INSTRUCTORS AND STUDENTS COMPETENCES, PERCEPTIONS AND ACCESS TO E-LEARNING TECHNOLOGIES: IMPLICATIONS FOR E-LEARNING IMPLEMENTATION AT THE OPEN UNIVERSITY OF TANZANIA

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Abstract: *In most sub-Sahara African countries, distance education is delivered using print materials complemented by a few face-to-face sessions. The approach is associated with a myriad of challenges some of which can be addressed by appropriately selected e-learning technologies based on the context in which they need to be used. This study was designed to understand the context of the Open University of Tanzania related to the use of e-learning technologies in distance education. A sample of 32 instructors and 208 students participated in the study. Both quantitative and qualitative data were collected. Results show that despite limited access to technologies, instructors and students (i) have positive perceptions about using e-learning technologies for distance education and support of students and (ii) have competences on basic computer and internet applications. It is argued that challenges related to narrow bandwidth, access, experiences and motivation of instructors to use e-learning technologies must be considered in deciding what technologies to use. Implications of the results for e-learning implementation, instructors' professional development and student learning needs are discussed.*

Keywords: *E-learning, Perceptions, Distance Education, Higher Education, Tanzania.*

INTRODUCTION

In most sub-Sahara African countries, distance education is delivered using printed materials which are distributed to students at the beginning of the academic year. A few face-to-face sessions are arranged in a year for instructors to meet students in regional centers for some real time lectures, discussions and administrative announcements. Despite great role that print materials play in the delivery of distance education, the approach is associated with a myriad of challenges (Dzakiria, 2004; Khoo & Idrus, 2004; Ludwing-Harman & Dunlap, 2003; Mcharazo & Olden, 2000; Mnyanyi & Mbwette, 2009). The challenges include: (i) inefficient interaction among students and between instructors and students, (ii) lack of effective

communication and interaction between instructors and students (iii) delays in delivery of study materials and assignments, (iv) lack of immediate feedback on students' assignments and tests, (v) outdated reading resources/study materials and (vi) feelings of isolation.

In some cases the challenges are so pressing to the extent that some distance learners opt to withdraw from studies and others delay to graduate (Carr, 2000; Galusha, 1997). E-learning technologies have great potential to enrich delivery of distance education programs and in redressing most of these challenges (Pena-Bandalaria, 2007; Peters, 1996; Tschang & Senta, 2001; Mnyanyi & Mbwette, 2009).   In this study, e-learning technologies refer to technologies such as computers, internet, mobile phones, CDs and DVDs. These technologies (and others) are used in distance education to systematically complement course delivery, facilitate access to resources, improve interaction and communication between instructors and students and for provision of feedback and support to students (Ludwig-Hardman & Dunlap, 2003; Pena-Bandalaria, 2007; Wright, 2000).

Despite the potentials, the application of e-learning technologies in distance education in most sub-Sahara African countries is low (Hoven, 2000; Siritongthaworn, Krairit, Dimmitt, & Paul, 2006) and instructors use technologies such as computers mostly for simple applications such as typing examinations, processing of examination results and development of learning materials. Moreover, according to Hoven instructors rarely use computers and internet for delivery of courses, guidance and counselling of students, and communication and interaction with students. This study sought to understand instructors and students access to e-learning technologies, their perceptions, competences and the implications of all these for e-learning implementation in a distance education setting at the Open University of Tanzania.

E-LEARNING AT THE OPEN UNIVERSITY OF TANZANIA

Efforts to Integrate E-learning

The Open University of Tanzania is a distance education institution with a student population of over 40,000 spread in 27 regional centers in a country of about 0.95 million square kilometers. Like the case in most other distance education universities in Africa, printed materials is the main mode of course delivery and students support. To increase flexibility, Open University of Tanzania is making several efforts to integrate e-learning technologies in education. The efforts include (among others); formulation of comprehensive institutional frameworks such as ICT Policy, ICT Master Plan and E-learning Implementation Strategy (OUT, 2009: ICT Policy; OUT, 2009: Master Plan and OUT, 2009: ICT Implementation Strategy). The university's aims and objectives are well stipulated in the institutional frameworks, which include (but not limited) to: (i) transform paper-based to blended learning, (ii) train instructors on e-learning programs development, (iii) motivate instructors on the use of an open source e-learning platform and (iv) enhance facilities for students with special needs.

To realize the stated aims and objectives towards e-learning, the university facilitates transformation from paper-based to blended learning, improves the intranet to enhance communication and information sharing, enhances the use of e-learning technology as a main interaction platform between instructors and students, enhances capacity building and motivate instructors to design and develop e-learning programs and enhances facilities for students with special needs.

Preliminary Achievements

There are several achievements witnessed since 2004 as a result of the efforts towards e-learning integration at the Open University of Tanzania (see for example Mbwette, 2008,

2009 and Bakari, 2009). The achievements relate to improvement of: (i) technology infrastructure and access, (ii) competence on technologies and (iii) student support. To improve instructors' and students' access, the technology infrastructure and service has substantially improved at the headquarters (Mbwette, 2009). According to Mbwette, the university has established 4 computer laboratories in the Dar es Salaam headquarters. Also, the university has equipped 7 regional centers with computer laboratories each with 10 computers connected to the internet. It is expected that each of the 7 centers will be connected to the headquarters via Virtual Private Network (VPN). It is unclear to the authors as to when the VPN will be installed.

