Advances in Research
8(3): 1-11, 2016; Article no.AIR.30283
ISSN: 2348-0394, NLM ID: 101666096

SCIENCEDOMAIN *international*
www.sciencedomain.org

Role of ICT in Teaching and Learning: Influence of Lecturers on Undergraduates in Tanzania

Yazidu Saidi Mbalamula[1*]

[1]Department of Educational Management and Policy Studies, College of Education, The University of Dodoma, Tanzania.

Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

Article Information

DOI: 10.9734/AIR/2016/30283
Editor(s):
(1) Ali Said Mohamed Al-Issa, Sultan Qaboos University, Sultanate of Oman.
(2) Marco Sorrentino, Pegaso Telematic University, Italy.
Reviewers:
(1) Adaobi Patricia Ifejiofor, Chukwuemeka Odumegwu Ojukwu University, Nigeria.
(2) Kalpana L. Chaudhari, Sardar Vallabhbhai National Institute of Technology, India.
Complete Peer review History: http://www.sciencedomain.org/review-history/17319

Original Research Article

Received 29th October 2016
Accepted 9th December 2016
Published 23rd December 2016

ABSTRACT

Reconnaissance to investigate on the integration of ICTs is not novel, and in case higher learning institutions in Tanzania as it is elsewhere remains indispensable to augment pragmatic corpus of knowledge and practice on ICTs integration in panoramic educational contexts. This study investigate on the influence of lecturers have on their students' use of ICTs in learning. Three objectives are adopted to determine essential ICT Skills needed by student-teachers in learning; to examine lecturers' usage of ICTs in teaching process; and to determine cause-effect relationships between lecturers' ICTS usage in teaching and student-teachers' use of ICT in learning. A survey design ensuing quantitative methodology to collect and analyze the data from sample of 97 student-teachers. The data were analyzed using Statistical package for Social Sciences (SPSS). The major posits of the study divulged that ICT skills are not only essential for construction of knowledge, but also essential for identifying useful information for learning. Also, the Lecturers consider ICT as a major tool in teaching. Moreover, though there was moderate relationship between lecturers' use of ICT in teaching has and student use in learning, lecturers' use of ICTs in teaching process significantly influence student teachers' use of ICTs in learning process. Generally, student teacher perceptions and ultimate use are dependent on self conceived usefulness of the ICT skills in learning, which in turn contingent to extent lecturers apply ICTs in

**Corresponding author: E-mail: mr.ysaidi@hotmail.com;*

their daily teaching and learning practices. Four major implications have been proposed in this paper for improving practice and theory.

Keywords: E-teaching; digital education; ICT Integration; TAM; technological-based-teaching.

1. INTRODUCTION

The concept of Information and Communication Technologies (thereafter ICTs) refers to electronic means of access, process, store and present communication and information using computers, internet, telephone, cell-phones, television, radio and slide projector [1,2]. In that regard, ICT integration connotes both means and tool to relay communication data and information amongst and between users through the electronic hardwares and software programmes [3,4,5].

Digital infrastructure has become a defining feature for need of technological competencies to improvise business-as-usual approaches and ensure quality of education provision [6]. Evidently, the explosion and advancement of ICTs has been significant impacting education as main vehicle of human capital development [7,8]. More importantly, integration of ICTs has facilitated abreast transfer of knowledge and skills to graduates not only accelerating national economies and address competitive labour markets [7].

Consequently, many reforms in 21st century have envisaged curricular changes particularly embedding ICTs as tools and alternative means to enhance traditional teaching-learning approaches by integrating ICTs in the whole curriculum, course or subject level, and also in distinct topic level [4,5]. Such extensive investment of ICTs in education systems resonate the empirical rewarding experiences of enhanced quality education benefits at disposal [9]. Also, many countries have established National ICT policies, for instance the Tanzania National ICT policy of 2003, Tanzania ICT Policy for Basic education of 2007 [4,10].

These policies have provided a conducive environment for profound ICT developments transforming various processes in education sector which have paved for diversified development in both developed and developing nations especially in the context of technology-driven economies of the 21st century [7,11,12,13].

Recently, ICTs have become common place in all educational spheres due to its increased popularity of generic electronic technology vantages among education stakeholders in relation to learning that is not confined to time and space [14,15]. Least to be said is that ICTs integration has become central focus among academics and researchers in both developed and developing countries on inventing more ways through which ICT can be used to enhance students' academic achievement [16,17]. [18] add that teachers need skills and pedagogical models to be able to take advantage of various information and communication technologies for supporting their students' learning.

