

A decade of technology enhanced learning at the University of Dar es Salaam, Tanzania: Challenges, achievements, and opportunities

Joel S. Mtebe
University of Dar es Salaam, Tanzania

Christina Raphael
Dar es Salaam University College of Education, Tanzania

ABSTRACT

For a decade past, integration of technology in teaching and learning has been received with both apprehension and skepticism from academics and student majority at the University of Dar es Salaam (UDSM). The study recounts real, professional and practical experiences, challenges, and opportunities of integrating educational technologies using available official documents and reports covering real practical experience in the period of ten years at UDSM. The study identifies gaps that need to be worked upon to unleash full potentials brought by educational technologies at the university. The study recommends more support to early adopters committed to initiating blended learning programs, strengthening and expanding existing blended distance programs as well as seeding new ones and building capacity in developing and testing more reliable blended distance program innovations.

Keywords: *Technology enhanced Learning; educational technologies; eLearning; higher education.*

INTRODUCTION

At the onset of the first decade of 21st century, educational technology has revolutionized teaching and learning process in many higher education institutions worldwide. These technologies have been praised in developing 21st century skills and competencies required for current and future workplaces (Bates, 2009) improving students' learning, widening access of education and reducing the number of students' dropouts (Carr, 2000; Garnham and Kaleta, 2002; Garrison and Kanuka, 2004; Lim, Morris and Kupritz, 2007; Vaughan, 2007; Collopy and Anord, 2009; Vaughan, Zimmer and Vallamar, 2011). Likewise, research has proved that appropriate integration of education technologies allows accomplishment of learning objectives more successfully than traditional approaches (Garrison and Kanuka, 2004; Prinsloo and Rooyen, 2007).

Nevertheless, the last decade has witnessed radical transformation in the use educational technologies in sub-Saharan Africa, the continent that been lagging behind for many years. A report published by UNESCO in 2002 indicated that, sub-Saharan Africa has no option but to overhaul its education system-turning it from 'schooling' to 'learning'. Nearly, all institutions in the continent have started using Information and Communication Technologies (ICT) in their daily activities and a good number have seriously started using educational technologies to improve the quality of face-to-face delivery through blended learning and to increase students' enrolments. Overall, the use of technologies in education has led to ameliorate access and quality of both in-campus and mediated distance learning in higher education.

In Tanzania, higher education is the life line and dream for the majority school children, their parents, guardians, communities, and the country as a whole (URT, 2010). For the past decade, there have been tremendous efforts to expand annual intakes in higher learning institutions in Tanzania yet enrolment is still very low. According to Lindow (2011), only 1.48% of Tanzanians participate in higher education which is the lowest in the sub-Saharan region. Similarly, change of student body characteristics and an influx of educational technologies are also compelling institutions to re-think on their education delivery methods.

Given this scenario, institutions in Tanzania have been adopting and using various educational technologies in a bid to expand access and to improve the quality of education (Lwoga, 2012). The study conducted by Munguatosha, Muyinda, and Lubega (2011), and Mtebe and Raisamo (2014) indicate that more than 80% of surveyed institutions in Tanzania were found to be using various educational technologies with Moodle system being the most popular.

The University of Dar es Salaam (UDSM) like many other institutions in Tanzania has been taking advantages of these technological developments in order to increase access to learning opportunities, enhance the quality of education delivery, and in long run reduce the costs of education. The university started by installing ICT infrastructure in all colleges and halls of residence as far back as 1998. After being connected to SEACOM optic Fibre cable in 2008, the infrastructure was also upgraded to accommodate the newly acquired Internet speed from 1Mbps/4Mbps to 155Mbps (Mtebe and Twaakyondo, 2012). The connection to Fibre optic cable was accompanied with the installation of wireless within the campus and halls of residence. As of now, the majority of public access rooms are equipped with computers connected to the Internet in all colleges and halls of residences.

The Blackboard system was the first eLearning system to be introduced in 1998 at UDSM whereas more than 16,000 users were trained and registered, and 402 courses were uploaded (Mtebe, Dachi and Raphael, 2011). However, ten years later the Blackboard system was replaced by Moodle due increased annual license fee which approximated to US\$ 18,000 annually (Mtebe, Dachi and Raphael, 2011). In the 2008, the university saw the need to replace Blackboard by migrating all courses to Moodle system (Mtebe and Twaakyondo, 2012).

