A Study approach to examine challenges for higher learning institutions to prefer ICT for teaching and learning

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ABSTRACT:-

The application of Information and Communication Technologies (ICTs) is already changing the organization and delivery of higher education. The pedagogical and socio-economic forces that have driven higher learning institutions to adopt and incorporate ICTs in teaching and learning include greater access to information, greater communication, synchronous and asynchronous learning, increased cooperation and collaboration, cost-effectiveness, and pedagogical improvement. However, ICTs have not permeated to a great extent in many higher education institutions in most developing countries due to various socio-economic and technological factors. This paper discusses new learning and training technologies considering their pedagogical, cost and technical implications. It also discusses challenges for integrating these technologies in higher learning institutions and provides best practice approaches for addressing each of the challenges.

Keywords: *Information and Communication Technology, e-learning, Teaching and learning Technologies, Higher learning Institutions.*

INTRODUCTION

Developments in Information and Communication Technologies (ICTs) have impacted all sectors of society, including the education sector. In higher education, the application of ICTs in the form of e- learning is already changing teaching and learning processes. There are many pedagogical and socio-economic factors that have driven higher learning institutions to adopt e-learning. These include greater information access; greater communication via electronic facilities; synchronous learning; increased cooperation and collaboration, cost-effectiveness (e.g. by reaching different students and in greater numbers) and pedagogical improvement through simulations, virtual experiences, and graphic representations. Both trainers and learners can choose more appropriate applications which are flexible in time, in place, personalized, reusable, adapted to specific domains and more cost-efficient.

On the other hand, there are a number of challenges that face universities in developing countries as they seek to implement e-learning systems. AAU (2001) asserts that African universities, which should be in the forefront of ensuring Africa's participation in the ICT revolution, are themselves unable and ill-prepared to play such a leadership role. This is because of the information infrastructure of African universities, which is poorly developed and inequitably distributed.

This paper discusses the application of ICTs in teaching and learning by reviewing the e-learning context, and then focuses on the pedagogical, cost and technical implications of different ICTs that can be used for e-learning purposes. Challenges for integrating these technologies in higher

learning institutions in developing countries are discussed, giving best practice approaches for addressing each of the challenges.

E-LEARNING IN CONTEXT

E-learning refers to the use of ICTs to enhance and support teaching and learning processes. It is the instructional content or learning experiences delivered or enabled by electronic technologies, and it incorporates a wide variety of learning strategies and technologies. E- learning ranges from the way students use e-mail and accessing coursework online while following a course on campus to programmes offered entirely online (Commission on Technology and Adult Learning, 2001). It is thus an alternative solution, which enlarges accessibility to training and becomes essential to complement the traditional way of teaching (i.e. face-to-face).

E-learning encompasses a continuum of integrated educational technologies. At one end are applications like PowerPoint, which have little impact on learning and teaching strategies or the organization. At the other end are virtual learning environments (VLEs) and managed learning environments (MLEs), which can have a significant impact upon learning and teaching strategies and upon the organization (OSU, 2003). Broadly, OSU (2003) views the continuum of e-learning as the educational technology from the supplemental use of technology in the classroom, through blended or hybrid uses comprising a mix of face-to-face and fully online instruction, to fully online synchronous and asynchronous distance learning environments delivered to remote learners.

In the supplemental use of ICTs to complement traditional learning experiences, the instructor teaches all sessions in the classroom but with the occasional use of technology, such as Web-based activities, multimedia simulations, virtual labs, and/or online testing (Arabasz and Baker, 2003). Blended learning denotes a solution that combines several different delivery methods, such as collaboration software, web-based courses, and computer communication practices with traditional face-to-face instruction. On the other hand, distance learning is conducted solely online, where interaction may be synchronous or asynchronous.Synchronous learning requires the teachers and students to interact at the same time, though they may be dispersed geographically. On the other hand, asynchronous learning allows teachers and students to interact and participate in the educational process at different times, irrespective of their locations. Actually, the use of synchronous with asynchronous activities is determined by the available technology, cost, and maintenance and is adjusted to suit each course, instructor and audience (Graziadei et al., 1997).

E-LEARNING TECHNOLOGIES

E-learning functionally incorporates a wide range of instructional strategies and ICT tools for exchanging information and acquiring knowledge. These ICT tools include television and radio, Compact Discs (CDs) and Digital Versatile Discs (DVDs), video conferencing, mobile technologies, web-based tools, and electronic learning platforms. This section describes these ICTs and assesses their pedagogical, technical, and financial considerations..

Television (TV) is an electronic device that displays visual images of stationary or moving objects, either live or pre-recorded, and typically includes sound that is electronically captured, processed, and reproduced. Similarly, radio refers to the transmission of live or pre-recorded audio. Both TV and radio enhance teaching and learning by providing access to processes and activities that might otherwise be unavailable to the learner. However, digitalization has replaced analog audio and video systems.