Cognizant, the debates on ICTs integration has burgeoned rhetoric among stakeholders on traditional classroom pedagogies versus a number of computer-based collaborative learning forms whether to change completely or supplement with more efficient strategies to enhance learning outcomes [15,19]. The rhetoric conform to ICTs integration as advocated effective means to provide better inclination to install not only innovative teaching methodologies, but also increased enthusiasm through interesting material that motivates learners to learn [20,21]. Research studies in both developed and developing countries have conceded that use of ICT in education has dramatically changed educational systems in the world particularly in access of the content, pedagogy and assessment of students' teaching and learning [22]. Also, studies show that ICTs have transformed the ways teachers teach and students learn and as such ICT integration playing an important role in supplementing traditional chalk-and-board use in teaching and learning process [23]. These research studies have provided valuable benefits about the nature and extent ICT influenced improvement of education [4,22,24,25].

Theoretically, the integration of ICT is presumed to be a supportive tool to teaching and learning is by and large an act of psychological conviction to accept or refute the significance of the technology by an individual [26]. The conviction is a function of individual's belief whether ICT compliment to their needs [15,27]. According to

popular theory of Technology Acceptance Model (TAM) two factors are critical to influence ultimate use of technology by the user, namely, perceived usefulness and perceived ease of use of the ICTs [12,15,28,29,30].

Arguably, the individual's perceived ease and perceived significance to ICT use in learning constitute integrated component of the learning process itself [14]. The contention is circumscribed by the intention attitude by the individual for prospective learned behavior through and resultant of ICT use in learning [12,24]. In this case, articulating to the theory of planned behavior, behavioral intention to ICT use in learning is significantly predicted by the individual's attitude toward a particular behavioral subjective norm and perceived behavioral control both which influence behavioral intentions to actual use of ICT in learning [22,24,31,32]. Also, both perceived ease and perceived significance of ICT use constitute to an important variable of self-efficacy (SE) which resonates individual's belief, and hence defining one's ability and confidence to integrate ICT in their learning. In light of the above, Teachers become crucial factors both as moderator of ICT integration skills and guides on the side to model students' SE to use ICTs in learning process [27]. Teachers' pedagogical perspectives to create ICT integrated learning environment which play an important role in the actual use of ICT in the classroom [33,34].

In line with the above arguments is the fact that learning relative change in behavior as result of inter and intra experiences; teaching is process of crafting an environment conducive for learner to generate and develop knowledge and skills about particular phenomenon. The use of ICTs in teaching and learning at either subject or topic is a relatively new phenomenon [5,35]. In this case, ICTs are integrated in teaching-learning contexts to provide versatility for engaging students into instructional activities to augment learning and learners' cognitive skills [1,4,5,26].

In a nutshell, the extent teachers integrate ICTs in their teaching process have significant influence on the students' use of ICTs in their learning process. Also, the students' actual use is a function of both perceptions of the extent their teachers use and students' belief on benefits accruable from ICT integration, and hence, those students' actual integration of ICT in learning process is subject of experienced students' SE. Moreover, the use of ICT in teaching-learning process is dependent on other demographic factors including gender with male users tend to integrate ICT more than female counter partners [30,36].

Notwithstanding, face-to-face teaching, tutorials and mentoring remain dominant methods in teaching and learning process, but integration of technologies has become a feasible infrastructure which enables teachers to engage students in a more enhance interactive and collaborative learning environment [5,27,28,33]. The latter contention endorses ICTs as innovative teaching methodology for increased student-teacher productivity, availability of vast of learning information, motivation to students' interest s to apply knowledge, and inculcating technological competences to students for prospective labour market to manage and counterproductive sense of lifelong learning [4,5,20,37,38]. For instance, a study by [19] revealed that there is ICTs have significant influence on learners' intelligence in logic, linguistic and visual spatial intelligences.

Hence, adoption and usage of ICTs has been revolutionary by and large becoming essential ideals and institutionalization for researchers and practitioners in all educational organizations particularly universities in both developed and developing countries [16,17,38, 39]. On the basis of similar reasons, all stakeholders in higher learning accord on significant changes that integration of ICTs has dramatically improved the access of the content, pedagogy and assessment procedures, and hence transformed the ways university teachers deliver the subject matter and students learn [22,23].

Undeniably in the 21st century ICTs are regarded not only feasible but also an effective enhancing means and apparatus for quality education hitherto necessitate comprehensive deliberation across education sectors [13,40]. Notwithstanding, numerous advances on hardware and softwares at disposal for users in education sector; nevertheless, the challenge making technology use viable and productive part of teaching-learning settings remain to be a confounded quandary [17]. The analogous reasons being some of the institutions still have not forfeited sufficient efforts on what, when, why and how the ICTs should be ensued in instructional processes [17,33]. Also, studies show that although ICTs in most higher learning institutions worldwide experience proliferation of instructional technologies expansion than ever

before but studying the role of technology has been marginal and little research has been done to verify the process how university students adopt ICTs in their learning [17,29,41,42].