Migration from Blackboard system to Moodle system was accompanied by the introduction of three postgraduate blended distance programs: Postgraduate Diploma in Education (PGDE), Postgraduate Diploma in Engineering Management (PGDEM), and Master degree in Engineering Management (MEM) (Mtebe and Raphael, 2013). These programs are offered via regional centers in Mbeya, Mwanza, Dar es Salaam, and Arusha. The UDSM blended distance programs combines face-to-face delivery with students accessing learning resources via the Moodle system. Instructors use Moodle to facilitate course delivery using system tools such as discussion forums, assignments, and chat forums.

In order to speed up the uptake of technology enhanced learning, the university established the Center for Virtual Learning (CVL) in 2005 (Twaakyondo and Munaku, 2012). The center aimed at facilitating the development and delivery of blended learning programs by providing pedagogical support to instructors for effective facilitation of the courses (Mtebe and Raphael, 2013). It was identified therefore, that CVL should take lead in establishing and technology enhanced learning at UDSM. Most of experience and encounters narrated in this paper cites activities done in the university through CVL.

LITERATURE REVIEW

The higher education landscape is undergoing significant change as a result of technological innovations. and use of various educational technologies has advanced significantly over the past few decades. It is now a common practice to find technology enhanced learning in many higher learning institutions all over the world. Interview with Tonny Bates (Simsek, 2011) for instance, revealed that the adoption and use of technology enhanced learning in USA higher education institutions is over 90% with more than 40% students taking at least some of their classes online. High usage of these technologies has also been reported in the United Kingdom, Australia, New Zealand, and Northern Europe and growing steadily in China, India, Brazil, and Africa.

Recently, higher learning institutions in sub-Saharan Africa have increasingly being adopting various technology enhanced learning in a bid to widen access to education and to improve the quality of learning. In South Africa for instance, the University of South Africa (UNISA), University of Cape Town (UCT), University of South Africa (UoSA), North West University (NWU), and University of Western Cape (UWC) are good examples of institutions that have adopted various educational technologies in their campuses. At UNISA, the instructors use Sakai system to distribute resources and facilitate interaction between students and instructors while mobile technology is used to facilitate communicate with learners (Venter, Rensburg and Davis, 2012). Data from the system shows that about 96% of learners have been accessing the system more frequently (Venter, Rensburg and Davis, 2012).

Another good example is the University of Cape Town which started by adopting WebCT before and finally decided to use Sakai system in 2006. The system has more than 25,000 learners and a good number of instructors who use the system to complement face-to-face delivery (Bagarukayo and Kalema, 2015). Similarly, the University of Stellenbosch (US) adopted WebCT as a technology to complement teaching and learning (Bagarukayo and Kalema, 2015). The system is widely used by students and instructors as the university decided to establish a policy which requires every instructor to use the system. The Other institution in South Africa that have been implementing various technology enhanced learning include Nelson Mandela Metropolitan University (Ssekakubo, Suleman and Marsden, 2011)

Studies have also shown a good number of higher education institution in Kenya have also adopted various technology enhanced learning in their campuses. These institutions include the University of Nairobi (UoN), Moi University (MU), Egerton University (EU), Kenyatta University (KU), Jomo Kenyatta University of Agriculture and Technology (JKUAT), Maseno University (MAU), and MasindeMuliro University of Science and Technology (MMUST) (Muuro *et al.*, 2014). Majority of these institutions have adopted Moodle as the technology that facilitate the delivery of blended learning with instructors actively interacting with students via Moodle systems.

Several other institutions in sub-Saharan Africa have also been reported to adopt and use educational technologies in their institutions. Many of these institutions are in countries such as Uganda (Mayoka and Kyeyune, 2012; Kituyi and Tusubira, 2013), Kenya, Mozambique (Unwin *et al.*, 2010), Uganda (Mayoka and Kyeyune, 2012), Sudan (Elmahadi and Osman, 2013), and Zimbabwe (Chitanana, Makaza and Madzima, 2008). Similarly, apart from UDSM, a good number of institutions in Tanzania have been offering its programs in technology enhanced learning.

Mzumbe University for instance, started using Moodle system in 2014 to offer its programs in blended distance programs via learning canters in Mwanza and Mbeya regions. Likewise, the Open University of Tanzania which initially used to run pure distance learning has now stated blending delivery of its programs with various educational technologies. The university is complementing its programs using Moodle system where materials are made available electronically for all students to access. Other institutions reported to use various educational

technologies to complement face-to-face delivery in Tanzania include Muhimbili University of Health and Allied Science (MUHAS), Sokoine University of Agriculture (Lwoga, 2014), Kilimanjaro Christian Medical University College (KCMUCo) (Eriki, Talib and Lim, 2015), and Mbeya University of Science and Technology (MUST) (Mwalumbwe and Mtebe, 2017).

