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Perceived usefulness and ease of use of Web 2.0 tools in university teaching and learning in Tanzania

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Abstract

Despite the potentials Web 2.0 technologies have in supporting teaching and learning processes in higher education institutions, there is a continuing debate on their perceived usefulness and ease of use. As such, this study examined academic staff and students' perceptions on the use of Web 2.0 technologies in teaching and learning activities in five Tanzanian universities. Specifically, the study aimed at determining the perceived usefulness and exploring perceived ease of use of Web 2.0 technologies in teaching and learning activities. A mixed approach (quantitative and qualitative) was employed by the study. Accordingly, a cross-sectional survey, alongside documentary review, was used to collect data from a sample of 350 respondents selected through simple randomly sampling and 10 purposively selected informants. The study findings suggest that faculty members and students used Web 2.0 technologies for academic discussions, posting and accessing lecture slides and tutorials, sharing materials and scholarly communication. The findings further inform that perceived usefulness and perceived ease of use of Web 2.0 technologies are important predictors of the adoption of these tools. On the basis of these findings, ICT infrastructure investment, training to upgrade skills and knowledge, policies and usage guidelines and other usage motivations are recommended to be in place to promote the usage of Web 2.0 technologies in teaching and learning. Besides, technical support to customise Web 2.0 technologies in teaching and learning activities is crucial.

Keywords: Web 2.0, web technologies, users' perception, teaching and learning, e-learning

Introduction

The advancement of ICTs and related innovations continue to change the mode of teaching and learning in higher learning institutions (Eligi & Mwantimwa, 2017). Several studies (Gaffer, Singh & Thomas, 2011; Anderson, 2007) indicate that there has been a growing trend of incorporating technology in education to fulfil some of the technological expectations of students and faculty members. Evidently, emerging technologies such as Web 2.0 technologies have been adopted and integrated to foster teaching and learning activities in universities and colleges (Mollel, 2013; Kazoka, 2016). Technologies such as YouTube, Mashups, online games/virtual

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worlds, social networking, social bookmarking, blogs, Wikis and syndication-based tools are examples of Web 2.0 (Mwantimwa & Nkhoma-Wamunza, 2016; Anderson, 2007). Prior studies (see example, Echeng & Usoro, 2014; Jimoyiannias et al., 2013; Koloseni & Omary, 2011; Salehe, 2008) have documented an increase in the use of emerging technologies such as Web 2.0 tools in teaching and learning activities. In particular, Mohammad (2011) discloses that Web 2.0 technologies adoption indicates that developing interactive, inquiry-based, technology-rich curricula is suitable for preparing students for the present complex world.

Remarkably, Web 2.0 tools provide users with ability to actively update websites in real-time, and collaboratively create and share their own insights into current and emerging themes within their education as opposed to non-interactive websites (Web 1.0), whose users are passive viewers of content created for them (Choudhury, 2014; Virkus, 2008; Alexander, 2007). Besides that, the technologies are suitable for active and meaningful learning and collaborative knowledge-building (Lwoga, 2012). In the same note, the tools foster information sharing, communication, collaborations and learning, and management (Howe & Kekwaletswe, 2010). It is also important to note that these technologies provide users with room for interactivity that enhances their creation and sharing of information, and teaching and learning materials (O'Reilly, 2005; Choudhury, 2014; Virkus, 2008).