Therefore, the need to understand and nurture prerequisite conditions for ICTs integration remains critical precedence inclusion in research discourses and predominantly on teachers' and students' attitudes towards its use, however little known about how university students experience ICTs in their learning environment [15,27,33,39]. In a nutshell, at hand is a need to comprehend complicity of teacher-student relationships as function of use and integration of respective methods and skills in computerized-mediated technology teaching and learning contexts [8,15].

The integration and use of ICTs is vital in higher learning institutions operation in Tanzania is of the quintessence for aspired sustainable development stipulated in its Vision 2025. The vision envisaged the adoption of National ICT policy in 2003 to be an umbrella code and blueprint for catering amongst others high quality livelihood through cross-sectoral adaption of ICTs including education [10,43,44,45]. The policy amongst other things envisions Tanzania as prospective crux of ICT Infrastructure that will enhance sustainable socioeconomic development in promoting multi-layered co-operation and knowledge sharing both at national and global level such that the policy framework centrifuges different sectors and in particular education sector becomes can be empowered through the development and application of ICT in its multiple convergences such as educational management information systems [2,10,45].

In most higher education systems in Tanzania are still striving to ensure ICT integration fully fledged in the educational system and hence improve the quality of education delivered in lecture halls and other learning spaces [16,17,43, 45]. In the same vein, integration of ICTs in higher education further capitulate improvement of the graduates as the universities continue to maintain their current share of the local and international labor market [44]. What remains imperative is for universities to ensure lecturers are integrating ICT in their teaching activities so as student teachers to be prepared on how to integrate information and communication technology (ICT) into their teaching and learning practices, and graduation [46].

2. PURPOSE OF THE STUDY

Doubtlessly, Tanzania like many countries in sub-Saharan Africa has continuously and substantially achieved notable progress of increased infrastructure, awareness and access of ICT by both teachers and students [10,35,43, 45]. However, while there is moderate progress in ICT apprehended in Tanzania, little is yet to be known about whether lecturers use, and how that can help students to adapt and use ICT as the learning tool [17,35]. Inclined to the latter reservation is the need to understand lecturer-student relation in the context of teaching and learning [35]. Therefore, the fundamental objective of this study was to investigate on the influence of lecturers' have on student-teachers' ICT use in learning process. Three major research objectives including, to determine what essential ICT Skills needed by student-teachers in learning; secondly, to examine the perceptions of student-teachers on Lecturers' usage of ICTs in teaching, and lastly, to determine cause-effect relationships of Lecturers' ICTS usage in teaching on student-teachers' use of ICT in their learning.

3. METHODOLOGY

The survey based design is adopted using quantitative methodology to collect data from undergraduate students in one of the college in the University of Dodoma. The self-administered with 5-point rating scales questionnaires were distributed a sample of 97 student-teachers. The questionnaires were developed from prior interview conducted to explore skills that student teachers needed in their daily learning. Analysis of the interviews produced five major categories of skills including, in this paper identified as SKILL 1= the skills on how to use ICT based information for learning, 2= the skills to use ICTs to access learning information, 3= the skills to ICT to evaluate the authenticity of learning information materials, 4= the skills to construct knowledge through ICT information materials, and 5= the skills to identify useful information from ICT media All of the respondents were second year students in one of the courses taught by the researcher in undergraduate courses at the College of Education[1]. The data collected are analyzed quantitatively by *Statistical Package for Social Sciences* (SPSS). The analysis used percentages, mean and

[1] *College of Education is one of the six constituent colleges of the University of Dodoma (Tanzania)*

standard deviations, Pearson Correlation Coefficient and Linear Regression analyses were use to establish the cause effect of the variables, that is, *Lecturers' ICT Usage* (LICTU) and *Student-teachers' ICT-in-Learning* (StICTUL). The Cronbach's alpha was .80 for the questionnaire use in the study as main instrument of data collection.

4. ANALYSIS AND FINDINGS

The first objective intended to determine the extent of ICT Skills needed by Student-teachers to integrate ICT in learning. Five ICT skills were used as factor measures in five point scale represented by Not Essential =1, Essential=2, Relatively Essential=3, More Essential=4 and Very Essential=5. The responses of the 97 respondents are hereunder.

The analysis made on the type of ICT skills Student-teachers need in their Learning Process (N=97) to show the extent of type of ICT skills needed by student-teachers in their learning process, the results are presented in Table 1.