Despite these developments, several challenges still exist which are unique to various countries or various institutions and there is a little research in the areas which can help institutions to share experiences on how they overcome those challenges (Simsek, 2011). In attempt to add into a body of researchers in the technology enhanced learning in sub-Saharan Africa, this study brings to attention the path UDSM has gone through in the course of adopting and implanting technology enhanced learning, identifies challenges that hinder the university from fully embracing educational technology and identifies opportunities available that can be harnessed to improve technology integration in higher education in the country.

METHODOLOGY

Data used in presenting issues and experiences in this article were gathered using the review of documents and reports on technology enhanced learning activities at UDSM. These documents and reports were reviewed for purposes of assembling relevant information on eLearning policies, implementation, and the impact over the past ten years, 2007- 2017.

ACHIEVEMENTS

While the conventional setting of the lecture hall continues to form the bedrock of higher education systems in many higher learning institutions in Tanzania, the acceptance, adoption and use of various educational technologies at UDSM via blended distance programs within campuses and outside the university is widely witnessed. There have been considerable achievements that worth mentioning in integrating technologies in teaching and learning at UDSM for the past ten years. These achievements are discussed next.

Increased acceptance of blended learning programs

While the conventional setting of the lecture hall continues to form the bedrock of higher education systems in many higher learning institutions in Tanzania, the acceptance, adoption and use of various educational technologies at UDSM via blended distance programs within campuses and outside the university is widely witnessed. Initially, many employers perceived graduates from blended distance programs as poor. With evidence from the number of students applying for blended distance programs and the number graduates continued to be employed in the industry, it is clearly that the acceptance of blended distance programs has increased.

The acceptance of blended learning programs can also be noticed from a number of similar programs offered by various institutions in Tanzania foster learning best practices from UDSM. These institutions include the Open University of Tanzania (Bhalalusesa, Lukwaro and Clemence, 2013), Mzumbe University, Muhimbili University of Health and Allied Science (MUHAS) (Lwoga, 2014), Kilimanjaro Christian Medical University College (KCMUCo) (Eriki, Talib and Lim, 2015), Mbeya University of Science and Technology (MUST) (Mwalumbwe and Mtebe, 2017), Institute of Finance Management (IFM), University of Dodoma (UDOM) (Mtebe and Raisamo, 2014). Increased acceptance of technology enhanced courses via blended learning mode established

over the past decade is very necessary if technology is to bring the intended outcome especially in this era where its use is inevitable.

Widening access of learning opportunities

Over the past ten years, blended distance programs have managed to widen access of learning opportunities especially to postgraduate students who were unable to attend courses offered at UDSM main campus. Most of these students are working adults, with the availability of blended distance programs allows them to schedule their studies around work and family. Since 2007, a total of 111 PGDEM, 138 MEM, and 61 PGDE students have been admitted. By the end of 2016, more than 200 students graduated and several others were at different levels of their research work (See Table 1).

Table 1. Blended distance program students admitted at the UDSM.

| Year | Admitted | | |
|--------------|----------|-----|------|
| | PGDEM | MEM | PGDE |
| 2008/2009 | 17 | 0 | 11 |
| 2009/2010 | 30 | 18 | 8 |
| 2010/2011 | 19 | 30 | 7 |
| 2011/2012 | 8 | 15 | 6 |
| 2012/2013 | 17 | 29 | 13 |
| 2013/2014 | 10 | 24 | 7 |
| 2014/2015 | 6 | 9 | 1 |
| 2015/2016 | 4 | 13 | 19 |
| Total | 111 | 138 | 61 |

Source: CVL (2016)

Increased awareness eLearning

The low awareness of educational technology integration has been described as a barrier to the integration of technology enhanced learning in higher education in Tanzania (Lwoga, 2012). Awareness goes along with attitude (Sife, Lwoga and Sanga, 2007) and positive attitude towards technologies is widely recognized as a necessary condition effective adoption and use of various technologies (King and Boyatt, 2014).