Compact Discs (CDs) and Digital Versatile Discs (DVDs) are based upon laser technologies for writing and reading data. They provide a way in which a large amount of multimedia training material can be stored and made available to end-users: CD-ROMs can store up to 1GB, while DVDs can store up to 17 GB. CD-ROM and DVD-based products can be linked with online information sources. This hybrid approach provides the user with access to media-rich, up-to-date information.

Video conferencing is a system where two or more participants, based in different physical locations, can see and hear each other in real time (i.e. live) using special equipment. It is a method of performing interactive video communications over a regular high-speed Internet connection. A videoconference can be either two-way (point-to-point) or multipoint, linking three or more sites with sound and video. It can also include data sharing, such as an electronic whiteboard where participants can draw on, or text-based real-time 'chat'. An interactive whiteboard is simply a surface onto which a computer screen can be displayed, via a projector (Department for Education and Skills).

Mobile e-Learning (sometimes called 'm-Learning') is a new way to learn using small, portable computers such as personal digital assistants (PDAs), handheld computers, two-way messaging pagers, Internet-enabled cell phones, as well as hybrid devices that combine two or more of these devices into one.These technologies have enormous potential as learning tools.

World Wide Web (WWW) is set of software tools and standards that allow users to obtain and distribute information stored on a server and connected to Internet. WWW is a decentralized information system, in which anyone can add new information whenever he/she wants. Lecture notes and other teaching materials are placed on the WWW and linking useful websites to these resources for students to access. In the recent years, web and Internet technologies have matured significantly by providing a uniform access media for both asynchronous and synchronous learning. This phenomenon has significantly increased the popularity of on-line learning (Chen et al., 2003). The usage of web technologies in e-learning are further enhanced with the web 2.0, which is a set of economic, social, and technology trends that facilitate a more socially connected Web where everyone is able to add to and edit the information space .These include blogs, wikis, multimedia sharing services, content syndication, podcasting and content tagging services.

E-learning platforms (sometimes called learning management systems (LMS)) are applications used for delivery of learning content and facilitation of learning process. They are developed for administration and teaching in tertiary education. This software enables the administrators and lecturers to treat enrolment data electronically, offer electronic access to course materials and carry out assessments. The activities managed by the LMS vary from instructor- led classroom training to educational seminars to Web-based online training. In addition to managing the administrative functions of online learning, some systems helps create, reuse, locate, deliver, manage, and improve learning content. These systems are called Learning Content Management Systems (LCMS) (Rengarajan, 2001). LCMS actually provide tools to deliver instructor-led synchronous and asynchronous online training. The LCMS provides tools for authoring content as well as virtual spaces for learner interaction (such as discussion forums and live chat rooms). Rengarajan (2001) emphasizes the importance of integrating both LMS and LCMS because they share different levels of administrative interests in the same entities. Lack of smooth integration between the products results in a broken solution with administrative conflicts.

Many e-learning platforms (both LMS and LCMS) currently available are based on either proprietary e-learning software (PES) or open source e-learning software (OSS). OSS usage in implementing e-learning systems is more emphasized in developing world due to the challenges

faced when implementing the PES. Coppola describes two characteristics of PES that make it ill-suited: (1) the rapidly escalating cost of proprietary software leaves too little of an institution's ICT budget available for creative exploration, once the software has been installed and minimally supported; (2) reduced flexibility to adapt to institutional culture, teaching practices, and disciplinary uniqueness occurs when software development is driven by mass market economics.

Open source software offers the potential to reduce the cost of the software while providing the universities greater control over its destiny. Elimination or reduction of license leaves more budgets available to invest in adapting and managing the software; offers reliability, performance and security over proprietary software due to the availability of the source code, which allows vulnerabilities to be identified and resolved by third parties and it is easy to customize (Wheeler 2003). Some of the widely used open-source e-learning software programs are the Claroline and Moodle.

