

Investigating the lecturers' challenges to embrace Collaborative Web Technologies in Higher Education Institutions

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ABSTRACT

The paper investigated the challenges facing Lecturers in embracing Collaborative Web Technologies (CWTs) in Higher Education Institutions (HEIs) in Tanzania. The study was motivated by the fact that while students have become natives of the CWTs, for the Lecturers, the case is different. A case study was designed to answer two research questions using questionnaires and interviews administered to 120 randomly obtained sample. The results show five major challenges such as lack of a guiding framework on CWTs; lack of ICT Policy on CWTs; unreliable ICT Infrastructure; lack of awareness; and poor internet connections. The paper submits that CWTs are essential tools to enhance learning and teaching in HEIs in Tanzania. The paper is a contribution to the existing body of knowledge and advances knowledge in the application of CWTs to the HEIs population in Tanzania.

Keywords: *Collaborative Web Technologies; Higher Education; Web 2.0; TAM; Tanzania.*

1. INTRODUCTION

Embracing Collaborative Web Technologies (CWTs) has posed challenges for the Lecturers in Higher Education Institutions in Tanzania (Lwoga, 2012; Pima, *et al.*, 2016). On the other hand, students of the HEIs have become the natives of the digital age desirous of using CWTs socially (Mtebe & Raphael, 2013; Deniz & Geyik, 2015; DeAndrea, *et al.*, 2012). In a study by Hussain (2012) at the Islamia University of Bahawalpur Pakistan, about 90% of the students (n=600) used Facebook. Maglajlic and Gütl (2012) emphasized that the use of social networking sites can improve the students' academic performance. Additionally, learners in HEIs no longer access the web for information on the courses they take, but for creating collective knowledge through social interactions (Maloney, 2007; Mtebe, 2015). In that case the shared contents and active interactions have increased among and between learners and lecturers' due to the presence of CWTs. Equally important learners can put together pieces of information and share the information they gained with others (Lwoga, 2012).

However, little efforts have been done in the context of HEIs in Tanzania (Sife, *et al.*, 2007; Lwoga, 2012; Mtebe & Raphael, 2013; Mtebe, 2015) to address the challenges facing Lecturers in embracing CWTs in learning and teaching. In that view, this paper sought to answer two research questions:

1. What are the challenges facing lecturers to embrace the use of the CWTs in learning and teaching in higher education in Tanzania?
2. How could the challenges be alleviated?

The case study designed, and the data collection methods discussed in section 5, enabled the authors to answer the above research questions. Furthermore, the paper contributes new knowledge about the actual and contextual challenges facing Lecturers when it comes to accepting CWTs willingly and enthusiastically using them in teaching and learning in HEIs. It further provides tested solutions, from the experiences of respondents, to the existing challenges. In the next section, a discussion on the reviewed literature is provided.

2. THE LITERATURE REVIEW

2.1 Overview

This section provides a discussion of both theoretical and empirical studies on the challenges facing lecturers to embrace CWTs in teaching and learning. The review discusses the challenges faced by lecturers throughout the revolution and evolution of the web. The discussion draws its premises in the higher education sector since web 1.0 when e-learning were common, and extends to the web 3.0 era when the web has become semantic and readable by both human and machines. The section's structure is aimed at first, conceptualizing the research problem, and, secondly, provide the state of the art of the challenges facing lecturers when embracing CWTs.

2.2 Three Technologies of the Web

The web has been around since 1990s after the proposal by Tim Berners-Lee to link all CERN researchers around the world to share information (Berners-Lee, et al., 1992). Since then, the CERN and Tim's efforts gave rise to the main three technologies of the web which have remained its pillars. According to (Berners-Lee, 2010) the three pillars of the web include the Hypertext Transfer Protocol (HTTP); the Universal Resource Identifier (URI); and the Hypertext Markup Language (HTML). These technologies made the web accessible to anyone from any place.

For the HTTP, the web technology protocols have four steps in data communication. First, opening a TCP connection to the web server; secondly, sending a request to the web server; thirdly, receiving a response from the web server (which includes the data of the requested web page); and fourthly, closing the connection (optional).

Secondly, the URI is a string of characters designed to identify a website resource over a computer network. The URI uses syntax and semantics for location and access of resources on the internet. The URL consists of the features in the following given order: the scheme name (commonly called protocol); a colon, two slashes; a host, normally given as a domain name but sometimes as a literal IP address; optionally a port number; and the full path of the resource.

The third web protocol is the Hypertext Markup Language (HTML). This is the main markup language for creating web pages and other information that can be displayed in a web browser. It is written using HTML elements called tags which are enclosed in angle brackets to define the web page contents. HTML tags are written in pairs with the open and close tags. In some cases, there are unpaired tags. Web designers can add text, comments, multimedia contents, and additional tags to define styles and layouts. The above theoretical framework, aims to submit that the web technology is powerful with ubiquitous capabilities. Thus, it is an equalizer between the disabled and abled users making it viable for learning and teaching (W3C, 2014; Pima, 2012). Given its potential and the demand for its use in learning, it is important to juxtapose its evolution in relation to its application in enhanced learning and teaching in HEIs and the challenges.