To improve the technology competence of instructors and students, the university has trained 150 students on basic technology skills and about 33 instructors on pedagogical skills related to the development of e-learning courses using Moodle (Bakari, 2009). Despite this training, instructors (except a few in the Institute of Educational Technology, IET) still deliver their courses in a traditional way using print-based materials. However, as a result of technology literacy and awareness, the use of technology at the university has improved significantly and fewer problems are reported (Bakari, 2009). Another achievement relates to the fact that the Open University has put in place Local Area Network (LAN) with Voice of Internet Protocol (VoIP) at the headquarters office in Dar es Salaam to facilitate communication and interactions in Dar es Salaam and across regional centers (Mbwette, 2009). Currently the VoIP facility is used only for communication among staffs in the university but not for instructor–students' interactions. It is expected that in future the LAN and VoIP facilities will be used to improve instructors and students' communication and interactions. In order to improve delivery of courses and reading resources to students, the university has customized Moodle for use by instructors and students, which is at pilot stage in one of the bachelor programs in the university.

Challenges

Despite efforts and accomplishments, e-learning integration at the Open University of Tanzania has encountered a number of challenges (see for example Mbwette, 2009; OUT, 2009: ICT Policy; OUT, 2009: ICT Master Plan), which include: (i) inadequacy of technology infrastructures and access, (ii) competences of instructors and students on technology, (iii) mindset and perceptions, (iv) limited motivation of instructors, (v) power fluctuation and (vi) narrow bandwidth. According to Bakari (2009), the university does not have enough computer and internet facilities for every instructor and student. This affects instructors' and students' access to technology. Lack of sufficient technology competences of instructors and students is another challenge for effective implementation of e-learning at the Open University of Tanzania. A program to ensure that all instructors are computer and internet competent is in place and no extension of contracts is granted if an instructor has not undertaken and passed the basic technology literacy test administered by the Open University of Tanzania (Mbwette, 2009).

There is a challenge of mindset and perceptions. Some instructors do not perceive e-learning as an effective means for teaching and learning (Bakari, 2009). Accordingly, Bakari argues that the university is challenged to demonstrate that e-learning can achieve university's mission. Limited motivation of instructors is another challenge for effective integration of e-learning technologies at the Open University of Tanzania. Limited motivation makes instructors reluctant to cooperate with technical staff to develop e-learning courses. Power fluctuation which is a national issue also affects effective use of e-learning technologies. According to Bakari (2009) the university has a standby generator in place at headquarters, but not in the regional centers. Narrow bandwidth is a serious challenge almost across most sub-Sahara African countries and affects e-learning implementation efforts at the Open University of Tanzania as well. This has been and in fact is a threat to sustainable

mainstreaming of technologies in education (Mbwette, 2009). According to Mbwette, the arrival of SECOM in the Tanzania's sea shore in June, 2009 is expected to avert the hitherto very high costs of bandwidth access in Tanzania.

This study aimed to understand the context of the Open University of Tanzania for successful integration of e-learning. Results of this study will enable to make informed decisions about; (i) the kind of technology to use, (ii) best approach to prepare instructors on e-learning course design and delivery and (iii) ways to orient students on how to learn in an e-learning environment.

E-LEARNING FOR DISTANCE EDUCATION

Potential of E-learning Technologies

Distance education refers to instruction that is delivered over a distance to one or more individuals located in one or more venues (Phipps & Merisotis 1999). The term is also commonly used to describe delivery of courses or programs in which instructors and students are geographically separated by physical distance and time. The use of technology in distance education to expand access to higher education in developing countries has two objectives: to increase enrolments and the opportunities for students unable to take part in campus-based programs because they live far from existing facilities, or because their work schedules prevent them from attending regular classes. As pointed earlier in the introduction, despite opportunities of distance education, instructors and students in distance education face several challenges (Dzakiria, 2004; Ludwing-Harman & Dunlap, 2003 and Mcharazo & Olden, 2000). E-learning technologies have huge potential of enriching distance education delivery (Bates, 2000; Moore, 1996; Pena-Bandalaria, 2007; Peters, 1996; Tschang & Senta, 2001), as such different e-learning technologies are widely used in distance education in developed countries for different purposes including redressing distance education challenges. Specifically, e-learning technologies such as computer, internet mobile phones,

CDs & DVDs, multimedia, video conferencing and others are used in distance education to complement course delivery, facilitate access to resources, improve interaction and communication with students and provide feedback and support to students (Ludwig-Hardman & Dunlap, 2003; Pena-Bandalaria, 2007; Wright, 2000). In terms of facilitating course delivery, e-learning technologies have made web-enhanced teaching and learning possible to complement traditional teaching processes in distance education in some developing countries (Pan-Bandalaria, 2007). In addition, computer and internet technologies are used for delivery of support to distance learners where through the use of such technologies, students in distance education are offered support such as tutorials, library resources, guidance and counselling, and academic and administrative consultations (Pena-Bandalaria, 2007). E-learning technologies such a computer and internet are also used by teachers and students to search for web resources. A study by Czerniewicz & Brown (2005) in South Africa found that 61% of instructors and 63% of students used internet frequently to access electronic resources and readings resources. In some occasions, this contributed to greater students' achievement (Bates, 2000; Tschang & Senta, 2001). E-learning technologies such as emails are used in distance education in most developed countries for communication and interaction between instructors and students (Thomas & Carswell, 2000). Where emails are used, the rapport between instructors and students' increases, provision of feedback to students improves and instructors feel they have more interactions with their students (Carswell, Thomas, Petre, Price, & Richards, 1999). Moreover, email technologies lead to more frequent contacts and teaching is more continuous than in traditional distance education (Thorpe, n.d). The use of mobile phones for communication and interactions in distance education is becoming popular too. Currently, many students own mobile phones and most of them use such phones for receiving and sending text messages (Fozdar & Kumar, 2007; Rao, 2009). According to Fozdar and Kumar, short messages are used in distance education to