In the efforts to raise awareness and change the attitude of academics and other members towards educational technologies integration, the university has been conducting various short trainings and workshops on weekly basis as well as offering continuous support on Moodle users across the university. The university also established an eLearning newsletter to disseminate information about various eLearning activities at UDSM and beyond. The newsletter was established in 2012 and it is published annually with a total of 5,000 copies distributed each year. The integration of education technologies as well as implementation of blended distance programs at UDSM has also increased awareness of the value and importance of ICT integration in education amongst members of university and community in general, which by itself acts as a catalyst for new users each semester.

Improving the quality of on-campus face-to-face delivery

The adoption and implementation of technology enhanced learning at UDSM has also improved the quality of on-campus face-to-face delivery. Majority of UDSM academic staff are now able to prepare course notes and share them via Moodle system for students to access. So far, there 671 courses uploaded in the system whereby teachers continue to teach in face-to-face but share the learning resources to students via Moodle system. Some of the courses have been integrated with multimedia elements, thus accommodating students with different learning styles.

To date, more than 493 academics are using Moodle to complement face-to-face delivery at UDSM. With the use of such technologies academics are able to promote lifelong learning whereas instructors no longer serve solely as distributors of content as before, but become facilitators of learning process. In this case, learners become active contributors, rather than passively consuming content (Lwoga, 2012) which is the learning styles/needs of current millennial students (Bates, 2009).

Establishing and strengthening International collaboration

The use of new technologies in education have enabled the university to establish collaboration with partners locally and globally. The first notable collaboration was with the African Virtual University (AVU) between 2003 and 2006 to deliver computer science and business studies programs from Royal Melbourne Institute of Technology (RMIT) and Curtin University of Australia respectively. In 2008, UDSM also partnered with the South African Institute for Distance Education (SAIDE) to develop and integrate animations and simulations into computer science courses at the university under the sponsorship of the Partnership for Higher Education in Africa (PHEA) (Mtebe and Twaakyondo, 2012). A total of 12 courses were improved with various multimedia elements such as video, audio, animations, and simulations.

Another notable ongoing collaboration is that of Indian universities under the Pan African India project since 2009. The collaboration involves delivering various academic programs from Indian universities to Tanzanians via the UDSM. The Indian universities include the University of Madras, Amity University, BITS Pilani, and IGNOU. Instructors from these universities interact with students using learning system and delivered live lectures via the satellite.

Introduction of Mobile Moodle

One of the challenge faced learners to use technology enhanced learning at UDSM was poor Internet accessibility. In fact, the system was developed to be accessible via desktop computers only. In 2015, the university decided to extend the system to be accessible into mobile devices so that many learners can be able to access it anywhere as far as they have Internet connection. The use of mobile Moodle has proven to be very successfully as many learners have managed to use the system more often than before. Through analyzing log of two selected courses, it was revealed that majority of students used Course View and User List features to read course notes and to check for their fellow students respectively (Mtebe and Kondoro, 2016).

CHALLENGES

The integration of education technologies at UDSM has recorded several successes as explained in the previous sub-section. Yet, one cannot ignore the numerous barriers that UDSM has encountered in the past decade during the adoption and use of these technologies. Some of the challenges are explained next.

Intermittent electricity

Studies have consistently described electricity power distribution national network as a limiting factor to the integration of educational technology in Tanzania (Tedre, Ngumbuke and Kemppainen, 2010; Lwoga, 2012; Kisanga and Ireson, 2015) and UDSM is no exception. The national electricity grid is still limited to commercially viable areas, thus bypassing most of the students in rural areas (Mtebe, Dachi and Raphael, 2011). In order to ensure availability of electricity, the university installed generators in almost all colleges. However, sometimes the standby generators become unreliable as they depend of fuel to operate. The cost of fuel keeps on rising and the university sometimes does not have enough budget to maintain all generators.

Resistance to change

Resistance to change amongst instructors in integrating technology to enhance teaching and learning remains a challenge (Kisanga and Ireson, 2015). Despite the continued acceptance and use of various technologies in teaching and learning at UDSM, some academics are still reluctant to use them. The reason to this tendency can be explained by study done by Tedre, Ngumbuke and Kemppainen (2010) who pointed out that many academics in universities in Tanzania never used these technologies in their own studies, and hence they have no previous knowledge on how those technologies could or should be used. This makes them feel uncomfortable when forced to abandon the traditional instructor-led learning style (Andersson and Grönlund, 2009).

Furthermore, the study done by Raphael and Mtebe (2016) found out that almost half instructors interviewed from OUT and 60% from UDSM did not have skills to manage workloads especially of their campus based courses, thus viewing blended courses as an added burden. These challenges have been reported to result into low confidence among instructors in the use of such technologies which in turn lead to slow acceptance of technology integration (Ssekakubo, Suleman and Marsden, 2011).