2.3 The Web Evolution: From Web 1.0 to Web 3.0

The three pillars of a web discussed above, have enabled the web to evolve from time to time; that is, from web 1.0 to web 2.0, and to Web 3.0 (World Wide Web Foundation, 2014). Web 1.0 was the first output from the initial idea of the web inventor, Tim Berners-Lee in 1989. From its inception, Berners-Lee had a dream to have “a common information space in which we communicate by sharing information” (Tim, 2010). Web 1.0 had the remarkable achievements in terms of searching facilities. The first search engine was the World Wide Web Worm (WWW), which indexed titles and headers only by 1993. The second search engine was the Yahoo!, a human edited search directory in 1994; then, the WebCrawler in 1994 became the first search engine capable of searching a text of a web page. In 1995 AltaVista was launched. This used natural language querying with Boolean operator (Naik & Shivalingaiah, 2008; Evans, 2013). The above distinguishing features of the web 1.0 motivated for the more efforts to improve the web experiences from static to a dynamic web (Ebner, 2007; Evans, 2013; Crook, 2008; Lal & Lal, 2011; Naik & Shivalingaiah, 2008; Shen, 2012).

Web 1.0 was followed by web 2.0 in the year 2000. The term web 2.0 was first used by Dale Dougherty of O'Reilly Media Inc. in 2004. Until the year 2000, the web had become more a social and participatory global space (Anderson, 2007; Ebner, 2007; Evans, 2013). The distinguishing features of web 2.0 include: the read and write web; collaborative and interactive web; improved web search engines such as Google in 2003; and, a social web. Additionally, Web 2.0 is also said to be participatory, collaborative, inclusive, creator-user centric, unsettled and very information sensitive (Dearstyne, 2007).

Additionally, web 2.0 witnessed the development of collaborative web technologies such as Social Networks, wikis, blogs, podcast, RSS, mash-ups, virtual societies, folksonomy, and Bookmarking (Ebner, 2007; Naik & Shivalingaiah, 2008; Evans, 2013).

In higher education, web 1.0 enhanced learning and teaching in a number of ways. First, the static contents on the web were used to supplement the materials delivered in face-to-face encounters in classrooms (Abdelaziz, et al., 2011). That is, universities and colleges had websites designed to cater for learning and teaching. For example, in a survey of higher education in mainland Tanzania conducted in 2010 by Mwashu and Pima (2011), all ten participating universities had static websites by 2002. Secondly, web 1.0 had attracted a limited number of electronic learning systems. Examples of the read-only e-learning systems include the early Blackboard, WebCT, Blackboard, Domino, etc. Additionally, portals and subject directories were used too (Mwashu & Pima, 2011). Thirdly, universities and colleges designed websites to provide information to the public and students on their functions, contacts, news, admissions, and publications. Fourthly, web 1.0 was also used in the administrative functions of the HEIs through portals and the management information systems (MIS) which utilized the static web. Until 1990s, it had become a common practice for a HEI to have its own website and the virtual learning environment. This was a step forward towards more advanced technologies which revolutionized the higher education. However, there were challenges faced by the Lecturers to embrace web technologies in teaching and learning as discussed in section 2.4.

From the foregoing, Web 2.0 paved the way to a further step of the web evolution; this is the semantic web, called web 3.0 also referred to as the web of data. Web 3.0 is the third stage of web evolution that began in 2010 (Giannakos & Lapatas, 2010). Web 3.0 websites focuses on the back-end than it used to be in web 2.0 where websites focused on front-end (Naik & Shivalingaiah, 2008). Web 3.0 promotes usage and interaction on data available in databases. The contents of web 3.0 would be accessible by both browser-based applications and non-browser applications, called agents. It links data across a wide spectrum of platforms and making it accessible, meaningful, and understandable to both human and machines. The promises made by web 3.0

form part of the potentials of the web technologies across the sectors of people's lives, including education and higher education, despite the challenges discussed in section 2.4 below.

During web 2.0, that is, from the year 2000, the HEIs had increasingly adopted the use of web technologies in many areas of its activities. In addition to the four applications during web 1.0 discussed above, HEIs began to use the web for collaborative learning and teaching. For instance, the communication and sharing of information had been improved and the real contribution of web 2.0 technologies in learning and teaching depended on the ability of the learners to use the contents provided (Giannakos&Lapatas, 2010). Until now, web 2.0 allows interaction between learners and trainers; and notably, amongst students. The web 2.0 technologies allow learners to contribute, share, and edit web contents created by their trainers or create their own contents (Giannakos&Lapatas, 2010). This ability makes the web to be open and collaborative in nature and hence suitable to enhance learning and teaching in HEIs. However, HEIs must seek for better ways to deal with the challenges shown in section 2.4. In this way, the learners and trainers are free to interact and collaborate with each other in social media and virtual communities (Singh, et al., 2011).

Moreover, the web 3.0 is promising learners and trainers to have unlimited access to learning and teaching materials as of any combination of human and computer Processing (Lal&Lal, 2011). The CWTs offers various collaborative web technologies and services for education and research (Naik& Shivalingaiah, 2008; Giannakos&Lapatas, 2010; Verizon, 2010; Lal & Lal, 2011; Emerald, 2013).

The collaborative web technologies discussed above can further expand the reach to many more students than in traditional face-to-face and e-learning systems. Learners who live in rural and remote areas could get access to education via web technologies. Active engagement and collaboration could also be enhanced through both synchronous and asynchronous communication hence enhanced learning and teaching.

2.4 Challenges of adopting Collaborative Web Technologies in Higher Education

Despite the enormous advantages and benefits offered by the CWTs in higher education from Web 1.0 through Web 3.0, many Lecturer's found it difficult to embrace and use it to enhance learning and teaching. The extant literature shows some of the challenges below. Additionally, little is known about the contextual challenges to embrace the CWTs in the context of HEIs in Tanzania.