The results indicate that majority of student-teachers (44.3%, n=43) needed more skills in their learning process requiring ICT skills to construct knowledge (Mean=4.29, SD=.72), but this would vary as other skills are also showing that student teachers need ICT skills for identifying useful learning information, skills to apply ICT information in learning, skills to access ICT learning information. The range of such variation of ICT skills needed by the student-teachers in their learning process is shown in Fig. 1.

The second objective pursued to determine the adequacy of Lecturers' ICT Usage in Teaching (LICTUT), the frequency of lecturer's usage of ICT per every teaching lecture session was adopted as factor measure in five point scale represented by Very Relative=1, Seldom=2, Not At All=3, More Often=4 and Very Often=5. The analysis of responses from respondents is presented hereunder. The perceived frequency in terms of percentage of the Lecturers' usage of ICTs per teaching lecture session was adopted.

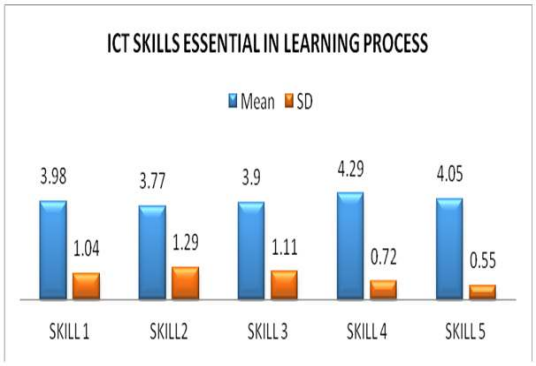

Fig. 1. Student-teachers' perceived essential ICT skills for learning

The analysis of student teachers' perceived frequency of the Lecturers' usage of ICTs (see Table 1) focused on five variables including, lecturers usage of ICTs media applications to present subject matter in lectures (LICTU1), Lecturers ICTs usage to provide assignment which required basic computer application softwares (LICTU2), Lecturers ICTs usage to involve students in class activities (LICTU3), Lecturers ICTs to provide assignments whose completion required use of internet (LICTU4), and Lecturers ICTs usage as a major tool in teaching and learning process (LICTU5).

These results indicate that majority of lecturers (59.8%, n=) use ICTs to provide assignments whose completion required use of internet; also lecturers have used ICTs to involve students in class activities. Fig. 2 provides full range of frequency of ICTs use by lecturer in teaching session as analyzed from student-teachers.

Table 1. ICT skills student-teachers need in learning process (N=97)

Variables	NE (%)	E (%)	RE (%)	ME (%)	VE (%)	*Mean*	*SD*
Skill 1	0	15.5	8.25	39.2	37.1	3.98	1.04
Skill 2	12.4	0	21.6	29.9	36.1	3.77	1.29
Skill 3	0	15.5	20.6	22.7	41.2	3.90	1.11
Skill 4	0	0	15.5	40.2	44.3	4.29	.72
Skill 5	0	0	12.4	70.1	17.5	4.05	.55

Table 2. Lecturer's frequency of ICT usage (N=97)

Variable	VR %	S %	NA %	MO %	VO %	*Mean*	*SD*
LICTU1	29.9	44.3	8.2	11.3	6.2	2.20	1.169
LICTU2	33.0	0	33.0	19.6	14.4	2.82	1.443
LICTU3	27.8	13.4	8.2	27.8	22.7	3.04	1.567
LICTU4	32.0	0	17.5	11.3	39.2	3.26	1.710
LICTU5	25.8	3.1	0	11.3	59.8	3.76	1.737

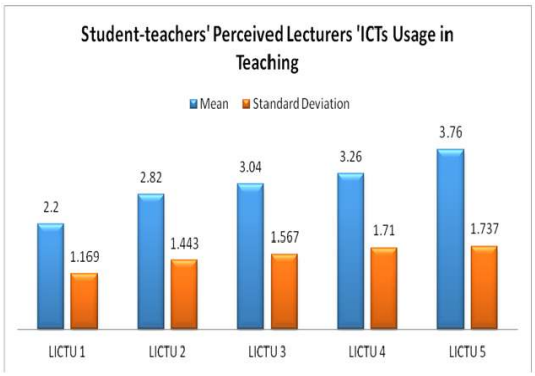

Fig. 2. Student-teachers perceived frequency of lectures' ICTs use in teaching

Also, the influence of *the Lecturers' ICTs Use in Teaching* (LICTUT) on *Student-teachers' ICT use in Learning* (StICTUL) is analyzed. Both the Pearson correlation coefficient and linear regression are used to determine the relationship and cause-effect between the two variables.