improve communication between instructors and students and between students in the following ways; receiving feedback on assignments, providing/receiving short information about important dates, scheduling of counselling, laboratory sessions, grades and examination results. However, studies from developing countries have shown that students prefer email communication more because they find emails more immediate than mobile phones and they feel guaranteed to receive a response within a short period of time unlike when using phones which may not be reachable (Thomas & Carswell, 2000).

The integration of e-learning technologies for content delivery and communication has opened new opportunities in distance education in most developed and some developing countries. This is because e-learning technologies allow access to course content and make communications easy for students who live in remote locations, or for those who are housebound due to health, disability or domestic responsibilities (Kirkwood & Price, 2005). When appropriately selected for distance education, e-learning technologies have the potential to (i) alleviate some common causes of withdrawal / drop out by improving interactions, collaboration and feelings of connectedness and community (Fozdar & Kumar, 2009; Ludwing-Hardman & Dunlap, 2003), (ii) diminish geographic and time barriers between instructors and students, enhances increased flexibility, faster feedback, prompt return of assignments and delivery of instructional contents (Latchman, Gillet & Bouzekri, 1999; Thomas & Carswell, 2000) and (iii) reduces students' drop outs in distance education by promoting interactions and develop feelings of connectedness and collaborative learning (Fozdar & Kumar, 2007).

E-learning Implementation Challenges

Despite huge potentials that e-learning technologies have in enriching distance education delivery in developed countries, the application of such technologies in the context of developing countries is limited (see for example Dzakiria, 2004; Khoo & Idrus, 2004;

Ludwing-Harman & Dunlap, 2003; Mcharazo & Olden, 2000; Mnyanyi & Mbwette, 2009). E-learning technologies are not yet used pedagogically by most instructors because they mostly use basic computer applications (Hoven, 2000). According to Hoven (2000) instructors and students usually use programs such as word processing, spreadsheets and graphics for preparation of assignments and other related academic works.

There are different challenges that make instructors and students in most developing countries unable to fully exploit e-learning technologies. Some of the challenges are; inadequate infrastructures such as computer and internet. According to Resta and Laferriere (2008), only 4% of the African population have access and use computer and internet. On the other hand, despite the fact that availability of mobile phones for educational use enjoys a phenomenal growth across Africa (see for example Brown, 2003; Hendrikz & Prins, 2009; Fozdar, & Kumar, 2007; McGreal, 2009; Pena-Bendalaria, 2007), there are some challenges associated with this technology, namely: cost (Brown, 2003 & Nnafie, 2002), limited screen size, battery span and memory and design content for m-learning delivery (McGreal, 2009). Effective use of the gadget is to some extent limited / hampered by these challenges.

Narrow bandwidth which affects internet speed is another big challenge in most developing countries. Gakio (2006) summarises the state of internet connectivity in tertiary institutions in Africa as: *too little, too expensive and poorly managed; as a result internet technology becomes even less useful for research and education purposes, (p. 41).* Gakio contents that one solution to controlling costs and improving access to internet is to press for more affordable access by, for instance: suggesting that governments open up their telecommunications markets; by joining forces with other academic institutions to negotiate better connectivity deals; by encouraging local internet service providers to set up country internet exchange points – at route traffic within the country instead of via Europe and North America; and by making use of open source systems and software.

Another challenge is lack of readily access to e-learning technologies by both instructors and students in most developing countries. The situation regarding access to different technologies is different for different stakeholders (Aguti & Fraser, 2006; Nnafie, 2002). For example in a study by Aguti and Fraser (2006) more than 60% of students in their study reported to have no access to video, computer and internet and only about 4% of the students had access to computers at home and 1% of students had access to internet at home. Also literature shows that students access e-learning technologies at different places such as home, workplace, university, or other places (Bates, 1994; Hoven, 2000; and Meyer- Peyton, 2000). Limited competence, skills and experiences on some e-learning technologies by both instructors and students is another challenge. Some instructors and most students have limited competence, skills and experience in using new technologies (Hoven, 2000; Kirkwood & Price, 2005 and Smart & Cappel, 2006). They argued that students' knowledge and skills on e-learning technologies such as computer and internet are important towards effective use of technologies. Instructors' and students' perceptions in terms of the benefits and ease of use of technologies are also a challenge. The perceived benefits of particular technologies have great influence on whether or not to use a technology. Siritongthaworn *et al*. (2006) argues that for flexibility benefits, instructors and students agree to use e-learning technologies because they help to create convenience in terms of flexibility in time and place of learning. Regarding ease of use of e-learning technologies, instructors and students with poor computer competences and skills perceive e-learning technologies use as difficult compared to those with comparatively good computer skills (Siritongthaworm *et al.,* 2006). In addition, beliefs about teaching and learning held by instructors are also among important challenges which influence e-learning application in higher education (Phillips, 2005). Attempts to redress this must include intensive training on computer use and on e-learning applications so as to

promote positive beliefs among instructors regarding the role of technologies in education (Joint, 2003).