Linking the research and the theory, this paper applies the Technological Acceptance Model (TAM) to discuss the challenges facing lecturers' when deciding to use or not to use the CWTs in learning and teaching in higher education. TAM is one of the accepted and widely used model in studies involving the use and acceptance of technologies (Martinez-Torres et al., 2008; Liu et al., 2013). Despite the available evidence that CWTs could enhance learning and teaching, the adoption and use the CWTs remains minimal and lecturers do not use them effectively (Pima et al., 2016). We use the theory of reasoned actions (TRA) (Fishbein & Ajzen, 2010) to discuss factors affecting lecturers to adopt, use or reject the use of CWTs in learning and teaching. The TAM has been used in empirical studies where proven evidences suggest its suitability in assessing challenges facing lecturers when embracing new technologies (Teo, 2009; Farahat, 2012). The model has been widely used in the technologically advanced world than in the least developed world, especially in a single case study in Tanzania.

We use the Perceived Usefulness PU), the Perceived Ease of Use (PEU) and Attitude towards Usage (ATU) to predict the challenges facing lecturers when adopting and using CWTs in learning and teaching. The PU represents the degree to which a lecturer believes that use of

CWTs aids to produce better teaching and learning performances. On the other hand, PEU is the extent to which a lecturer believes that using the CWTs be ease and with little efforts (Davis, 1989). Then, the ATU is influenced by the PU and PEU to determine the individual measurable effect due to negative or positive sentiment towards the use of CWTs behavior. The ATU is examined to see how it impacts lecturers' behavioral intention to adopt and use CWTs in learning and teaching. Finally, the PU, PEU and the ATU are used to provide a lead to the current challenges given the lecturers' behavioral intention to use the CWTs.

Table 1: Common Challenges facing Lecturers to embrace CWTs in Higher Education

Challenge	Source
The lack of guiding framework to use the CWTs in higher education	(Tarus et al., 2015; Pima et al., 2016; Olelewe, 2014, Kahiigi, 2013; Hao & Lee, 2015)
Lack of ICT Policy on the use of CWTs	(Hao & Lee, 2015)
Lack of awareness and skills about the web technology and its potential in learning and teaching	(Sife et al., 2007; Tarus et al., 2015; Pima et al., 2016; Hao & Lee, 2015; Mtebe & Raisamo, 2014)
Poor ICT infrastructure	(Gaffar et al., 2011; Olutola & Olatoye, 2015; Olelewe, 2014; Kahiigi, 2013; Alebaikan, 2010; Hao & Lee, 2015)
Limited teaching resources such as laptops, overhead projectors and computer laboratories	(Olutola & Olatoye, 2015; Mtebe & Raisamo, 2014)
Limited internet connectivity at campuses	(Olutola & Olatoye, 2015; Olelewe, 2014; Pima et al., 2016; Alebaikan, 2010; Lwoga, 2012)
Limited internet connectivity at the residential areas	(Olutola & Olatoye, 2015; Olelewe, 2014; Pima et al., 2016)
The Cultural issues on the Internet (Muslim Females); and audit trail of social sites which may expose opinion	(Alebaikan, 2010; and Albion, 2008)
Lack of information about the available ICT infrastructure capabilities.	(Pima et al., 2016; Tarus et al., 2015; Lwoga, 2012)
Negative attitude towards ICT; (It is acknowledged that some academics working in higher education are reluctant in accepting aspects of technology in their teaching and learning.	(Kahiigi, 2013 ;Singh et al., 2005)
Lack of systematic approach to ICT implementation	(Tarus et al., 2015)
Presence of resistance to change in ICT systems	(Olelewe, 2014; Alebaikan, 2010; Hao & Lee, 2015)
Inadequate funding and priorities	(Gaffar et al., 2011; Tarus et al., 2015; Kahiigi, 2013)
Lack of top management support and ownership of ICT initiatives	(Gaffar et al., 2011; Kahiigi, 2013; Hao & Lee, 2015)
High cost of internet connection	(Tarus et al., 2015; Olutola & Olatoye, 2015; Lwoga, 2012)
Lack of skills	(Gaffar et al., 2011; Olutola & Olatoye, 2015; Alebaikan, 2010; Lwoga, 2012).
Pedagogical issues requiring course redesign and administration	(Alebaikan, 2010)
Ethical Considerations (authenticity of information, plagiarism, intellectual property rights)	(Alebaikan, 2010; Hao & Lee, 2015).

The TAM variables are used to answer the research questions stated above. The individual metrics used to produce the findings discussed in section 5 are appended with this paper.

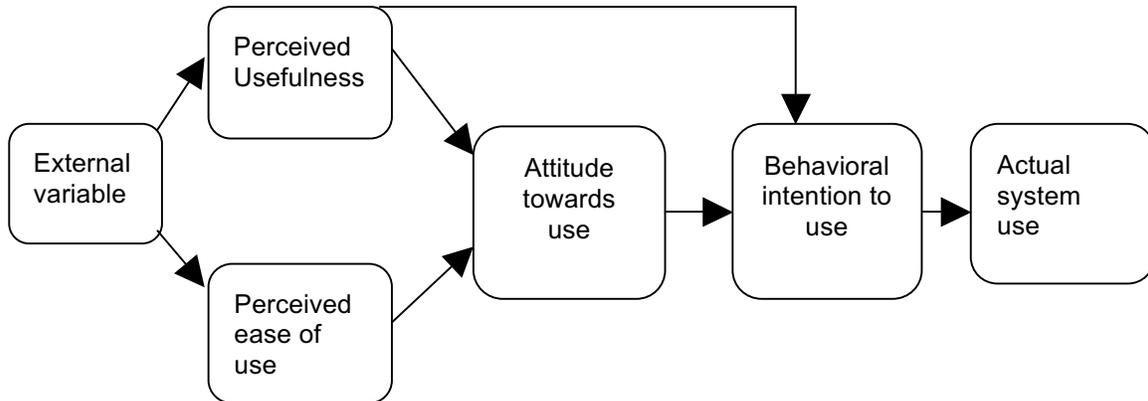


Figure 1: The Technology Acceptance Model (TAM) Source:

4. METHODS

We use a case study design in this research. According to Zainal (2007) a case study is considered to provide a thorough and an in-depth investigation for a specific population. We adopt both qualitative and quantitative strategies in a sequential approach that is, qualitative research strategy is used to answer/seek clarifications for unanswered or unclear responses given when quantitative methods are used. The questionnaire is the main data collection tool supplemented by interviews (Creswell & Plano Clerk, 2011). This design provides strength that offsets the weaknesses of both quantitative and qualitative strategies. We use both probability and non-probability sampling strategies. For the probability sampling strategy, we use simple random sampling for lecturers while for non-probability sampling strategies we use purposive sampling to get respondents from the management team. Table 2 provides a description about the strategies, data collection methods, sampling strategies, participants and justification for their use.

Table 2: The Research Methods

Strategy	Method	Sampling	Respondents	Justification
Quantitative	Questionnaire	Simple random	Lecturers	To provide an equal opportunity
Qualitative	Interview	Purposive	Managers	To get specific information

The data analysis adopted both qualitative and quantitative techniques such as descriptive and regression analysis. Furthermore, meta-synthesis is used to group similar qualitative data. This being a case study the permission and access the IAA was sought. Participants consent form

was also given to every participant. The researchers who are also members of the IAA community ensured no biasness during the data collection and analysis. We append the sample questionnaire and interviewed protocol for reproducible purposes. The methods adopted can help to answer the two research questions stated in section one above.

5. RESULTS AND DISCUSSION

The theoretical framework discussed in section three above, highlights three major constructs used to answer the research questions. These are the Perceived Ease of Use (PEU), the Perceived Usefulness (PU), and the Attitude Towards Actual Use (ATU). In other words, the results presented hereunder, cover the research questions. In order to answer the research questions, we collected data from the faculty members using a survey questionnaire as the main tool, and the interview as a supplement as discussed in section three above. In this section, we present the survey results first and then supplement it with the interview results as a follow up loop. The survey results were analysed using a quantitative data analysis technique - the frequency descriptive technique, while the interview results were qualitatively analysed through descriptive analysis. The analysis advances new knowledge on the use of a mixed methods and how the three constructs were used to answer the research questions.

The survey used a five point likert scale ranging from strongly agree to strongly disagree. We append the survey tool for reproducibility purposes and further reference. During the quantitative analysis, a summative approach was used whereby we combine the five likert scale points into three groups. For example, the first group is called "AGREE" comprising of the "Strongly Agree" and the "Agree". The second group is the "DISAGREE" which combines the "Strongly Disagree" and the "Disagree", and the third group is the "Neutral". The presentation of the results begins with the findings from research question one, then the second question. This is done for each construct assessed.

What are the challenges facing lecturers in embracing CWTs in learning and teaching in higher education? And secondly, how could the challenges be alleviated? In order to answer these questions, respondents were asked a series of questions to cover the three constructs above. Starting with the first construct, PEU, the first question asked the respondents whether the availability of a guiding framework on how to use the CWTs in teaching could ease their work; meaning that its absence would be one of the challenges. In their replies, about 78.8% of respondents agreed that the availability of a guiding framework on how to use the CWTs in teaching could ease their work as facilitators; while 21.2% of respondents were neutral and none disagreed. In addition, respondents were asked whether the presence of a guiding framework on how to use the CWTs in teaching was an essential component for successful adoption of the CWTs in higher education. The results show about 90.1% agreed and about 9.1% of respondents were neutral. The results in the first two questions highlight the first challenge that the faculty would face when embracing the use of the CWTs in teaching and learning.

In the follow up interviews, the results concurred with the survey results and said how the institute could alleviate the challenge. For instance, one of the Interviewees had the following to say regarding the lack of a guiding framework on the use of CWTs "*The framework is very important such that if not given, could affect me since I have no guidance on how to use the CWTs and therefore, I recommend to have the framework put in place.*" Source: Research Interview Data 2015.

The above results concurs with (Tarus et al., 2015; Pima et al., 2016; Oleelewe, 2014; Kahiigi, 2013; Hao & Lee, 2015) who insisted on a guiding framework on how to use and mix the technology in teaching and learning through the CWTs.

The second challenge found under the PUE was the lack of a good ICT Policies in a BL environment. In the first part, the respondents were asked to rate their responses using five point Likert scale, whether the availability of good ICT policies could ease their efforts on the incorporation of the CWTs in the teaching process. The results show about 78.8% agreed, none disagreed, and 21.2% were neutral. Similarly, about 87.8% of the respondents believe that an ICT policy on the use of CWTs in teaching is an essential component for a successful adoption of the web technologies in higher education, none believed otherwise and 12.1% were neutral. The results strongly show that the lack of an ICT policy on the use of the CWTs could be a challenge to the faculty when embracing the use of the CWTs in higher education. We juxtaposed the survey results with interview results in order to establish a strong line of argument. The results were the same. For example, one of the interviewees said *"CWT is all about ICT, so if the policy is silent on the CWTs then its use won't be taken seriously. An ICT policy is very important and should be put in place to guide the whole use of CWTs otherwise, it possesses a great challenge and could amount to inconsistencies and poor delivery quality."* Source: Research Interview Data 2015.