The results from Pearson Correlation Coefficient showed a moderate positive correlation (r (95) =.568, p<.01) between *Lecturers' ICT Usage in Teaching* and *Student-teachers' ICT Use in Learning*, which indicates that lecturers' use of ICT in their teaching sessions has significant linear relationship with actual student-teachers' use of ICT in their learning activities. Also, a simple linear regression was calculated to predict the influence of *Lecturers' ICT Usage in Teaching* on *Student-teachers' use of ICT in learning*. The results from the regression equation was found significant (F (1, 95) = 45.306, p<.001, with an R^2 of .323. The subjects' perceptions predicted that *Lecturers' ICT Usage in Teaching* was equal to 12.026 + .352 (*Student-teachers ICT use in Learning*). The aggregate analyses of both Pearson Correlation Coefficient and the linear regression designate that not only there was significant relation between the LICTUT and StICTUL, but the former significantly influenced the latter by 32.3% (R^2=.323) and that lecturers' ICT usage in teaching had predicatively by 12.026+.352 times enhanced the Student-teachers' ICT Usage in their Learning activities.

5. DISCUSSION

The findings of the study conform to wide consensus among stakeholders that integration of various ICT skills by students represents increasingly critical means and tools that can used to enhance students' learning [36]. Evidently, a university operating in the modern digital world, a teach-techno-learn mediation has become an intimately crucial procession of optimizing learning process in the postsecondary education [47]. The assertion implies that the utilization of ICT tools can indeed assist students in acquisition of competency and the quality of their learning experiences. However, individual learner need to perceive these ICT skills as useful and advantageous to influence the learners on the essence of using such skills in their learning process [48,49], and whose emphasis in the existing classroom practice is likely to change along with emerging forms of teaching or learning activity [37].

Also, learners and student-teachers in particular regard those ICT skills that can enable them construct knowledge more essential in their learning. A study by [50] revealed that learners show positive attitudes towards their learning if are conversant with those ICT skills which nurture constructivist learning environment and critical-thinking as a vital factor for developing their concrete knowledge. This being said, such ICT skills are essential in learning of knowledge which enable learner to construct concepts which activates their prior knowledge as a framework for a new mental knowledge to be learned [51,52]. Another observation made in the study showed that student-teachers considered ICT skills were essential to identify the information that was useful in their learning. Similarly, a study by [53] showed a strong relationship between the use of ICT tools and enhancement in teaching and learning particularly in the way

that they can help in acquisition of learning material prescribed in the curricula.

Apart from that, the analysis of the study shows that the lecturers' used of ICT, by and large using ICT as a major tool in teaching. Evidently, the findings showed lecturers integrated ICT in the assignments where student-teachers were required to use of one or more forms of ICT such as internet, E-mail, projector to complete, submit or present the assignments. Having group assignments is one of the ways to help student teachers to work together and learn from each other [54]. In addition, in such a context where most of universities in Tanzania experiences larger classes, the use of ICT devices can facilitate the teaching and learning more easily [17,44]. However, that does not necessarily imply that lecturers used the ICTs to empower students' skills in learning, but at least shows that the higher incidence of ICT use among lecturers attribute to strong belief on potential of ICT in teaching-learning process [20,21,55]. The implication of such an attempt by lecturers not only shows that they are not sufficiently competent to make use of ICT as a tool in a range of activities in their teaching process.

Moreover, it was established that there was moderate relationship of lecturers' use of ICT in teaching related to student teachers use of ICTs in learning (r (95) =.568, p<.01). This shows lecturers' use of ICT had potential to model the students in using ICT in their learning. The study by [56] revealed that there was a significant relation between tutor's influence and students' familiarity and use of ICTs in actual learning processes. This relationship can be a strong indicator of the extent lecturers would put their influence into action to their students. Consistence with the results of regression analysis lecturers' use of ICT had influenced student-teachers' ICT Use in their learning by 32.3% (R^2=.323) which predicted a 12.026+.352 times students teacher would use ICT in learning as lecturer use the ICT in teaching. This means lecturers' teach via ICT medium were role models to influence by eliciting motivation in decisions and actions of their learners in using ICT as a tool for learning and to use ICT in search for the learning materials [48]. A study by [57] noted that lecturers' usage patterns of e-learning systems affect how such systems are adopted by their students. Also, [58] found that Student-instructor interaction was significant contributor of student learning. Therefore, lecturers play a critical role in creating an environment where technology can be used and allow teaching to be tailored in various spaces of students' learning [59].

6. RECOMMENDATIONS

Four critical implications emerged in this study for institutional administrators, faculty and students regarding the integration of ICTs in universities and other higher learning institutions. First, the findings express the need for administrators to not only supply and maintain adequate and appropriate ICTs, but also should monitor and evaluate its usage in the institution and particularly in all teaching and learning contexts such as in lecture session or in other campus residences. This is imperative to encourage wider usage of ICT in the teaching and learning [60,61].