Successful implementation of e-learning technology requires a thorough understanding of the context. This study was carried out to understand the context of the Open University of Tanzania. The following overall research question guided the study; *what is the feasibility of implementing an e-learning course delivery approach in distance education at the Open University of Tanzania*? The following research sub-questions were formulated:

1. What kind of e-learning technologies do instructors and students access and where do they access them?

2. What are the perceptions of instructors and students about the use of e-learning technologies in distance education?

3. What do instructors and students perceive as the benefits of using computers and internet in distance education?

4. What basic competences on computer and internet use do instructors and students have?

5. How often do instructors and students use computers and internet for teaching and learning? What difficulties do they encounter?

6. How should instructors and students be prepared to successfully implement e-learning technologies in distance education?

METHOD

Design of the Study

A *planning evaluation* research design was applied, because results from the study were aimed to be used to plan e-learning implementation strategies. According to Guskey (2000), *planning evaluation* is an appropriate design because it takes place prior to the implementation of an innovation and allows for the determination of needs, assessment of characteristics of participants, careful analysis of context and the collection of baseline

information. This study sought to understand realities of the Open University of Tanzania form instructors and students perspectives for effective e-learning integration in course delivery. Instructors and students were involved in the study so that they own the intervention right from the initial stage. This information is necessary especially in deciding about what e-learning technologies to use in distance education. Moreover, the information helped to make informed decisions regarding best ways to prepare instructors on e-learning course design and delivery.

Participants

Instructors

All instructors (N=47) from two faculties (Faculty of Education and Faculty of Science, Technology and Environmental Studies) and one institute (Institute of Continuing Education) were invited to participate in the study. The instructors were selected based on their interest to participate in the study and also because of the fact that the university management encourages instructors to use technology in teaching. 32 instructors (80%) responded. Instructors had an average age of 37 years ranging from 27-70 years. There was only 1 professor, 6 lecturers & senior lecturers, 15 assistant lecturers and 9 tutorial assistants. Instructors had an average of only 3.5 years of working experience within the university. Of the 32 instructors, 19 were males and 13 females.

Students

A total of 300 students spread over three regional centers were invited to participate in the study. The three centers were selected for logistical reasons: they were easy to reach and they had comparatively a large proportion of the student population. Students were selected because they participated in the courses offered by the selected academic units i.e. Faculty of Education, Faculty of Science, Technology and Environmental Studies and Institute of Continuing Education. 208 students (69.3%) responded across regional centers in the

following proportions: Dar es Salaam (159), Coastal (23) and Morogoro (26). There were 126 males and 82 females aged between 22 and 55 years. Students were in different years of study.

Instruments

A structured questionnaire was used to collect data from instructors and students. Many items in the questionnaire were common for both instructors and students, but some were specific for each group. Some scales in the questionnaires were adapted from the Technology Proficiency Self Assessment (TPSA) Instrument (Christensen & Knezek, 2001) and a technology scan questionnaire developed by a Dutch consultant agency (*TOAS)* (http://www.stoas.nl/stoas_com/stoas_com_homepage.php). The questionnaires had Likert with 3, 4 or 5 point scale. Based on the responses in the questionnaires, follow up interviews with instructors and students were conducted. Statistics mainly means, standard deviations, percentages and effect size were computed and presented accordingly. Interview data were audio taped and transcribed using data reduction techniques (Miles & Huberman, 1994) to provide in-depth elaborations for the qualitative data.

RESULTS

Access and Access Points for E-learning Technologies

Access to e-learning technologies

Instructors and students access to different e-learning technologies was investigated during the study. Figure 1 presents the state of access of instructors and students to different e-learning technologies.
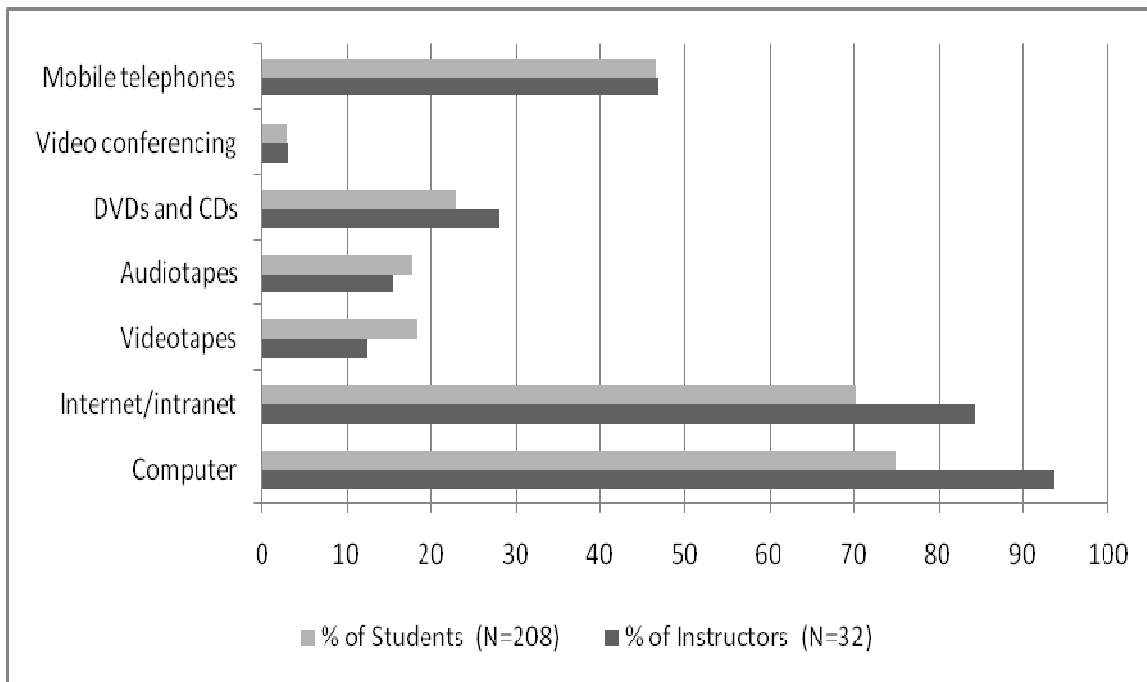
Figure 1. Access to e-learning technologies by instructors and students (in %)