PEDAGOGICAL, TECHNICAL AND COST IMPLICATIONS OF E-LEARNING TECHNOLOGIES

e-learning technologies	**Pedagogical implications**	**Technical implications**	**Costimplications**
TV/Radio	Effective use of TV/radio depends on three key moments in the application:before,during and after the viewing session and give instructions,explanations, questions or evaluation before and after each moment	Equipment's are needed depending on the objectives and the scope of the training application, which includes audio cassette,video camera,PCs,editing software,distribution channel and receiving and displaying equipment.	Costly in terms of TV/radio production, which includes, animation and graphic designers, hardware, access to the broadcast network
CD/DVD	• Simulation for self- study • Used with the presence or remote support of the trainer	Hardware that meets their specifications - graphic screens, MPEG2cards,CDor DVD reader and appropriate software	Costs are higher than for printed materials - replication downloading free products or buying ready-made product scan lower the costs.
Web-based technologies	Permanent accessibility (24hours,all days of the week), speed, direct communication, link store related topics and up-to-date notes.	• Fast computers with soundcards and reliable Internet connection are required. • The following team is needed for implementing web-based training: (a) Instructional designer	Hardware,technical expertise and Internet subscriptions costs

		familiar with computer delivered instruction; (b) A programmer or author to use the authoring tool; (c) A graphic artist; (d) A subject matter expert; (e) A webmaster for maintaining the Programme on the server	
Video conferencing	• New pedagogical methods requiredto provoke interaction • Require smallgroups • Both trainers and learners requiresome basic training	Required equipment :(i)Soundproofing and controlling the lighting conditions; (ii) Audio-visual peripherals – TV monitor or video projector, camera(s), microphone(s) and sound playback; (iii) Videoconferencing codec (Rollabout) (iv) Multimedia PC (with PCI-based as well as software based videoconferencing codec)and (v) More bandwidthisneeded for higher-quality images	There are two types of costs: setting up the videoconferencing system and operational costs.
e-learning platforms	• Adding and changingcontent as course is progressing. • Template for inclusion of coursecontent. • Support multimedia presentation of course content while others are text based. • Complex structuring of content allowing for multiple links and cross-reference possibilities	(i) Server platform hardware requirements; (ii) Client platform hardware requirements; (iii) Operating system/cross platform; (iv) organization/ registration/ administration;and (v) The learning contentshouldbeinstandardformats thatcaneasilybe stored,accessed anddistributed. Such for mats include HTML,PDF,RTF, GIF,JPEGand MPEG.	• Hardware cost implications • Cost for maintenance • Operational costs (technical and administrative support) • License fee (annualfee).

ICT IMPLEMENTATION CHALLENGES IN HIGHER LEARNING INSTITUTIONS

Lack of systemic approach to ICT implementation: Integration of ICTs in the functions of any organization is a complex process that needs to be fully conceptualized and defined from the beginning. However, this is not the case in many higher learning institutions in developing countries as most of them have embraced the ICT integration process without clear plans to guide the way. The institution ICT policy and strategic plan should be defined to provide a framework for the development and implementation of specific ICT projects. The diversity and competing interests of different stakeholders in the institution should be recognized when developing ICT policy and a strategic plan. The following issues, amongst others, should be taken into consideration: (i) ICT infrastructure already in place; (ii) ICT skill levels in the institution; (iii) number of staff and students in each department and projected growth; (iv) academic management process: curriculum development, assessment methods and administration; (v) cost-effectiveness analysis (including hidden costs) and the choice of proper technologies for the needs of the institution; and (vi) staff development in new technologies

Awareness and attitude towards ICTs: It is important for all stakeholders in the institution to know the existing ICT facilities and services and their importance in relation to their specific tasks. However, according to Tusubira and Mulira there tends to be some vague knowledge about ICTs, some interpreting them as simply advanced technologies that require a lot of money and very advanced skills. They are not appreciated as a means of creating efficiency and cost-effectiveness. Lack of awareness goes along with attitude. Positive attitude towards ICTs is widely recognized as a necessary condition for their effective implementation (Woodrow 1992). Full involvement of all stakeholders in the implementation process is a key to addressing awareness and attitude problem. Formally organized awareness programmes, visits to similar institution where success has occurred, and short trainings can contribute to raise the awareness and change the attitude of stakeholders towards facilities and services.

Administrative support: Administrative support is critical to the successful integration of ICTs into teaching and learning processes. Administrators can provide the conditions that are needed, such as ICT policy, incentives and resources. The commitment and interest of the top management and other leaders at every level is the most critical factor for successful implementation of ICTs. According to Cameron and Ulrich (1986), a transformational leadership is a leadership that involves a process of fundamental change which is required for the institutions to adapt to changes brought about by the information society3. Dwyer et al (1997) emphasize that for the integration of ICTs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, pedagogical, administrative, financial, and social dimensions of ICTs in education.

Technical support: This includes issues like installation, operation, maintenance, network administration and security. This is an important part of the implementation and integration of ICT in education system. In most cases however, technical support is not available, which implies that trainers and students require some basic troubleshooting skills to overcome technical problems when using ICTs. However, in most of the developing countries including Tanzania there are very few technical experts to implement and maintain ICTs (Bakari et al., 2001; National Committee for WSIS Prepcom II 2003). Appropriate strategies should be in place to ensure that integration of ICTs in teaching and learning process goes together with the recruitment, training, retaining and retention of required staff.