The third challenge found in this study was the lack of strong and reliable ICT infrastructure capable of supporting the use of the CWTs in learning and teaching in higher education. In the first place, the survey results indicated about 24.2% of respondents said that the ICT present infrastructure was not good enough to use CWTs in teaching and learning. On the other hand, about 45.5% said it was good enough, and about 30.3% were not sure. This is an indication that the majority of our respondents do not see the ICT infrastructure as good enough to support the CWTs. In a follow up interview about this response, it was established that the internet connection at the HEI was 8mbps and therefore not enough to allow live streaming and podcast usage. However, the rest of the ICT infrastructure components such as Local Area Network (LAN), the learning management systems (LMS), and power supply, people, and supporting devices were present enough to support the use of the CWTs. The second part of the investigation asked the respondents to comment whether the ICT infrastructure was an essential component towards a successful adoption of the CWTs in learning and teaching. The survey results show about 90.9% agreed, and 9.1% not sure that the ICT infrastructure was an essential component towards a successful adoption of the CWTs in learning and teaching. That means, it could be a challenge if the ICT infrastructure is not capable to support the adoption and use of the CWTs in learning and teaching. The Interview results showed similar trends as discussed above. For example, the majority of the interviewees agreed on both the first and second question regarding the ICT infrastructure. One of the interviewees said *"I know, the poor ICT infrastructure may really affect my decision to use CWTs, especially in the past where we had no internet for a whole week. Although the situation has improved, I recommend that the institute should upgrade the available Internet connection to meet the current needs as many people are increasingly becoming internet dependants"*. Source: Interview Research Data 2015.

The fourth challenge is the lack of sufficient teaching and learning resources. We first asked respondents whether the currently available ICT teaching and learning resources could aid in the use of the CWTs in teaching and learning. Using the strongly agree to the strongly disagree, the survey results show about 30.3% of the respondents agreed that computer labs are sufficient enough to make use of CWTs in teaching in higher education, 42.5% disagreed and 27.3% were neutral. This is an indication that the present number (quantity) of computer laboratories, the audio-visual equipment, and teaching aids do not meet the number of users or the current arrangement for these devices should be revisited. On the second part of this challenge, we asked the respondents whether the available teaching resources such as laptops, desktops and overhead projectors were sufficiently enough. The results show about 36.4% of respondents disagreed, 27.3% were neutral, and 36.4% agreed. Then, we asked our respondents to strongly agree - strongly disagree that the presence of sufficiently enough resources is essential for

successfully embracing the CWTs in teaching in higher education. The results show about 84.4% agreed, about 12.1% disagreed and 3% were neutral. Importantly, scholars such as Olutola & Olatoye (2015) and Mtebe & Raisamo (2014) at different times, saw the lack of sufficient learning and teaching resources as serious challenge in HEIs and called for the management interventions. In a similar way, we followed up the survey results with interviews, in which one of the interviewees said *“the shortage of the teaching resources such as laptops, and overhead projectors, could impact on my decision to embrace the use of CWTs, although the tools such as laptops and overhead projectors may not be directly related to such use.”* Source: Interview Research data 2015.

The fifth challenge investigated was the insufficient and unreliable internet connection. We first asked the respondents if the internet connection is an important component of the ICT infrastructure to support the use of CWTs in learning and teaching. The results show about 94% agreed, and about 3% disagreed. Secondly the respondents were asked whether the current internet connection at the campus was good enough to support learning and teaching through the CWTs in a BL. The results show that about 30.3% of respondents agreed that they use it and it is capable of supporting teaching using the CWTs, where about 45.5% disagreed, and 24.2% were neutral. Thirdly, the respondents were also asked whether the presence of internet connection at the residence was essential for the use of CWTs in teaching and learning. The results indicate about 66.7% felt that it is important for effective use of CWTs in teaching, about 18.2% said no, and about 15.2% were neutral. Additionally, respondents were asked whether the internet connection at residence could support the use of CWTs. The results show that about 60.7% said internet connection at the residence was capable of supporting the use of CWTs, 15.1% said it was incapable and 24.2% were neutral. During the interviews, we asked the respondents if the internet was insufficient and unreliable. The majority of the interviewees said that the available internet can support the use of the CWTs and it is reliable depending on the bundle tariffs selected. One respondent said *“all the major cellular network operators provide 3G and 4G internet connection speed in rural and urban, so internet reliability depends on your chosen bundle.”* Source: Interview Data 2015. Moreover, the literature concurs with the above results by insisting that good internet connection at the campus and at residence is essential for the smooth use and effective participation in learning through online modes (Alebaikan, 2010; Lwoga, 2012; Olelewe, 2014; Olutola & Olatoye, 2015; and Pima et al., 2016).

The sixth challenge investigated was lack of awareness about the present ICT infrastructure capability to support the use of the CWTs in learning and teaching. In order to investigate this challenge, we first asked the respondents whether being aware about the capability of the ICT infrastructure at the campus would motivate them to use and adopt the CWTs. The results show 75.7% of respondents agreed, 6% disagreed and 18.2% were neutral. Our interview results have also proven that many respondents would be happy to know and would make appropriate decisions regarding the adoption and use of the CWTs in their module. For instance, one interviewee said *“I have never been told about new technology or been trained on new technologies or the LAB born services except for new Microsoft Office Packages. We need to know the capability of our systems so that we innovate and make the most of it including using the CWTs in my class.”* Source: Interview Research Data 2015.