As presented in Figure 1, results show that more than three-quarters of both instructors and students have access to computers (93.8% vs75%) and internet/intranet (84.4% vs 70.2%). Instructors have relatively higher access to computers and internet technologies than students. Less than half of the instructors and students have access to mobile phones (46.9% vs 46.6%) respectively. Far less than one-third of teachers (3.1%) and students (2.9%) have access to video conferencing. In addition, results also demonstrate that less than a third of instructors (28.1%) and students (23.1%) have access to DVDs and CDs. Despite some access to mobile phones, computer and internet; both instructors and students confirmed during interviews that emails and mobile phones are never used for delivery of courses and communication.

Access points for e-learning technologies

Table 1 presents data related to places that instructors and students normally access e-learning technologies.

Table 1. Access points for e-learning technologies by instructors and students

Access points	% of Instructors (N=32) Headquarters	% of Students (N=208) DSM* (n=159)	Coastal (n=23)	Morogoro (n=26)
Library of the Open University of Tanzania	71.9	52	95	11.5
Regional center offices	22	23	8.7	0.0
Workplace	93.8	37.7	8.7	34.6
Home	18.8	23.2	4.3	3.8
Internet cafes	75	66	52.2	88.5

Note: DSM*=Dar es Salaam

Results show that over three-quarters of instructors' access computers and internet in their offices at their workplace (93.8%), in the library of Open University of Tanzania (71.9%) and in internet cafes (75%). Only less than one-thirds of instructors access technologies at regional center offices (22%) and in their homes (18.8%). Majority of students (95%) in the Coastal regional center have access to computer and internet at the university library. Slightly more than half of students in the Coastal region access technologies in internet cafes. Quite a small proportion of students access such facilities at the Coastal regional center offices (8.7%), at their workplaces (8.7%) and in their homes (4.3%). More than half of students in Dar es Salaam access technologies at the university library (52%) and internet cafes (66%). In Dar es Salaam only one-third of students' access technologies at workplaces. Less than one-third of them access technology facilities at the regional center (23%) and at home (23.2%). In Morogoro results show that more than three-quarters (88.5%) of students access technologies from internet cafes and slightly more than one-third (34.6%) of them access such facilities at their workplaces.

Perceptions and Perceived Benefits

Perceptions on technology

Instructors and students were asked to express their perceptions on the use of computers and internet as e-learning technologies in distance education. Overall, both instructors and students are receptive about using computers and internet as e-learning technologies. Instructors expressed a higher mean value (M = 4.75, SD = 0.44) compared to students (M = 4.48; SD = 0.81).