Despite the potentials Web 2.0 technologies bring to teaching and learning processes in higher education institutions, there is a continuing debate on the quality of resources accessed. Scholars (e.g. Gaffer, Singh, & Thomas, 2011; Muhammad, 2011; Salehe, 2008) raise a number of questions and policy issues regarding the adoption and support of Web 2.0 technologies in teaching and learning. Mainly, the questions and issues raised surround matters to do with the quality, appropriateness, and reliability of Web 2.0 tools used to support teaching and learning. In the same line, authors (e.g. Jabr, 2016; Echeng & Usoro, 2014; Jimoyiannias et al., 2013) raise questions regarding the privacy of students' data, control and freedom of students' use of Web 2.0 tools. In fact, understanding perceived usefulness and ease of use of Web 2.0 technologies used in teaching and learning activities is crucial (Echeng & Usoro, 2014). Various empirical studies have been conducted using Technology Acceptance Model (TAM) devised by Rogers to measure acceptance of technology in developed countries (Echeng & Usoro, 2014). However, not much of such empirical studies have paid attention to perceived usefulness and ease of use of Web 2.0 technologies in developing countries like Tanzania. According to Usoro, Echeng & Majewski (2014), various theories have been developed to predict acceptance of technology (in this case perceived usefulness and ease of use as constructs in Technology and Acceptance Model – TAM), however, majority of them are applicable to few cultures, mainly those in developed countries. Therefore this study is designed to establish the perceived usefulness and perceived ease of use of Web 2.0 technologies in teaching and learning activities by faculty members and students in Tanzania. The purposes of the study were twofold: determining perceived usefulness and exploring perceived ease of use of Web 2.0 technologies in teaching and learning activities.

Literature review

The adoption of Web 2.0 technologies in education has been growing for years now, such that their influence has become more apparent. A variety of Web 2.0 technologies are employed in various ways to foster teaching and learning in higher learning institutions. It is evident that

Web 2.0 technologies and tools are becoming increasingly popular in education, especially higher education (Can et al., 2019). For instance, Web 2.0 such as social networking sites and social video tools are most utilized by instructors and students in learning (Yuen, Gallayanee, & Yuen, 2011). Similarly, technologies and services such as blogs, microblogs, Flickr, YouTube, course management systems, Twitter, Facebook, slideshare, wikis, RSS, social tagging, social bookmarking, and media sharing platforms in addition to SNSs and other social media software are used differently by faculty members and students to support learning directly or indirectly (Ajjan & Hartshorne, 2008; Grosseck, 2009). In fact, professional and instructional use of tools such as LinkedIn, Academia, and ResearchGate is increasingly enhancing learning process. A wide array of educational Web 2.0 applications, tools and services are available for application in the field of education in order to enhance learning experiences regardless of geographical location (Can et al., 2019). However, the question that stands is how useful and easy to use teaching staff and students perceive these to be. This study has attempted to respond to this question.

Perceived usefulness of Web 2.0 tools

According to Usoro, Echeng and Majewski (2014), perceived usefulness is an individual belief that a technology will make their work better. On the other hand, Lwoga (2014) views perceived usefulness as the degree to which students believe that using technologies will improve their learning performances. Several studies (see Masele, 2014; Mollel, 2013; Mohammad, 2012) acknowledge that perceived usefulness is a determining factor of the adoption, integration and continued usage of technologies in teaching and learning activities. Basically, web-based technologies used in teaching provide faculty members and students with opportunities to collaborate in knowledge creation and sharing. In this regards, elements of collaboration, communication and participation in knowledge creation and critiquing of ideas given by others are essential factors for the adoption and integration on web-based technologies in teaching and learning (Kazoka, 2016; Kam & Katerattanankul, 2014; Ajjan & Harsthone, 2008). These inform that technologies and tools provide a learning environment in which students can construct their learning experiences and collaborate with others to generate ideas (Alsadoon, 2018). For example, web applications open the door to direct communication among learners and educators (Light, 2011). In these aspects, many constructivist theorists affirm that the use of technologies enhances interactions between individuals and the sharing of information between them (Mohammad, 2011). Furthermore, supporters of collaborative learning believe that collaborative learning helps students to retain information better than when they work individually (Ndumbaro, 2018; Gaffer, Singh, & Thomas, 2011). This is attributed to the fact that when Web 2.0 tools are used, students and instructors become co-authors or co-developers of ideas and contents (Gadanidis, Hoogland & Hughes, 2008).