Staff development: Integration of ICT in teaching and learning does not only deal with introduction of new hardware and software, but both trainers and the students have to adopt new roles, and change their ICT behaviors and ways of teaching and learning. As Farrell (1999) points, training and workshops are needed not only to improve the skills of the instructors, but also as a means of getting them involved in the process of implementing and integrating ICTs in teaching and learning. For example, faculty staff requires training not just in the choice and use of appropriate technologies, but more fundamentally in how people learn and in instructional design (Bates 1997). Pelgrum (1999) recommends staff training to be a continuous process for regular updates with the development of ICTs.

Lack of ownership: It is critical that all stakeholders contribute to and own the policy and the plan. Institution-wide consultations are necessary in the identification of challenges, and in proposing areas for ICT application. Stakeholders must agree on the projects to be implemented, including their role therein. Employees must see ICTs as tools rather than as competitors for their jobs. A related challenge is getting stakeholders in an organization to think for the organization, rather than the natural tendency of considering the interests of their particular departments.

Inadequate funds: Financial resources form a key factor to the successful implementation and integration of ICTs in education. It is obvious that countries with higher financial resource bases stand a good chance than those with limited resources to reap benefits offered by ICTs. In addressing the problem of limited funds and sustaining donor funded projects, higher learning institutions can do the following: (i) adopt freeware and open source software for teaching and learning activities; (ii) continuously press for more funds from their governments; and (iii) diversify sources of funds to have a wide financial base.

CONCLUSIONS AND RECOMMENDATIONS

ICTs provide great opportunity for universities in developing countries to improve their teaching and learning processes. So far most of the universities in developing countries possess basic ICT infrastructure such as Local Area Network (LAN), internet, computers, video, audio, CDs and DVDs, and mobile technology facilities that form the basis for the establishment of e-learning. It is argued that, universities in developing countries should adopt e-learning technologies to improve teaching and learning processes. Pedagogical, technical and cost issues should be taken into account for each specific technology when integrating ICTs in teaching and learning practices. Government of India has taken numerous initiatives to increase the use of ICT in higher education. But the problem lies in the proper execution and implementation of these programs at the ground level. Furthermore, there is lack of infrastructure in the backward area for instance, problem in internet connectivity and non-availability of computers etc. So it is suggested to the govt. that to improve the overall education system, first of all provide adequate infrastructure and provide quality education to all learners in the country so that they able to compete at the global level. The educated youth could bring the economy of India to the number one in the world.

REFERENCES

1. Bates, A. W. (1997) Technology, open Learning and distance education. London: Routledge.
2. Cameron K.S., and Ulrich, D.O. (1986) “Transformational leadership in colleges and universities”. In J. C. Smart (Ed.), Higher education: Handbook of theory and research. New York: Agathon Press. Vol 2, pp. 1-42.

3. Commission on Technology and Adult Learning(2001)"E-learning work force for America's".A vision of report of the Commission on Technology and Adult Learning.
4. Dwyer, D.C., Ringstaff, C and Sandholtz, J. H (1997) Teacher beliefs and practices part II: support for change: the evaluation of teachers' instructional beliefs and practices in high access to technology classrooms, first – fourth year findings, Cupertino, CA: Apple Computer.
5. Ehrmann, S. (1995) "New technology, old trap", Education review, Vol. 30, No. 5, pp. 41-43.
6. Farrel, G. M. (1999) "The development of virtual education: A global perspective", A study of current trends in the virtual delivery of education, Vancouver
7. Fisser, P. (2001) "Using Information and Communication Technology". Ph.D. thesis, Netherlands: University of Twente.
8. Graziadei, W. D., Gallagher, S., Brown, R. N., and Sasiadek, J. (1997) "Building Asynchronous and Synchronous Teaching-Learning Environments: Exploring a Course/Classroom Management System Solution".
9. Pelliccione,L.(2001) "Implementing innovative technology:Towards the transformation of a university", PhD thesis, Australia: Curtin university of Technology.
10. Pelgrum,W.J and Anderson,R.E(1999)"ICTand the emerging paradigm for life long learning:a worldwide educational assessment of infrastructure, goals and practice", International Association for the Evaluation of Educational Achievement and University Twente.
11. Rengarajan,R.(2001) "LCMSand LMS:taking advantage of light integration".http://www.e- learn.cz/soubory/lcms_and_lms.pdfaccessed 28 March 2007.
12. UnitedRepublicofTanzania(2003)*NationalInformationandCommunicationTechnologyPolicy*. Daressalaam:GovernmentPrinters.
13. Woodrow,J.E.(1992)"Locus ofcontrol and student teacher computer attitudes", Computers in Education, Vol.14, No.5, pp. 421-432.