Policies

Government decisions have proven to be crucial to many aspects of technology integration in teaching and learning in higher education in Tanzania. There are some policies formulated by the government that have been affecting the adoption and use of educational technologies in teaching and learning. For instance, the government excepted import tax on computing devices in 2007 (Sife, Lwoga and Sanga, 2007; Tedre, Ngumbuke and Kemppainen, 2010). The policy increased affordability of computers and other ICT equipment in the country and in turn, enabled many people in the country to own computers of various kinds. However, recently the exception has been removed which means the cost of computing devices been increased.

Moreover, the UDSM Intellectual Property Policy of 2008 identifies learning content created for technology enhanced courses as being protected under IPR (UDSM, 2008). Therefore, academics are not allowed to share learning resources in the public domain. The IPR is also against the current trend of openness which put an emphasis on sharing content in the various repositories as Open Educational Resources (OER). Due to this policy, many staff members consider their lecture slides and other lecture materials to be the biggest assets in their work (Tedre, Ngumbuke and Kemppainen, 2010). These policies and many others have shown to hinder the adoption and use of technology enhanced learning in higher education in Tanzania.

Coping with changing technologies

The fast development of educational technologies has been a challenge to the implementation technology enhanced learning at UDSM. While staff have been trained to use Moodle to support teaching and learning, many students have been using various social media networks. As a result, there is a mismatch between what technologies students are using with what instructors are using to facilitate teaching and learning.

In addition, the proliferation of mobile telephony in Tanzania add new challenge to educators. Many users have access to mobile devices such as mobile phones and tablets and they expect educators to tailor learning in devices they have already have access to. However, Moodle and many educational technologies were not designed to be accessible in these devices without distortion. For instance, the university had to configure Moodle to be accessible in mobile devices so as to ensure that learners have access to learning resources in their mobile devices (Mtebe and Kondoro, 2016).

There is also emergency of Massive Open Online Courses (MOOCs) and cloud computing as the new technologies. The MOOCs provide thousands of courses online while cloud computing offers an opportunity of institutions to implement technology enhanced learning without installing ICT infrastructure. However, many institutions have not yet embraced them to complement technology enhanced learning. In long run, the impact of these technologies will definitely affect the way institutions in Tanzania deliver their programs.

Insufficient Internet bandwidth

The university has made a lot of efforts to improve the speed and accessibility of the Internet. So far, almost all colleges are connected with Fibre optic marine cable with a speed of 155mbps. Nonetheless, students have continued to find difficulties in accessing courses especially outside the university. This was evident from a study conducted by Mtebe and Raphael (2013) which found that students in regional centers were unable to access multimedia enhanced courses properly via the Internet due to bandwidth difficulties. While many users depend on modems to access Internet, Internet bundles are still expensive. A subscription of 10GB of Internet bundle is charged between 40,000 (US\$ 20) to 60,000 (US\$ 30) per month which is expensive to the majority of Tanzanians. Insufficient Internet speed and unaffordable cost of Internet bundles remain to be a constraint to the wider adoption and use of technology enhanced learning across sub-Saharan Africa (Unwin *et al.*, 2010; Venter, Rensburg and Davis, 2012). In a study conducted by Mtebe and Raisamo (2014) in 11 institutions in Tanzania, 9 institutions were found to have bandwidth between 7mbps to 20mbps.

Inadequate funds

Financial resources forms a key factor to the successful technology enhanced learning at any institutions (Sife, Lwoga and Sanga, 2007; Andersson and Grönlund, 2009). The UDSM like many institutions in sub-Saharan Africa has been depending on donor funds to implement various eLearning initiatives. These donors include Swedish International Development Agency (SIDA), Danish International Development Agency (DANIDA), Commonwealth Fund for Technical Cooperation (CFTC), World Bank, Commonwealth of Learning (COL), and Carnegie Corporation of New York (Komba, 2009). The majority of these initiatives are not sustainable as they tend to end once the donor funds have reached to the end. Moreover, the majority of these initiatives tend to be linked with the outputs needed by funders rather than institutions objectives.

OPPORTUNITIES

Integrating technology in teaching and learning at UDSM has created several opportunities to learners, instructors, and other institutions in Tanzania. Likewise, there are opportunities that eLearning practitioners at the UDSM can capitalize on and improve delivery of both campus and blended based courses. Some of these opportunities are discussed next.