Secondly, it is worth noting that the deductive modeling effect propagated by lecturers using ICT during teaching process is likely to intensify and extend usage in every aspect of the students' assessment. However, both administrators and faculty need to promote awareness among undergraduate students not to conceive ICTs integration a dialogical rhetoric, but *regular tool* to enhance teaching and learning process. Implicitly, it is inconceivable for teachers to be trained in the area of ICT to enable modern ways of making sense of knowledge if institutions do not play their roles in provision of ICT facilities universities [62]. The role laxity is often the case as evidenced by poor institutions' coordination which remains a significant challenge hindering using ICTs in many higher learning institutions in Tanzania [63].

Thirdly, as noted earlier in this paper, TAM remains a popular theoretical framework which guides understanding of the acceptance of technology. Hence, the prominent constructs, the *perceived usefulness* and *perceived ease of use*, provide fundamental conceptual structure of practical integration of technology. However, for lecturers and students in particular, acceptance of technology should be considered as a psychosocial process which integrates both motivation and relative modeling of learning experiences within classroom and in other learning contexts. Therefore, lecturers must be pro-active in using ICTs in all teaching processes to effect students' acceptance and actual use of ICT in learning processes.

Cognizant, TAM need to account inclusion of factors, and suggestively, perceived influence of

external moderators whose actions are significant to change and model individual learning behavior using technology. In the same vein, [64] argued that, despite TAM is a useful model, but has to be integrated into a broader one which include variables related to both human and social change processes, and to the adoption of the innovation model. Moreover, [65] augmented that the theoretical underpinnings for information and communication technologies need to extent how the complex interplay between the pedagogy and technology.

Therefore, future research studies need to focus on determination of the most appropriate method of preparing pre-service teachers to be effective e-teachers. In line with the findings in the study, the moderated ICT integration framework raises two major questions for further investigation including; What psychological and social factors modeled by moderators are critical for effective ICT integration in universities?, and To what extent moderators' psychological and social factors can lead to effective deliberation of ICT integration in universities?

7. CONCLUSION

The major findings from the study emphasize on the general popular consensus that ICTs stand to be reliable means and tools to enhance teaching and learning in all levels of education, and particularly universities. Notably, the universities play critical role in the fast changing and emerging knowledge based economies of the 21st century. Hence, ICT integration becomes inevitable and imperative to accommodate techno-based challenges and realize the cherished goals in aspiration for provision of quality education in the country**.** While, ICT can be used to improve construction of knowledge among students, then ICT skills are equally important to identify useful learning information for effective learning. The latter contention is well articulated by the fact that lecturers' ICT usage in teaching has a significant influence on student-teachers' actual ICT use in learning. Lecturers are role models and moderators for motivating and facilitating learning among students in the use of ICT in universities. Therefore, lecturers must regularly make use of ICT tools in all teaching and assessment processes.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. Ali G, Haolader FA, Muhamad K. The role of ICT to make teaching-learning effective in higher institutions of learning in Uganda. International Journal of Innovative Research in Science, Engineering and Technology. 2007;2(8):4061-4073.
2. Mbalamula YS. Information, communication and technologies (ICT) and its implication for education management information systems (EMIS) in Tanzania. Munich, GRIN Verlag; 2014.
3. ChanLin L. Technology integration applied to project-based learning in science. Innovations in education and Teaching International. 2008;45(1):55-65.
4. Kafanabo E. The relationship between learners' intelligence profiles and performance in computer application skills. Papers in Education and Development. 2011;30:1-33.
5. Wang Q, Woo HL. Systematic planning for ICT integration in topic learning. Educational Technology and Society. 2007;10(1):148-156.
6. Linstead S, Fulop L, Lilley S. Management and organization: A critical text, New York. Palgrave MacMillan; 2004.
7. Alazam A, Bakar AR, Hamzah R, Asmiran S. Teachers' ICT skills and ICT integration in the classroom: The case of vocational and technical teachers in Malaysia. Creative Education. 2012;3:70-76.
8. Easton TA. Clashing views in science, technology, and society: Taking sides. Boston, McGrawHill; 2008.
9. Livingstone S. Critical reflections on the benefits of ICT in education. Oxford Review of Education. 2012;38(1):9-24.
10. United Republic of Tanzania (URT). National Information and Communication Technologies Policy, Dar es Salaam, Ministry of Communications and Transport; 2003.
11. Ion A, Vespan D. Collaborative learning and knowledge transfer in consciousness society. Informatica Economica. 2011;15 (3):115-127.
12. Lu Y, Zhou T, Wang B. Exploring Chinese users' acceptance of instant messaging using the theory of planned behavior: The technology acceptance model and the flow theory. Computer in Human Behavior. 2009;(25):29-39.
13. UNESCO. ICTs and teacher competencies, policy brief. Institute for