It is evident that using Web 2.0 tools have been found to help learners understand complex materials and enhance effective transfer of information and concepts learned in one setting to problem-solving processes in other settings (Gadanidis et al., 2008). It is also a well-known fact that when users actively participate in their learning, their ability to apply and retain knowledge is higher (Huang, Jeng & Huang, 2009). On the same note, studies (e.g. Jimoyiannis et al., 2013) show that today's digital students learn more when they are engaged in meaningful, relevant, and intellectually stimulating schoolwork and that the use of technology is fundamental in such

learning. Besides that, it is worth noting that web tools enhance blended learning and create a positive learning environment both for the teaching staff and students (Tatli, Akbulut & Altinisik, 2019; Majid, 2014), and provide learners with opportunities to create and edit the content accessed (Grosseck, 2009). Along these, the employment of web tools increases self-confidence levels of learners (Tatli et al., 2016), and enhances the development of critical thinking skills among teachers (Sendag et al., 2015).

Exploring perceptions, interests, and use of Web 2.0 tools in education, Yuen et al. (2011) found that participating teaching staff indicated positive perceptions of the pedagogical benefits and importance of Web 2.0 tools for teaching and learning. The findings further suggest that teaching staff expressed interest in gaining further skills and understanding the technologies in order to more effectively and seamlessly integrate them in classroom instructions. The findings inform that access to Web 2.0 tools enhances meaningful teaching and learning and fosters readiness for their adoption and integration in classrooms. Hortshore and Ajjan (2009) examined students' decisions to adopt Web 2.0 technologies and found that many students feel that some Web 2.0 applications are effective at increasing their satisfaction with a course, improving their learning and writing ability, and increasing students-students and students- faculty interactions. Surprisingly, the study further discloses that few students chose to use them in educational contexts. Alsadoon (2018) noted that faculty's perceptions of the usefulness of web tools are significant predictors of their intention to use the applications in teaching. Furthermore, web technologies provide students and teaching staff with avenues for publishing their works. Similarly, the usefulness of the technologies exists in form of their enhancement of learning subjects, satisfaction with courses, students' grades, and evaluation of and access to learning materials (Ajjan & Hartshorne, 2008). Their ability to change the way of sharing, accessing and interacting with information improves Web 2.0 tool perception (Tarik & Karim, 2011). In all, examining the perceived usefulness of Web 2.0 technologies is crucial when trying to predict their actual use in teaching and learning activities. Alsadoon (2018) asserts that the perceived usefulness of a technology is a stronger predictor of its use.

Perceived ease of use of web 2.0 tools

Perceived ease of use refers to the degree to which an innovation (technology) is perceived to be easy to understand and use (Rogers, 2003). Users of a technology can perceive ease of use of technology when they are exposed to or familiar with it (Kazoka, 2016). It is clear that when users perceive ease of use of a technology, they are likely start making use of it (Long, 2010). Conversely, Robinson (2009) asserts that new ideas and innovations that are easier to understand are adopted more rapidly than those that require adopters to develop considerable new skills and understandings. It is undeniable that technologies that are easily integrated into classroom environment (Konstantinids, Theodosiadou & Pappos, 2013) foster the usage of web 2.0 tools in higher learning institutions. Apart from that, the low level of skill complexity needed for use (Grosseck, 2009), easy usage opportunity with interfaces (Adcock & Bolick, 2011), and quick and easy access to all kinds of information and content predict the usage of the tools (Liu & Dig, 2016). Along these, ease of preparing teaching materials and processes (Tatli, Akbulut & Altinisik, 2016) are important determinants for web 2.0 tools usage by faculty and students.