Perceived benefits of e-learning technologies

Figure 2 presents Means on instructors and students perceived benefits of using technologies for teaching and learning. It is apparent that both instructors and students perceived benefits associated with e-learning technologies as shown by mean values between 2 and 4, which means that the perceived benefits range from small to very large benefits. Instructors consider the following as first priority benefits of e-learning technologies (i) accessibility by students to courses, assignments and course outlines, (ii) enhancement of students learning, (iii) improvement of feedback to students. For students the first priority benefits of e-learning technologies are; (i) more responsibility for their learning, (ii) easy access to courses, assignments and course outlines and (iii) enhancement of their learning. Results also show that both instructors and students perceive the following as the least benefits of e-learning technologies; (i) understanding of the relationship between theory and practice, (ii) education adapted to learning styles of students and (iii) learning becomes fun.
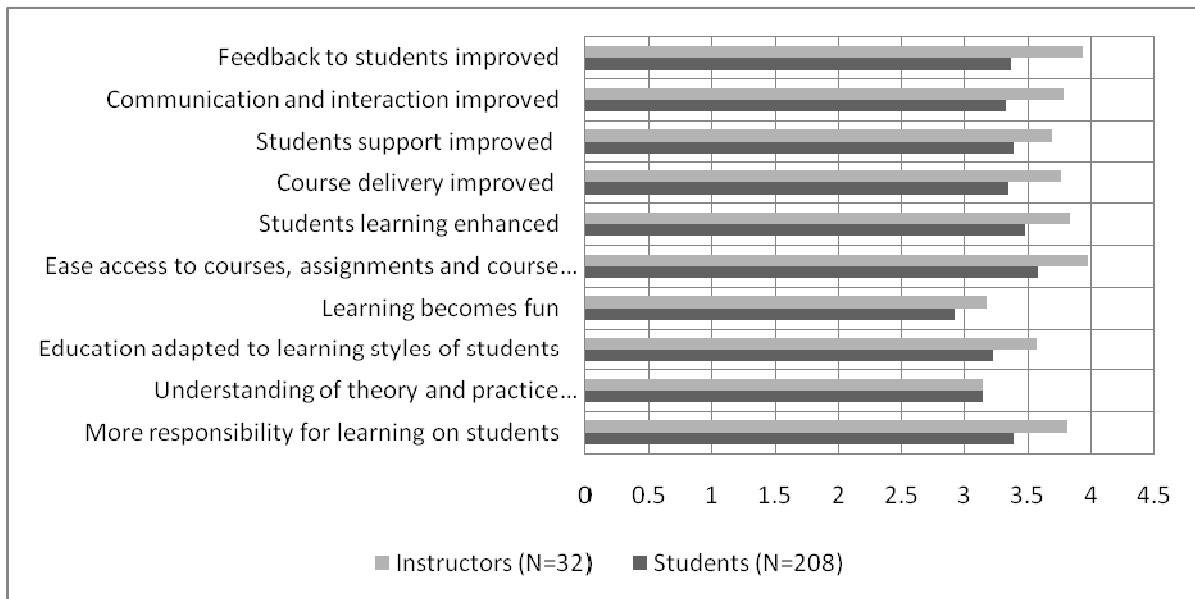
Figure 2. Perceived benefits of e-learning technologies by instructors and students (in Means)
Note: Scale; 1= no benefit, 2= small benefit, 3= large benefit and 4= very large benefit

Competences, Uses and Difficulties

Competences on computer and internet use

Instructors and students basic competences on common computer and internet applications were investigated and the results are presented in Figure 3.
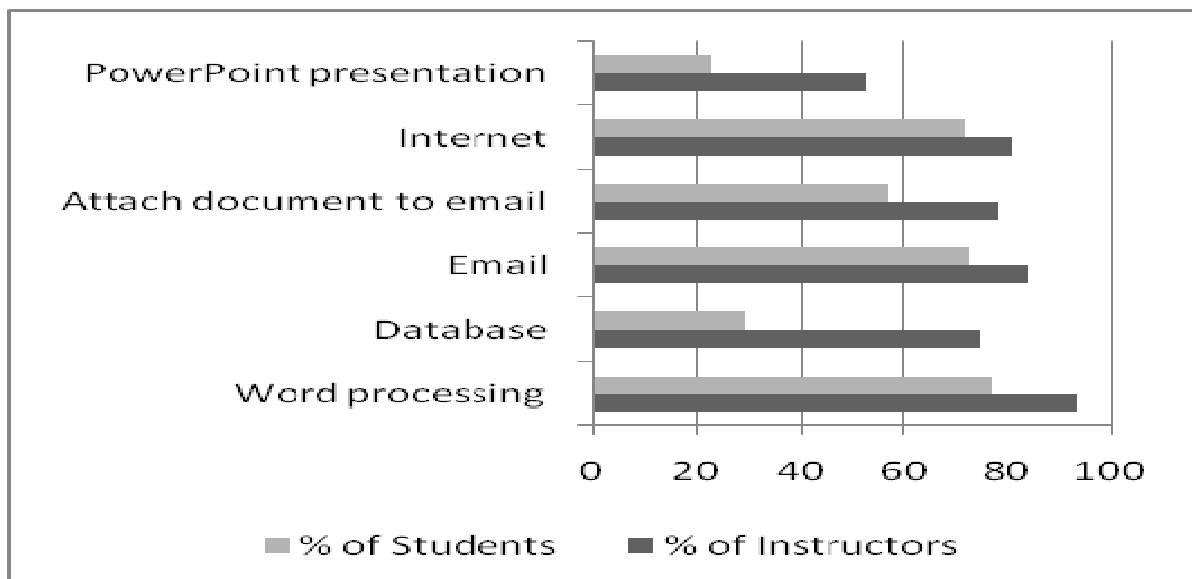

Figure 3. Basic technology competences of instructors and students (in %, of yes/no responses)

The results in Figure 3 demonstrate that students' competences are relatively lower than those of instructors. Specifically, more than three-quarters of instructors are competent in using word processing (93.8%), email (84.4%), sending documents as attachments (78.1%), and

internet (81.3%). Results from interviews with instructors revealed that they acquired basic technology competences either through workplace-based training, as part of university education or by self-learning. On the part of students, results show that about three-quarters of them are competent in using word processing (76.9%), email (72.6%) and internet (71.6%). However, only less than two-thirds of students (57.2%) can send documents as attachments. Compared to instructors, results show that students' competences on database and power point presentations is relatively low, 29.3 %(students) as opposed to 75% (instructors). Interviews with students showed that a few students who had skills on how to use power point were not practicing it and the skills just fade away over time.