The seventh challenge investigated was the lack of the faculty involvement in the CWTs implementation project. We started by asking the respondents whether the involvement in the implementation of CWTs for their modules would make them accept it. The results show about 66.7% agreed, about 9.1% did not agree, and 24.2% were neutral. We secondly asked them whether the stakeholders' involvement was essential component for a successful embracing of the web technologies in higher education. The results show about 84.9% agreed, about 9.1% disagreed and 6% remained neutral. The survey results above were supplemented with interviews, where the importance of user involvement in the adoption of the CWTS was

discussed. The majority of the interviewees strongly believe that lack of proper involvement of key stakeholders could amount to the project failure. For example, one of the respondents said that “the lack of involvement could affect my decision to embrace CWTs in teaching because involvement creates awareness, and I may not be aware about such initiatives and therefore consider it as an imposition. I also suggest that the Institute should involve all key stakeholders for awareness and acceptance since they can understand its importance and the available infrastructures to support CWTs”.

The eighth challenge we explored was the need to change from traditional face-to-face to a Blended learning mode. Our survey results show about 72.7% believe that it is important to change from traditional teaching mode to new teaching using CWTs, while 6.1% disagreed and about 21.2% remained neutral. Additionally, about 75.8% agree that changing from the traditional teaching model for new teaching with CWTs could enhance their teaching performance, and about 3% disagree while 21.2% were neutral. In the interviews, we asked respondents how serious was the demand for change from the face-to-face to a combination of online and face-to-face. The majority of the respondents believed that it is a challenge to both the Institution and individual faculty to adjust the delivery and assessment strategies. One of the interviewees said “this is a challenge, we need a good plan to train and enable everyone to deliver, assess, and provide feedback to students in the same quality and time”. Additionally, another interviewee added that “the change should be based on the best practices and accepted standards of the blended learning implementation.”

The ninth challenge explored was the lack of enough funds for the CWTs implementation and support. In this challenge, our results show about 90.9% of the respondents believe that the availability of enough funds at the Institute could improve access and use of CWTs in teaching, about 6.1% disagreed and 3% were neutral. We also asked respondents whether good funding and priorities to the internet connection could motivate colleagues to use CWTs in teaching. In their reply, about 87.9% of the respondents agreed while 3% disagreed and 9.1% remained neutral.

The tenth challenge was the lack of strong support from the top management. We first asked the respondents whether the presence of strong support from top management could encourage them to incorporate CWTs in the teaching process. The results show about 68.8% of respondents agreed, about 6.1% disagreed, and about 25% remained neutral. Secondly the respondents were asked whether the top management support on the adoption of CWTs in teaching is essential. The results show about 81.2% agreed, about 3.1% disagree, and 15.6% were neutral. In a follow up interview, the respondents agreed that support from the management is essential and that both policies, motivations, and monitoring depended largely on the top management support. For example, one respondent said “Lack of management support is essential and may affect my decision to embrace the use of CWTs. This is because it is management that will ensure things like ICT infrastructures are good enough to support the use of CWTs in teaching. I recommend that the management should set aside and provide enough funds and support to improve ICT facilities.”

The internet cost was also assessed as a challenge towards the decision to embrace the CWTs in teaching and learning in higher education. This was the twelfth challenge studied. The results show that about 54.9% of the respondents felt that internet connection is not expensive at the campus while 19.3% said it was expensive and about 25.8% were neutral. At the residence, about 60.7% felt at residence it was expensive, 12.1% said it was not expensive and about 27.3% remained neutral.

Another challenge was the faculty's level of ICT skills. We asked the respondents whether their ICT skills were one of the factors affecting their decision to embrace the use of CWTs in learning

and teaching. About 54.9% agreed, about 15.2% disagreed, and about 30.3% were neutral. Additionally, about 54.5% felt that they need training to use CWTs, 21.3% felt they didn't need it, and 24.2% were neutral that they have enough skills to use CWTs in teaching and learning. Along similar lines, about 84.9% agree that good skills are essential for a successful adoption of CWTs in a BL environment in higher education, none disagree on the subject while 9.1% were neutral. In a follow up interview, one of the interviewees said the following on the issue of the need of training on how to use CWTs: "I am a bit, well versed in Information Technology aspects so I believe it will not be a problem for me to use CWTs but for others it's important to provide them with some training so as they may be able to use the CWTs effectively in their teaching."

Another challenge that we explored was the need to redesign the course module in order to use the CWTs, about. The results show about 53.2% of the participants felt that it won't be a problem to redesign their course module to suit the CWTs requirements. In addition, about 18.7% said it would be a problem and about 28.8% were neutral. About 81.8% felt that using CWTs in teaching could ease the course administrative activities such as student's enrolment and participation in the module, class attendance, group work participation and submission of the assessments and feedback. On the similar question, about 15.2% were neutral and 3% of the respondents disagreed. We also followed up the above responses using interviews. The findings show similar reply and one of the interviewees said "*the need for course redesigning does not affect my decision to embrace CWTs in teaching*". Source: Research Interview Data.