Hortshorne and Ajjan (2009) examined students' decisions to adopt Web 2.0 technologies and noted that ease of use positively affects the use of the technologies. This implies that ease of use is a significant predictor of faculty's attitudes toward using web applications in learning; that

is their intention and actual use. Davis (1989: 320) indicates that perceived ease of use is the degree that using a specific technology will be free of effort. In support of these, findings of study by Dalvi-Esfahani et al. (2018) reveal that students' intention to continue using Web 2.0 technologies in learning was determined by factors such as perceived ease of use. Scholars (e.g. Ajjan & Hartshorne, 2008; Dearstyne, 2007) found that Web 2.0 technologies make sharing content among users and participants much easier than in the past. The authors expand that ease of creating, sharing, publishing, and distributing content makes the technologies have more potential in learning. In fact, the use of Web-based technologies such as LMS, Web 2.0 technologies, MOOCs, Smart blackboard and other e-learning technologies for teaching and learning activities depend on their ease of use. In this regard, Anderson (2007) asserts that Web 2.0 technologies encourage mass participation and provide an architecture (ease of use, handy tools) that lowers barriers to participation. However, few studies in developing countries were conducted to examine perceived ease of use of Web 2.0 technologies in teaching and learning activities. Usoro, Echeng & Majewski (2014) observe that various theories have been developed to predict acceptance of technology but these are applicable to few cultures and mainly those in developed countries.

Theoretical framework

Literature documents various models used to predict the acceptance and use of technology. However, the mostly used model to explain and predict the acceptance technology is the Technology Acceptance Model (TAM). TAM has four constructs that lead to the actual usage of an information system: perceived usefulness, perceived ease of use, attitude towards using the system, and behavioural intention to use the system as presented in Figure 1. Unquestionably, TAM has been used to examine factors affecting users' intentions to use and adopt different technological systems or tools (Venkatesh & Davis, 2000). TAM recognises the intention to use information systems by identifying the measurement of users' attitudes towards a system's usefulness and ease of use, and proposing external factors that influence usage intentions. Long (2010) asserts that perceived usefulness is the strongest predictor of an individual's intention to use an information technology.

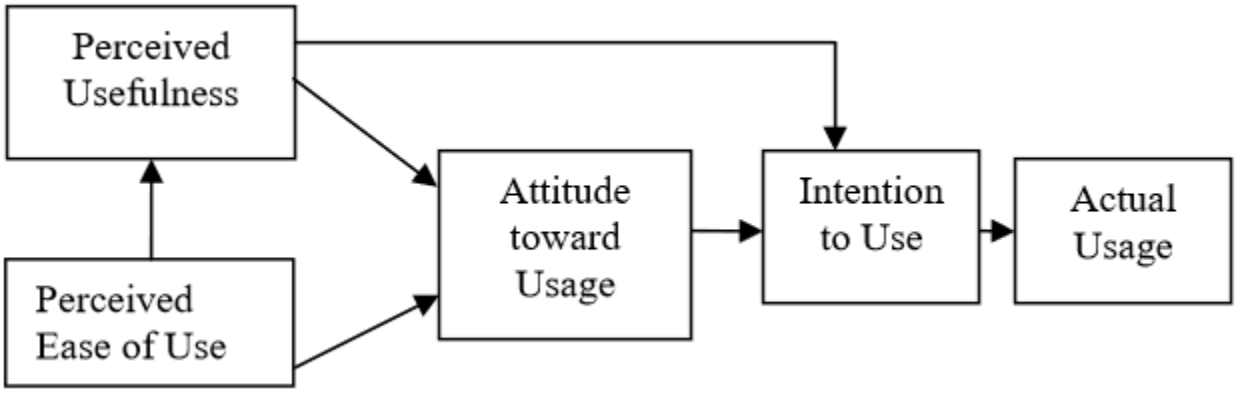

Figure 1: Technology Acceptance Model

(Adopted from Long, 2010)

As postulated in the TAM, perceived usefulness and ease of use through to attitudes and behavioural intention are the constructs predicting the use of technology. This suggests that readiness of faculty members and students to integrate web-based technologies in learning depend on how they useful and easy to use they think the technologies are. Masele (2014) asserts that there is a strong link between intention to use and actual usage of a new technology, that is, the web-based technologies' usage depends on end-user's intention to use them technologies. According to Pradia (2016), intention to use is what makes commitment and later adoption and integration of technologies in teaching and learning activities possible. Intention to use comes after determining the perceived ease of use and perceived usefulness of the technology in question. The author affirms that when there is high intention to use a technology, the commitment towards using it would be high. All in all, perceived usefulness and perceived ease of use are used to predict the use of technologies in teaching and learning activities.