Establishment of quality assurance bureau

During the early implementation of technology enhanced learning at the university, one of the main challenges was ensuring the quality of blended distance programs. The existing quality assurance was mainly developed focusing on on-campus delivery. The UDSM had to develop quality assurance procedures for blended distance programs and were integrated into the existing quality assurance procedures and are coordinated by Quality Assurance Bureau.

The presence of quality assurance guidelines and procedures at UDSM is seen as an opportunity as blended distance programs delivery is a new method of teaching and learning in Tanzanian universities, thus its quality need to be constantly safeguarded. Other institutions offered similar programs in Tanzania are likely going to learn from how these guidelines and procedures can be used to assure and control the quality of technology enhanced learning programs.

The presence of Regional Learning Centers

The university has built regional centers in Mbeya, Dar es Salaam, and Mwanza dedicated in offering blended distance programs. The centers have been equipped with 80 computers each and installed with network infrastructure. The presence of these centers provides a good opportunity for colleges and units of the university to widen access of their programs beyond university campus and therefore reaching many students upcountry. The centers can also be used by other institutions in the country planning to offer similar programs in blended distance mode.

Increased demand for flexible continuing education

Based on the number of applicants to blended distance programs at UDSM, the demand for flexible continuing education is growing. Most of working people require upgrading of their knowledge and skills required in the current competitive global economy. Therefore, the presence of blended distance programs is expecting to continually enable many people to attain their education without being required to travel to the university main campus and leave their employment. Constituent colleges of the UDSM like the Dar es Salaam University College of Education (DUCE) have also started offering blended distance programs in 2016 and currently have enrolled a total of 14 students. Many more students have been applying in these courses but fail to register due to financial constraint. For instance, data from DUCE show that 2016/2017, a total of 30 students applied and were admitted to the PGDE program.

Establishing eLearning research group

The Centre for Virtual Learning (CVL) which has mandate to oversee technology enhanced learning the university established the eLearning research group (eLRG) in order to provide an environment for researchers to conduct and disseminate research on technology enhanced learning. The eLRG is a multi-disciplinary research group aiming at promoting research in various areas of technology enhanced learning at all levels of education. The group is focused not only on basic research but also in solving existing societal challenges through the application of educational technologies. The group has a website at www.elearning.udsm.ac.tz. The group has

researchers from school of education, library and College Information and Communication Technologies (CoICT). So far, the group has 6 PhD students and 21 masters' students doing various researches in technology enhanced learning.

CONCLUSION AND RECOMMENDATIONS

The university has seen breaking down of resistance to technological innovations in the university among academics and students, where many more university members have decided to embrace the opportunities brought by educational technologies. What is needed is a strategy, longer term plan to spark new hopes among university communities and cases that eLearning can change not only composition of the student body but works beyond boundary offering equitable access to and quality of education to those who would otherwise never get the chance to study at our campus. Based on experience gathered during technology integration at UDSM in the past ten years, the following are recommended for successfully continued usage of these technologies:

- There is a need to continue increasing access of and to improve the speed of Internet. Mobile firms should establish special Internet bundles that will be used for education purposes that is affordable to many learners across the country. Moreover, the government and other partners should reduce the cost of Internet in Tanzania so that it can be affordable to the majority of Tanzanians. The cost of internet is still high despite the emergence of Fibre optic marine cable.
- The university and the Government should review some policies that hinder the wider adoption and use of technology enhanced learning. For instance, the IPR policy need to be reviewed. While the majority of instructors tend to use OER to prepare materials for students' access, the IPR prohibits them to share into the public domain after modification. Such policies and many others should be reviewed.
- The government should ensure the availability of reliable electricity especially in rural areas where many learners are found. In places where national grid is not available, some other alternative power sources such as solar power can be deployed.

REFERENCES

- Andersson, A. and Grönlund, Å. (2009) 'A conceptual framework for eLearning in developing countries: A critical review of research challenges', *The Electronic Journal on Information Systems in Developing Countries*, 38(8), pp. 1–16.
- Bagarukayo, E. and Kalema, B. (2015) 'Evaluation of elearning usage in South African universities: A critical review', *International Journal of Education and Development using Information and Communication Technology*, 11(2), pp. 168–183.
- Bates, T. (2009) 'Expectations and goals for e-learning'. Available at: <http://www.tonybates.ca/2009/06/18/expectations-and-goals-for-e-learning/>.
- Bhalalusesa, R., Lukwaro, E. E. and Clemence, M. (2013) 'Challenges of using elearning management systems faced by the academic staff in distance based institutions from developing countries: A case study of the Open University of Tanzania', *Huria Journal of OUT*, 14, pp. 89–110.
- Carr, S. (2000) 'As distance education comes of age, the challenge is keeping the students', in *The Chronicle of Higher Education*, pp. 46, A39 – A41.