The challenge regarding the quality of teaching and learning process was also explored. About 66.7% of the respondents agreed that using CWTs could improve the quality of the course module delivery and students' performance, where about 30.3% were neutral and 3% disagreed. Similarly, we asked respondents to rate their decisions, using strongly agree to strongly disagree, that it is difficult to verify the authenticity of a student's assessment through CWTs. The results show about 18.2% of the respondents disagreed, about 39.4% agreed, and about 15.2% were neutral. Moreover, about 54.6% of the respondents agreed that the use of CWTs could infringe intellectual properties through copy and paste without acknowledgement, 18.2% disagreed, and 27.3% were neutral.

The perceived usefulness construct was also used to answer the research questions stated above. In this construct, a number of questions were asked. The first question asked the respondents whether the lack of awareness about the importance of the CWTs could impact the decisions of the faculty to embrace them in the course they teach. The survey results show about 71.9% agreed, about 6.3% disagreed, and 21.9% were neutral. We also interviewed the faculty about the above question. The interview results were similar to the survey results. For example, one of the interviewees said "If I don't know the importance of something, then I would rather not use it at all, so lack of awareness on the importance of CWTs will make me not embrace them in teaching." The respondent also added "for the second part, we need to have a strategy that will create awareness to all key stakeholder." Furthermore, the survey results show that about 75.7% believe that creating awareness about the importance of CWTs in teaching is an essential component when embracing them in higher education, but 3.1% disagreed and 18.8% were neutral. The respondents were also asked whether reluctance, could be the reason for none embracing of the CWTs in teaching and learning. The results show about 65.6% of the respondents felt they are just reluctant to accept CWTs in their teaching activities, about 18.8% said were not reluctant and 15.6% were neutral.

We also asked the faculty about their attitude towards the use of the CWTs in teaching and learning. The results show about 6% of respondents felt using CWTs contravene with their beliefs, 78.8% felt otherwise and 15.2% were impartial. In addition, about 3% felt that using CWTs in teaching violates their privacy, 72.7% felt it does not affect them anyhow, and about 24.2% were neutral. However, about 66.7% of the respondents believe that a good understanding

of the usefulness of ICT will change their attitude towards the CWTs, 6% believed otherwise and 27.3% were neutral. In a follow up interview, the results show that the majority of the interviewees were positive towards the use of CWTs in teaching and learning. In one instance, the interviewees said "I feel the use of CWTs does not contravene in any way with my beliefs and does not violate my privacy, since I am responsible for my conduct on the CWTs."

6. DISCUSSION AND REFLECTIONS

Embracing the use of CWTs by the lecturers of HEIs in Tanzania has significant potential to support and enhance the quality of learning and teaching experiences. Recently, the technologically developed world has widely embraced the use of the CWTs in higher education (Iqbal et al., 2011; Liu et al., 2013). While on the technologically developing world such as Tanzania, the pace of adoption is at its infancy stage (Lwoga, 2012), however, the lecturers face the challenges presented in the results section above. The results presented above show the challenges facing lecturers in HEIs in Tanzania. First, the lack of guiding framework to mix the face-to-face and online in higher education (Tarus et al., 2015; Pima et al., 2016; Olelewe, 2014; Kahiigi, 2013; and Hao & Lee, 2015). The second challenge presented above is the lack of ICT Policy on the use of CWTs (Hao & Lee, 2015).

According to Teo, (2009) and Farahat (2012), the presence of a guiding framework supports the perceived ease of use (PEU). In this case, it is perceived that lecturers are likely to accept the CWTs when they have a guideline to use. For example, the first and second challenges, the lack of a framework and policy issues could result into other problems such over-workload, resistance to technology, and concerns about quality of instruction (Brown, 2016). On the other hand, the presence of a guiding framework could increase interactions with students and peers, efficiency and effective management of large classes, and timely and lively feedback (Brown, 2016). in the light of the TAM, this results support the PEU construct. How does it support?

The third challenge presented above is the lack of strong and reliable ICT infrastructure capable of supporting the use of the CWTs in learning and teaching in higher education (Gaffar et al., 2011; Olutola & Olatoye, 2015; Olelewe, 2014; Kahiigi, 2013; Alebaikan, 2010; Hao & Lee, 2015). In this discussion, the third and sixth objectives are combined together. The sixth challenge is the lack of information about the available ICT infrastructure capabilities (Pima et al., 2016; Tarus et al., 2015; Lwoga, 2012). In addition, the above results concur with the prominent scholars (Gaffar et al., 2011; Olutola & Olatoye, 2015; Olelewe, 2014; Kahiigi, 2013; Alebaikan, 2010; Hao & Lee, 2015) who discussed the impact of the challenge. They insist that HEIs must strive to improve the ICT infrastructure so that the CWTs could be well utilized in learning and teaching. In the same line of thinking, this supports the ascertainment by Teo, (2009) and Farahat (2012) that lecturers could make decision based on their perceived ease of use (PEU).

For example, if HEIs put in place an awareness raising strategy that could cover among others, the ICT infrastructure and ICT services available to staff and students, this would improve the acceptance level by lecturers. This argument echoes from Graham et al., (2013), who insist that HEIs should have a strategy that could enable them to transform smoothly from awareness to acceptance and implementation to sustainable growth and completeness. The suggestion by Graham et al., (2013) could have a positive impact on the perceived ease of use of the CWTs by the lecturers.

Along similar lines, the lack of the faculty involvement in the CWTs implementation project (Gaffar et al., 2011; Kahiigi, 2013; Hao & Lee 2015) could create vacuum of information and cause resistance (Olelewe 2014; Alebaikan 2010; Hao & Lee 2015) to technological adoption. This

study therefore recommends for the users involvements including the faculty from planning to implementation stages of adopting the CWTs in teaching in HEIs.