Information Technologies in Education. Paris. UNESCO; 2011.
14. Byrne-Davis L, Dexter H, Hart J, Cappelli T, Byrne G, Sampson I, Mooney J, Lumsden C. Just-in-time Research: A call to arms for research into mobile technologies in higher education. Research in Learning Technology. 2015; 23:1-10.
15. MacCallum KM, Jeffrey L. The influence of students' ICT skills and their adoption of mobile learning. Australasian Journal of Educational Technology. 2013;29(3):303-314.
16. Kafyulilo AC. Developing technological pedagogical content knowledge (TPACK) among pre-service science and mathematics teachers at DUCE: The role of activity-based learning. Papers in Education and Development. 2012;31:77-101.
17. Mselle LJ. The use of ICTs in education in Tanzania: Teaching and learning improvement in higher education, workshop proceedings. The University of Dodoma; 2012.
18. Valtonen T, Makitalo-Siegl K, Kontkanen S, Pontinen S, Vartiainen H. Facing challenges with new teachers' use of ICT in teaching and learning'. Bulletin of the IEEE Technical Committee on Learning Technology. 2012;14(4):46-49.
19. Li M, Zheng C, Tang X. Exploring the nature of teacher-student interaction in small group discussions in a Chinese university setting. Journal of Computer Education. 2015;2(4):475-491.
20. Goyal E, Purohit S, Bhagat M. Factors that affect information and communication technology usage: A case study in management education. Journal of Information Technology Management. 2010;XXI(4):38-57.
21. Afsari M, Bakar KA, Luan WS. Factors affecting teachers' use of information and communication technology'. International Journal of Instruction. 2009;2(2):77-104.
22. Lee J, Cerreto FA, Lee J. Theory of planned behavior and teachers' decision regarding use of educational technology. Educational Technology and Society. 2010;13(1):152-164.
23. Fillion G, Limayam M, Laferriére T, Mantha R. Integrating ICT into higher education: A study of onsite versus online students' perceptions. Academy of Educational Leadership Journal. 2007;11(2):45-72.
24. Nchise A. An empirical analysis of the theory of planned behavior. JeDEM. 2012; 4(2):171-182.
25. Sabanci A, Ozyildirim G, Imsir R. The effect of ICT usage on the classroom management: A case study in language teaching. International Review of Social Sciences and Humanities. 2014;7(1):232-245.
26. Kennewell S. Using affordances and constraints to evaluate the use of information and communications technology in teaching and learning. Journal of Information for Teacher Education. 2001;10(1&2):101-116.
27. Smeets E, Gennip H, Rens C. Teaching styles of teacher educators and their use of ICT. Inonu University Journal of Faculty of Education. 2009;10(3):49-62.
28. Ifinedo P. Acceptance and continuance intention of web-based learning technologies (WLT) use among university students in a baltic country. EJIDC. 2006; 23(6):1-20.
29. Park SY. An analysis of technology acceptance model in understanding university students' behavioral intention to use e-learning. Journal of educational Technology and Society. 2009;12(3):150-162.
30. Umar IN, Yusoff MTM. A study on Malaysian teachers' level of ict skills and practices, and its impact on teaching and learning. Social and Behavioral Sciences. 2013;116(2014):979-984.
31. Fu JS. ICT in education: A critical literature review and its implications. International Journal of education and Development using ICT. 2013;9(1):112-125.
32. Schepers J, Wetzels M. A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. Information & Management. 2007;44:90-103.
33. Mahadizadeh H, Biemans H, Mulder M. Determining factors of the use of e-learning environments by university teachers. Computers and Education. 2011; (51):142-154.
34. Margaryan A, Littlejohn A, Vojt, G. Are digital natives a myth or reality? University students use of digital technologies. Computers and Education. 2011;56 (2):429-440.
35. Mwalongo A. Teachers' perceptions about ict for teaching, professional development, Administration and personal use.