- Chitanana, L., Makaza, D. and Madzima, K. (2008) 'The current state of e-learning at universities in Zimbabwe : Opportunities and challenges', *International Journal of Education and Development using ICT*, 4(2), pp. 5–15.
- Collopy, R. M. . and Anord, J. . (2009) 'To Blend or Not to blend:Online and Blended Learning Environments in Undergraduate Teacher Education.', *Issues in Teacher Education*, 2(18), pp. 85–101.
- Elmahadi, I. and Osman, I. (2013) 'A study of the Sudanese students ' use of collaborative tools within Moodle Learning Management System', in *IST-Africa 2013 Conference Proceedings*, pp. 1–8.
- Eriki, P., Talib, Z. and Lim, C. (2015) *Kilimanjaro Christian Medical University College (KCMUCo) MEPI site visit Report*. Kilimanjaro.
- Garnham, C. and Kaleta, R. (2002) 'Introduction to Hybrid Courses', *Teaching with Technology Today*, 8(6).
- Garrison, D. R. and Kanuka, H. (2004) 'Blended learning: Uncovering its transformative potential in higher education', *The Internet and Higher Education*, 7(2), pp. 95–105. doi: 10.1016/j.iheduc.2004.02.001.
- King, E. and Boyatt, R. (2014) 'Exploring factors that influence adoption of e-learning within higher education', *British Journal of Educational Technology*, 46(6), pp. 1272–1280. doi: 10.1111/bjet.12195.
- Kisanga, D. and Ireson, G. (2015) 'Barriers and strategies on adoption of e - learning in Tanzanian higher learning institutions : Lessons for adopters', *International Journal of Education and Development using Information and Communication Technology*, 11(2), pp. 126–137.
- Kituyi, G. and Tusubira, I. (2013) 'A framework for the integration of e-learning in higher education institutions in developing countries', *International Journal of Education and Development using Information and Communication Technology*, 9(2), pp. 19–36.
- Komba, W. L. M. (2009) 'Increasing education access through open and distance learning in Tanzania: A critical review of approaches and practices', *International Journal of Education and Development using Information and Communication Technology*, 5(5).
- Lim, D. ., Morris, L. . and Kupritz, W. . (2007) 'Online vs blended learning: difference in instructional outcomes and learner satisfaction', *Journal of Asynchronous Learning Networks*, 11(2), pp. 38–50.
- Lindow, M. (2011) *Weaving Success: Voices of Change in African Higher Education*. NewYork, NY 10022: Library of Congress Cataloging-in-Publication Data.
- Lwoga, E. (2012) 'Making learning and Web 2.0 technologies work for higher learning institutions in Africa', *Campus-Wide Information Systems*, 29(2), pp. 90–107. doi: 10.1108/10650741211212359.
- Lwoga, E. (2014) 'Critical success factors for adoption of web-based learning management systems in Tanzania', *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 10(1), pp. 4–21.