Methodology

This study employed a mixed research design. This is a class of systematic inquiry where the researcher mixes or combines quantitative and qualitative research approaches, sampling procedures, and data collection and analysis methods in a single study (Mwantimwa, 2012; Johnson & Onwugbuzie, 2004). The combination of research methods involves the collection, analysis, and integration of quantitative and qualitative data in a single or multiple studies (Marczyk, Dematteo, & Festinger, 2005). In all, the present study employed a mixed research design to determine perceived usefulness and ease of use of Web 2.0 technologies among teaching staff and students in higher learning institutions in Tanzania.

The study was conducted at University of Dar es Salaam, Sokoine University of Agriculture, The Open University of Tanzania, Muhimbili University of Health and Applied Sciences, and Tumaini University Dar es Salaam College. The population of the study was made of teaching staff and students. The study's sample included 350 respondents, where 303 were students and 47 were faculty members. Simple random sampling technique was used to select students and faculty members who filled in questionnaire in this study. Purposive sampling was used to select faculty members and students who were interviewed. Kothari (2004) asserts that through purposive sampling procedure, researchers select items for a sample deliberately and their choice concerning an item remains supreme.

Regarding data collection methods, a cross-sectional survey method was used to collect data by mixing questionnaire and structured interview. The combination of these methods was deemed necessary taking into account the nature of the research problem under study and the fact each of these methods has both advantages and disadvantages in the research process. In the final analysis, when used together, the two types of data collected through these methods complement each other, whereby the weaknesses of one type are addressed by the strengths of the other. This study employed self-administered questionnaire. Standardized questionnaires with both open and closed-ended questions were administered to students and lecturers in this study. The research questionnaire contained specific questions formulated on the basis of the research objectives and questions. The general questions such as the profile of the respondents added value to the

research despite having no direct relationship with the objectives of the study. The questions laid a background for the other questions of the study. The respondents' socio-demographic characteristics provide a snapshot on the background of the respondents and their suitability for the inquiry (Mollel & Mwantimwa, 2019). Along that, face-to-face interviews using open ended questions with key informants were also used to collect qualitative data.

The data collected were subjected to quantitative and qualitative analyses. Qualitative data were analysed under various themes that corresponded to the specific objectives of the study. The qualitative data were analysed using content analysis of ethnographic summaries, direct quotations and selected comments from informants. Findings are summarized and used to complement what was found through quantitative method. Quantitative data were analysed using Statistical Product for Service Solutions (SPSS) where descriptive statistics (frequency and percent) were performed and presented in the form of tables and figures.

Results

Socio-demographic characteristics of the respondents

It was necessary to take into considerations socio-demographic characteristics (profiles) of the respondents. These included information on gender, age, designation of the respondents, and their discipline affiliation. The integration of technologies, in this case Web 2.0 technology, sometimes has connection with the academic disciplines of the students and their other characteristics. Indeed, some academic disciplines such as computer studies have a higher inclination towards using such technologies than others. To establish the distribution of respondents based on various characteristics, descriptive statistics (frequency and percent) were generated as Table 1 presents:

Table 1: Socio-demographic characteristics of respondents

Personal characteristics (n = 350)	Faculty Members		Students	
	F	%	F	%
Gender				
Female	15	31.9	112	37
Male	32	68.1	191	63
Age				
20 - 25 years	1	2.1	156	51.5
26 - 30 years	14	29.8	105	34.7
31 - 35 years	14	29.8	32	10.6
36 -40 years	14	29.8	6	2.0
41 - 45 years	3	6.4	4	1.3
46 years and above	1	2.1	0	0.0
Web 2.0 use experience				
For six month now	2	4.3	25	8.3
One year now	6	12.8	42	13.9
Two years now	6	12.8	45	14.9
Three years now	9	19.1	47	15.5
Four years now	5	10.6	40	13.2