International Journal of Education and Development using ICT. 2011;7(3):36-49.
36. Selwyn N. An investigation of difference in undergraduates academic use of the internet. Active Learning in Higher Education. 2008;9(1):11-22.
37. Hennessy S, Ruthven K, Brindley S. Teacher perspectives on integrating ICT into subject teaching: Commitment, constraints, caution and change. Journal of Curriculum Studies. 2005;37(2):155-192.
38. McIntosh C, Varoglu Z. Perspectives on distance education: Lifelong learning and distance higher education. Paris, UNESCO; 2005.
39. Venkatesh V, Davis FD. A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science. 2000;46(2):186-204.
40. McNair V, Galanouli D. Information and communication technology in teacher education: Can a reflective portfolio enhance reflective practice?. Journal of Information Technology for Teacher Education. 2002;11(2):181-196.
41. Luhanga ML. The courage for change: Re-engineering the University of Dar es Salaam. Dar es Salaam, Dar es Salaam University Press; 2009.
42. Richardson H, Tapia A. Applying critical theory to the study of ICT. Social Science Computer Review. 2006;24(3):1-8.
43. Hare H. ICT in Education in Tanzania: Survey of ICT and education in Africa. Tanzania Country Report; 2007.
44. Mikko V, Jyri K, Carolina IS, Matti T, Erkki S. Contextualizing ICT in Africa: The development of the CATI model in Tanzania higher education. African Journal of Information and Communication Technology. 2006;2(2):88-109.
45. Swarts P, Wachira EM. Tanzania: ICT in education situational analysis. Global e-School and Communities Initiative; 2002. Available:http://www.tanzania.go.tz/egov_uploads/documents/Situational_Analysis_Tanzania_sw.pdf
(on 29th October, 2016)
46. Sang G, Valcke M, Van Braak J, Tondeur J. Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology. Computers and Education. 2010;54:103-112.
47. Sisco A, Woodcock S, Eady M. Pre-service perspectives on e-teaching: Assessing E-teaching using the EPEC hierarchy of conditions for e-learning / teaching competence. Canadian Journal of Learning and Technology. 2015;41(3):1-32.
48. Tasouris C. Investigating physics teachers' beliefs about the use of ICT in Cyprus. Educate~ Special Issue. 2009;48-61.
49. Wan Z, Wang Y, Haggerty N. Why people benefit from e-learning differently: The effects of psychological processes on e-learning outcomes. Information & Management. 2008;45(8):513–521.
50. Neo M, Neo T. Engaging students in multimedia-mediated constructivist learning -students' perceptions. Educational Technology & Society. 2009; 12(2):254–266.
51. Beers PJ, Boshuizen HPA, Kirschner PA, Gijselaers WH. Computer support for knowledge construction in collaborative learning environments. Computers in Human Behavior. 2005;21:623-643.
52. Lehtinen E. Potential of teaching and learning supported by ICT for the acquisition of deep conceptual knowledge and the development of wisdom. Portland Press Limited; 2010.
53. Obahiagbon K, Osahon OJ. Information and communication technology (ICT) key tool for enhancing teaching and learning in Nigeria: A study of two tertiary institutions in benin metropolis. American Journal of Educational Research. 2014;2(12):1257-1259.
54. Zhang Z. Teaching ICT to pre-service teachers: Experiences and reflections. Learning Landscapes. 2014;8(1):323-337.
55. Kirschner P, Davis N. Pedagogic benchmarks for information and communications technology in teacher education. Technology, Pedagogy and Education. 2003;12(1):125-147.
56. Strømsø HI, Grøttum P, Lycke HK. Changes in student approaches to learning with the introduction of computer-supported problem-based learning. Medical Education. 2004;38(4):390–398.
57. Chinyamurindi W, Shava H. An investigation into e-learning acceptance and gender amongst final year students. South African Journal of Information Management. 2015;17(1):1-9.
58. Sher A. Assessing the relationship of student-instructor and student-student interaction to student learning and satisfaction in web-based online learning

environment. Journal of Interactive Online Learning. 2009;8(2):102-120.
59. Cubukcuoglu B. Factors enabling the use of technology in subject teaching. International Journal of Education and Development using Information and Communication Technology. 2013;9(3): 50-60.
60. Gulbahar Y, Guven I. A Survey on ICT Usage and the perceptions of social studies teachers in Turkey. Educational Technology & Society. 2008;11(3):37-51.
61. Yunus Md M, Suliman A. Information & communication technology (ICT) tools in teaching and learning literature component in Malaysian secondary schools'. Asian Social Science. 2014;10(7):136-152.
62. Arifalo S, Kola A, Adesanmi A, Tola E. Power point as an ict tool for teaching and learning in the schools focusing on secondary and tertiary institutions in Nigeria. International Journal of Engineering Research & Technology. 2013;2(8):2519-2522.
63. Rumanyika JD, Galan RM. Challenges for teaching and learning information and communication technology courses in higher learning institutions in Tanzania: A review. Information and Knowledge Management. 2015;5(2):1-12.
64. Legris P, Ingham J, Collerette P. Why do people use information technology? A critical review of the technology acceptance model. Information & Management. 2003;(40):191–204.
65. Otrel-Cass K, Khoo E, Cowie B. Scaffolding with and through videos: An example of ICT-TPACK. Contemporary Issues in Technology and Teacher Education. 2012;12(4):369-390.

© 2016 Mbalamula; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/17319