Common uses of computer and internet

The frequency by which instructors and students use technology was also investigated during the study as reported in Table 2 and 3.

Table 2. Instructors' use of computer and internet (in M & SD)

applications	N	M	SD
Delivery of assignment and course materials	30	2.37	1.1
Setting examinations	31	2.74	1.1
Provision of educational resources	29	1.38	0.8
Guidance and counseling	30	1.77	1.2

Note: Scale. 1=never, 2=at least 2-3 times per year, 3=at least 3-4 times per year, 4=throughout the year and NA=not applicable

Results in Table 2 reveal that to a limited extent, instructors use computers and internet for delivery of educational materials and setting of examinations. Specifically, they use computers for (i) delivery of assignments and course materials for at least between 2-3 times per year (M=2.37, SD=1.1) and for setting examinations for at least between 3-4 times per year (M=2.74, SD=1.1). Hardly any of the instructors use technology for the provision of educational resources (M=1.38, SD=0.8) and for guidance and counseling (M=1.77, SD=1.2). The interviews revealed that although instructors use emails for non-educational

communications, they hardly use emails to send assignments, course outlines and study materials to students.

Table 3 compares the use of computers and internet between instructors and students.

Table 3. Instructors and students use of computer and internet compared (in M & SD)

applications	Instructors			Students			Effect size
	N	M	SD	N	M	SD	
Processing of examination results using database	31	3.13	1.1	190	1.81	0.9	0.55
Develop study materials using word processing program	29	2.00	1.2	201	2.53	1.0	-0.23
Teaching and learning using *atutor, moodle or audio/videotapes*	30	1.23	0.7	190	1.14	0.4	0.08
Communication through email	30	2.73	1.1	200	2.78	1.0	-0.02
Searching for materials	31	3.42	1.0	200	2.65	1.0	0.36
PowerPoint presentation	29	1.69	0.9	190	1.61	0.9	0.04

Note: Scale. 1=never, 2=at least 2-3 times per year, 3=at least 3-4 times per year, 4=throughout the year and NA=not applicable

Results demonstrate that on average instructors and students use computers and internet for at least 3-4 times per year to search for materials (Instructors: M = 3.42, SD = 1.0; Students: M = 2.65, SD = 1.0). Also, they both use computers and internet for at least 2-3 times per year for communication through emails (Instructors: M=2.73, SD=1.1; Students: M= 2.78, SD=1.0) and for word processing (Instructors: M=2, SD=1.2; Students: M=2.53, SD=1.0). Hardly any of the students (M=1.81, SD=0.9)use database program compared to the instructors who expressed that on average they use database programs at least 3-4 times per year usually for processing examination results (M= 3.13, SD = 1.1). In addition, instructors use computers and internet for at least 2-3 times per year for delivery of assignments and course materials (M=2.37, SD=1.1) and for setting of examinations (M=2.73, SD=1.1). Moreover, results show the majority of the instructors and students never use e-learning technologies for teaching and learning processes (Instructors: M=1.23, SD=0.7; Students

M=1.14, SD=0.4) and for making power point presentations (Instructors: M=1.69, SD=0.9; Students: M=1.61, SD=0.9). It is apparent of Table 3 that instructors use database (effect size = 0.55) and internet (effect size = 0.36) more than students.

Difficulties when using computers and internet

In Table 4 results related to difficulties encountered by instructors and students when using the computer and the internet are presented.

Table 4. Difficulties encountered by instructors and students (M & SD)

	Instructors			Students			Effect size
Areas of difficulties	N	M	SD	N	M	SD	
Availability of access points	28	2.36	0.8	172	2.28	0.8	0.05
Slow network	30	2.53	0.6	175	2.42	0.8	0.08
Unsuitable computers	30	2.17	0.9	170	2.19	0.8	-0.01
Experience in using computer	31	1.68	0.7	185	2.10	0.9	-0.25

Note: Scale, 1=no constrain, 2=not so important constrain and 3=important constrain

Results in Table 4 illustrate that both instructors and students encounter related difficulties when using computer and internet (effect size = 0.05 and below). Specifically, instructors and students feel that difficulties related to availability of access points (Instructors: M = 2.36, SD = 0.8; Students: M = 2.28, SD = 0.8), slow network (Instructors: M=2.53, SD=0.6; Students: M=2.42, SD=0.8) and unsuitability of computers (Instructors: M=2.17, SD=0.9; Students M=2.19, SD=0.8) are constraints, but not so important as experience in using computers for students (M=2.10, SD=0.9) is. The latter however is not a constraint for most instructors (M=1.68, SD=0.7). It was found during interviews that instructors share computers with 4-5 other colleagues in the office. As for students, interviews revealed that the number of computers in the laboratory is insufficient compared to the number of students who visit the university library in a day. Other interview results with students showed that there are no technology facilities for students in the regional centers.

Preparation of Instructors and Students

Instructors' professional development needs

Data related to instructors' professional development needs were also solicited during the study. In terms of willingness, the majority of instructors (90%) are willing to participate in e-learning training. Regarding the content of the training, results in Table 5 shows that the majority of instructors prefer the following as the content: (i) design of e-learning courses/programs (96.6%), (ii) make courses/programs available online (93.8%), (iii) how to deliver courses using appropriate e-learning technologies (93.8%) and (iv) facilitation of students learning in an e-learning environment (100%).