The fourth challenge presented above was the lack of sufficient teaching and learning resources. This is combined with the ninth challenge, the lack of enough funds for the CWTs implementation and support. The earlier challenge concurs with Olutola & Olatoye (2015) and Mtebe & Raisamo (2014) who found similar challenge in their studies. The latter was also found by (Gaffar et al., 2011; Tarus et al., 2015; & Kahiigi, 2013). These scholars found out that insufficient funding could result to acute shortage of teaching facilities such as laptops, overhead projectors, furnished classrooms, computer laboratories, and teaching aids. This could negatively impact the perceived ease of use by the lecturers (Teo, 2009; Farahat 2012). Furthermore, motivations and incentives could be suspended due to insufficient funding, thus negatively impact on the intention to embrace and use CWTs in HEIs. For example, respondents said the computers in their labs are as old as eight years and could no longer receive support from their vendor. Given the above findings, an ICT strategy could be a solution, top management support and training.

The fifth challenge found out was the insufficient and unreliable internet connection. Empirically, several scholars (Olutola & Olatoye, 2015; Olelewe, 2014; Pima et al., 2016; Alebaikan, 2010; Lwoga, 2012) support the finding. For example, Pima et al. (2016) found out that the internet connection is more reliable and cheap at university campuses than at residences. This is due to the fact that HEIs provide free internet services to both students and lecturers. However, at home everyone has to settle the bills individually. This finding supports the perceived ease of use (PEU). The perception that is ease to use the CWTs at home or at the university has an impact on the decision. Given this challenge, Lwoga (2012) emphasis that in order to use the CWTs internet should be stable. Contrary to the presence of reliable and stable internet connection, the lecturers may choose not to embrace and adopt the use of the CWTs in delivering the curriculum. This challenge was also revealed by Olutola & Olatoye (2015). In our view, a combination of policy enforcement and awareness strategies could be implemented to resolve this challenge.

Furthermore, other challenges presented above include the requirement to change from traditional face-to-face to a Blended learning mode (Brown, 2016); the need to redesign the course module in order to use the CWTs (Alebaikan, 2010); and pedagogical issues about the quality of teaching and learning process (Hao & Lee, 2015). The lecturers find it challenging to redesign the course module. The need to redesign a course module contents affects the perceived ease of use (PEU). This is attributed by the faculty's level of ICT skills. In this study, the results has shown that majority of lecturers would need training to use the CWTs in teaching. This finding concurs with the results found in a study that sought to investigate the capability of ICT infrastructure present in HEIs in Tanzania (Pima et al., 2016). An integrated framework for the adoption and use of the CWTs is required and could be a solution to the challenges.

From the foregoing, the cultural and attitude challenges were also found and presented in section 4 above. Many lecturers do not believe that their culture and religion could stop them from embracing the CWTs in learning and teaching. This is an attitude towards use (ATU) (Teo, 2009; Farahat, 2012). In addition, personal privacy over the use of CWTs could be a limiting factor to many lecturers hence categorized as an attitude towards use (ATU). For example, lecturers do not trust the CWTs and that their personal comments, opinions, and information could easily be shared by their students outside the sites. While this holds, to some extent, it is an indication of worries and fear (Albion, 2008; Kahiigi, 2013). An awareness strategy is the key to the success and could resolve the above challenge.

Furthermore, ethical issues and quality of pedagogical process rose with serious concerns from the lecturers. This challenge affects the perception that the CWTs would be useful in teaching qualities and its outcomes, the perceived Usefulness (PU). For example, lecturers feels that

through the use of the CWTs, students could easily copy and paste work from unauthentic sources. Along similar lines, the same finding was presented in the past studies (Alebaikan, 2010; and Hao & Lee, 2015). However, Graham et al. (2013) ascertains that institutional strategy, pedagogical arrangement, and effective support services across the adoption phases is important to ensure quality process and products.

This study came at the right time when the adoption and use of CWTs across the societal life becomes the rule of the day. The paper's is a novelty as it has revealed and provided solutions to the current and future challenges facing lecturers when embracing CWTs in teaching. The challenges are contextual and the solutions proposed are practical. The paper is relevant to other researchers and decision makers in the areas of educational technology adoption, blended learning practices, and pedagogical transformation strategies. However, the paper was limited to only one institution, whose contexts would similar to other HEIs in Tanzania and the Eastern Africa.

7. CONCLUSION AND FUTURE WORKS

Given the advancement in web technologies discussed above, and the results thereof, it important for lecturers to embrace the use of these technologies while instructing. The study used two research questions which were answered through a questionnaire and interviews. In summary, the results of this study show that, while most of the lecturers have shown interest to adopt the CWTs, several challenges have become a setback. Notably, the result has shown five main challenges facing lecturers to embrace the CTWs in teaching and learning. This include the lack of reliable and strong ICT infrastructures, absence of a guiding framework, unreliable internet connection, the lack of awareness about the capabilities of the available ICT infrastructures, and lack of lecturer's involvement in the CWTs implementation projects. Therefore, several efforts are needed so as to overcome the mentioned challenges. Among them, is the promotion of awareness and knowledge on ICT and CWTs among lecturers, upgrading of ICT infrastructure and ensuring that there is a reliable internet connection.

In addition, the results and the recommendations are supported by the existent literatures as provided in the discussion section. We finally propose the future works as follows. First, a study should be done to design a framework that will guide the use of CWTs. Secondly; the same research could be done on a wider population of the higher education.

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