- Mayoka, K. and Kyeyune, R. (2012) 'An analysis of eLearning Information System adoption in Ugandan Universities : Case of Makerere University Business School', *Information Technology Research Journal*, 2(1), pp. 1–7.
- Mtebe, J. S., Dachi, H. and Raphael, C. (2011) 'Integrating ICT into teaching and learning at the University of Dar es Salaam', *Special Issue: Distance Education for Empowerment and Development in Africa*, 32(2), pp. 289–294. doi: 10.1080/01587919.2011.584854.
- Mtebe, J. S. and Kondoro, A. W. (2016) 'Using Mobile Moodle to Enhance Moodle LMS Accessibility and Usage at the University of Dar es Salaam', in *IST-Africa 2016 Conference Proceedings*. Durban, South Africa: Paul Cunningham and Miriam Cunningham (Eds), pp. 1–11.
- Mtebe, J. S. and Raisamo, R. (2014) 'Investigating perceived barriers to the use of Open Educational Resources in higher education in Tanzania', *International Review of Research in Open and Distance Learning*, 15(2), pp. 43–65.
- Mtebe, J. S. and Raphael, C. (2013) 'Students' experiences and challenges of blended learning at the University of Dar es Salaam, Tanzania', *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 9(3), pp. 124–136.
- Mtebe, J. S. and Twaakyondo, H. M. (2012) 'Developing and using animations and simulations to teach computer science courses: The case of University of Dar Es Salaam', *2012 International Conference on E-Learning and E-Technologies in Education (ICEEE)*. Ieee, pp. 240–246. doi: 10.1109/ICeLeTE.2012.6333383.
- Munguatosha, G. M., Muyinda, P. B. and Lubega, J. T. (2011) 'A social networked learning adoption model for higher education institutions in developing countries', *On the Horizon*, 19(4), pp. 307–320. doi: 10.1108/10748121111179439.
- Muuro, M. E. *et al.* (2014) 'Students' Perceived Challenges in an Online Collaborative Learning Environment: A Case of Higher Learning Institutions in Nairobi, Kenya.', *International Review of Research in Open and Distance Learning*, 15(6), pp. 132–161. Available at: <http://eric.ed.gov/?id=EJ1048242>.
- Mwalumbwe, I. and Mtebe, J. S. (2017) 'Using Learning Analytics to Predict Students' Performance in Moodle Learning Management Systems: A case of Mbeya University of Science and Technology', *The Electronic Journal of Information Systems in Developing Countries*, 79(1), pp. 1–13.
- Prinsloo, A. A. and Rooyen, V. (2007) 'Exploring a blended learning approach to improving student success in the teaching of second year accounting', *Meditari Accountancy Research*, 15(1), pp. 51–69. doi: 10.1108/10222529200700004.
- Raphael, C. and Mtebe, J. S. (2016) 'Instructor support services : An inevitable critical success factor in blended learning in higher education in Tanzania', *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 12(2), pp. 123–138.
- Sife, A. ., Lwoga, E. . and Sanga, C. (2007) 'New technologies for teaching and learning : Challenges for higher learning institutions in developing countries', *International Journal*

- of Education and Development using Information and Communication Technology (IJEDICT), 3(2), pp. 57–67.
- Simsek, A. (2011) 'Interview with Tony Bates on the Aspects and Prospects of Online Learning', *Contemporary Educational Technology*, 2(1), pp. 88–94.
- Ssekakubo, G., Suleman, H. and Marsden, G. (2011) 'Issues of adoption : Have e-Learning Management Systems fulfilled their potential in developing countries ?', in *Proceedings of the South African Institute of Computer Scientists and Information Technologists Conference on Knowledge, Innovation and Leadership in a Diverse, Multidisciplinary Environment*. Cape Town, South Africa.: ACM New York, NY, USA ©2011, pp. 231–238. doi: 0.1145/2072221.2072248.
- Tedre, M., Ngumbuke, F. and Kemppainen, J. (2010) 'Infrastructure , human capacity , and high hopes : A decade of development of e-Learning in a Tanzanian HEI', *Redefining the Digital Divide in Higher Education*, 7(1).
- Twaakyondo, H. M. and Munaku, M. (2012) 'A Steady Progress Towards E-Learning in Tanzania ; The Case of CVL-UDSM', in *IST-Africa 2012 Conference*, pp. 1–7.
- UDSM (2008) 'UDSM Intellectual Property Policy', pp. 189–198.
- UNESCO (2002) *The Challenges of Achieving EFA in Africa, civil society perspectives and positions to MINEDAF VIII*.
- Unwin, T. et al. (2010) 'Digital learning management systems in Africa: myths and realities', *Open Learning: The Journal of Open and Distance Learning*, 25(1), pp. 5–23. doi: 10.1080/02680510903482033.
- URT (2010) *Higher Education Development Programme(HEDP) 2010-2015*. Dar es Salaam.
- Vaughan, N. (2007) 'Perspectives on Blended Learning in Higher Education', *International Journal on E-Learning*, 6(1), pp. 81–94.
- Vaughan, N., Zimmer, J. and Vallamar, F. (2011) 'Student Engagement and Interactive Technologies:What's the connection?', *International Journal of Excellence in E-Learning*.
- Venter, P., Rensburg, M. J. Van and Davis, A. (2012) 'Drivers of learning management system use in a South African open and distance learning institution', *Australasian Journal of Educational Technology*, 28(2), pp. 183–198.

Copyright for articles published in this journal is retained by the authors, with first publication rights granted to the journal. By virtue of their appearance in this open access journal, articles are free to use, with proper attribution, in educational and other non-commercial settings.

Original article at: <http://ijedict.dec.uwi.edu/viewarticle.php?id=2290>