Table 5. Suggestions regarding content of the training

Suggested content	*Frequency (n)*	*% of Instructors*
Designing of e-learning courses/programs	31	96.6
Make courses available online	30	93.8
Course delivery by e-learning technologies	30	93.8
Facilitation of students	32	100

Students' learning needs

Students' learning needs for effective e-learning implementation were also determined during the study. Results in Table 6 reveal that more than three-quarters of the students indicated the following as learning needs; orientation on e-learning technologies (79.8%) and strategies on how to learn using e-learning technologies (76.9%). More than two-thirds indicated basic technology skills to get more experience (66.3%) and provision of a student manual on how to use specific technologies (68.7%) as important learning needs. About half of the students (54.8%) indicated *support* on how to find information from university website as a learning need.

Table 6. Students' learning needs for e-learning implementation (in %)

Students learning needs	Frequency (n)	% of students
Orientation on e-learning technologies	180	79.8
Students manual on e-learning	172	68.8
Strategies on e-learning	178	76.9
Basic skills on computer and internet	185	66.3
Help on how to find information from OUT's website	169	54.8

Note: OUT=Open University of Tanzania

CONCLUSION AND DISCUSSION

This study was designed in order to understand the context of the Open University of Tanzania and its implications for successful e-learning implementation. Results have shown that it is feasible to implement e-learning technologies for distance education delivery at the Open University of Tanzania. Both instructors and students have competences on basic computer and internet applications and are positive about using technologies in distance education. Despite limited access to technology, instructors can access technology in their offices by sharing with some colleagues. Unexpectedly, instructors' and students' access to mobile phones, CDs and DVDs was below 50%, while authors' experience with the Open University of Tanzania shows that access to such technologies is increasing. On the other hand, students access to computers and internet in the regional centers is a challenge because of lack of such facilities in the centers but they can access technologies at the university library but also in the centers especially where computer laboratories are already installed (Mbwette, 2009). Also, students can access computer and internet facilities at internet cafes and at their workplaces to a limited extent. Despite new investments in the technological infrastructure, students' access was still a problem in 2008, when the data for this study were collected. The available technologies to which instructors and students have limited access can still be used to enrich course delivery and improve student support at the Open University

of Tanzania. According to the instructors and students in this study, technologies can be used (among other uses) to (i) facilitate access to course, assignments, course outlines and reading resources, (ii) improve communication and interactions between instructors and students, (iii) provision of immediate and effective feedback to students. There already exist numerous best examples regarding appropriate ways to use technologies for educational purposes in developing countries (see for example Pena-Bandalaria, 2007; Peters, 1996; Tschang & Senta, 2001; Czerniewcs & Brown, 2005; Fozdar & Kumar, 2007).

Instructors and students alike are quite positive to use e-learning technologies for educational purposes. According to Phillips (2005), being positive on technology use is among important conditions for successful implementation of technologies in an institution. The majority of instructors and students have basic competences on computer and internet use and they currently use technologies such as computer and internet mostly as tools. For example, instructors use them for setting examinations and tests, processing examination results and for searching information as reported in previous studies (see for example Hoven, 2000). On the other hand, students use computer and internet for word processing and searching of reading materials. Other studies emphasize that instructors and students competences on basic applications are among the necessary conditions for successful implementation of technology-related innovation (Hoven, 2000; Kirkwood & Price, 2005; Smart & Cappel, 2006).

However ambitions to implement e-learning technologies in distance education at the Open University of Tanzania must consider contextual challenges. In this case challenges such as narrow bandwidth, access (to computers, internet, mobile phones, CDs, DVDs and the like), instructors and students perceptions, motivation, and experiences on the selected technologies must be put into consideration. For example, since narrow bandwidth is a big challenge in most African countries and affect internet connectivity and speed (Gakio, 2006) the use of

online systems may seem un-ideal. This implies that offline systems, CDs or DVDs may be more appropriate for course delivery in such a situation. Concurrently, technologies such as mobile phones and emails may be used to improve communication and interactions between instructors and students. In this way delivery of course, resources, assignments and provision of immediate feedback can be improved and students may feel connected to their instructors as found in other studies (Czerniewics & Brown, 2005; Ludwig-Hardman & Dunlap, 2003; Pena-Bandalaria, 2007; Wright, 2000).

It should also be noted that teachers' competences on basic computer applications may not necessarily be sufficient for the use of e-learning technologies application in distance education. This implies that an appropriate professional development arrangement for teachers is necessary in order to prepare them on how to transform their traditional courses into e-learning courses. The findings from this indicate that among other things instructors need training on e-learning course design and facilitation of students learning in a new learning environment. Furthermore, learning needs of students in an e-learning environment must be addressed accordingly through appropriate orientations on how to use such technologies. The extent to which instructors are actively involved in professional development is a determining condition for the success of an innovation (Ball & Cohen, 1996; Deketelaere & Kelchtermans, 1996; Mishra *et al.,* 2007).

The nature of the instructors who participated in this study is one major limitation to the generalization of the results to a different context. The instructors accepted to participate in the study because (among other things) the university management encourages instructors in the university to use technology in teaching. It is therefore argued that comprehensive context analysis is necessary for an e-learning initiative to be successful in any particular context. However, like any other educational innovation, e-learning integration and implementation for delivery of education is a challenging endeavor.

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