they are under-funded, and lack of capital budget means there is no enough money to spend on sustaining ICT facilities and activities. Most capital budget for ICT has to be spent on activities that contribute to immediate goals. Universities and colleges are further disadvantaged because they misused priority in their dealings. Savings from energy efficiency measures will result in lower operational costs, but normal budgeting systems make it difficult to transfer money saved from operational costs to a capital budget

Lack Information and Guidance: Because the issue of sustainable ICT is relative new, many people, particularly teaching and research staff, do not know where they can find relevant information and guidance about. Especially confusing is the fact that a number of vendors claim that their products are "green". A common problem is that much of the ICT equipment used in the institution is not owned by the IT department, so it is hard to carry out an audit of what is owned by whom, and how energy-efficient it is. The situation is exacerbated by the lack of standardized metrics to assess the energy efficiency of ICT equipment.

A good understanding of the energy consumption association with specific computer tasks is a prerequisite for better management, but without this kind of information it is difficult to set targets for, and therefore to measure the success of sustainable ICT projects.

Infrastructure-related Challenges: Before any ICT-based programme is launched, policymakers and planners must carefully consider the following:-

- Appropriate rooms or buildings should be available to house the technology? Proper buildings extensive retrofitting to ensure proper electrical wiring, heating/ cooling and ventilation, and safety and security are highly needed.
- Another basic requirement is the availability of electricity and telephony. In developing countries large areas are still without a reliable supply of electricity and the nearest telephones are miles away.

CONCLUSION

From the foregoing, it is clearly showed that ICT play an important role in sustainable development for both developed and developing countries. Consequently, recommendations were made for minimizing some of the challenges attributed to the implementation of ICT facilities. In conclusion, government and any other stake holders must take necessary measures on proper implementation of ICT facilities in order to achieve goals and objective of sustainable development.

- A rigorous analysis of the present state of the education system. ICT-based interventions must take into account current institutional practices and arrangements. Specifically, drivers and barriers to ICT use need to be identified, including those related to curriculum and pedagogy, infrastructure, capacity-building, language and content, and financing.
- The specification of educational goals at different education and training levels as well as the policymaker an understanding of the potentials of different ICTs when applied in different contexts for different purposes, and an awareness of priority education needs and financial and human resource capacity and constraints within the country or locality, as well as best practices around the world and how these practices can be adapted for specific country requirements.
- The specification of existing sources of financing and the development of strategies for generating financial resources to support ICT use over the long term.
- Government should provide adequate fund for ICT facilities maintenance and otherwise.
- Also government should create monitoring and evaluation team in respects to the ICT facilities distributed to the various intuitions and organizations.

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