Five years now	19	40.4	93	30.7

Note: F = Frequency; % = Percent

Regarding gender, the results show that majority of faculty member respondents (68.1%) and students respondents (63%) were males. These finding seem to imply that there are more male faculty members and students at the universities where the study was carried out. Besides, the results suggest that most of the students were aged between 20 and 25 years while most of faculty members were aged between 26 and 40 years. The results further disclose that majority of the respondents had experiences of more than five years using web 2.0 technologies. This indicates that a significant percentage (71.1) of faculty members and students had enough experience in web 2.0 technologies usage to be able to provide quality data for this study. Accordingly, the results show that the respondents belonged to social sciences (43.4%), library and information studies (14.3%), agricultural sciences (8.9%), business studies (4.9%), and from health and allied sciences (3.7%). The high representation of social sciences students can be attributed to the big intakes of social science programs.

Uses of Web 2.0 technologies to accomplish academic tasks

To gain insights on the usage of Web 2.0 technologies, the respondents were asked to indicate the frequency and purposes for using the technologies in academic tasks. This was included so as to understand how the technologies foster their learning, teaching in higher learning institutions. Regarding frequency, the results show that 190 (54.3%) respondents frequently used the tools while 150 (42.9%) occasionally did so to accomplish academic tasks. Their responses on how they use Web 2.0 are recorded in Table 2:

Table 2: Uses of Web 2.0 technologies to perform academic tasks

Use of Web 2.0	**Staff**		**Students**	
	Frequency	**Percent**	**Frequency**	**Percent**
Academic Discussion	23	48.9	143	47.2
Share materials	41	87.2	204	67.3
Posting / accessing announcements	14	29.8	113	37.3
Scholarly communication with colleagues	26	55.3	98	32.3
Posting / accessing lecture notes/slides	17	36.2	161	53.1

The results show that 17(36.2%)of faculty members and 161(53.1%) students make use of Web 2.0 technologies for posting, and accessing lecture slides and tutorials whereas 41(87.2%) of faculty members and 204(67.3%) use them for sharing materials, and 23(48.9%) of faculty members and 143(47.2%) of students use for academic discussions. Indeed, the findings suggest that Web 2.0 technologies are used in a range of academic activities. However, it was revealed during interviews that few lecturers were familiar with and made use of Web 2.0 technologies. For example, one faculty member (No.2) during an interview session had this to say:

> …I started using these tools after attending a workshop organised by library staff at this university. Before that I was totally not familiar with these tools and how they can be

> used to accomplish my daily activities as a faculty member. I remember we were trained on the use of Mendeley and Google Forms. The workshop was very useful for me as a researcher. From there, I developed interest in these tools and wherever librarians invite us to attend such workshops, I usually do.

Accordingly, the findings suggest that familiarity with Web 2.0 tools and their applicability in teaching and learning was limited among most faculty members and students but applied them anyway.

Web 2.0 technologies adopted for academic tasks

Faculty members and students were asked to indicate types of Web 2.0 technologies adopted in teaching and learning. This was important in the establishment of the extent to which Web 2.0 technologies are used to strengthen learning and teaching environment as Table 3:

Table 3: Web 2.0 technologies adopted for academic tasks

Web 2.0 technologies (n = 350)	Frequency	Percent
Facebook	265	75.7
Wikis	263	75.1
Academia	202	57.7
Google calendar	201	57.4
MyExperiment	197	56.3
Google Drive	164	46.8
YouTube	163	46.5
LinkedIn	148	42.3
Blogs	137	39.1
YouTube.edu	105	30
Mendeley	38	10.8

The results show that majority of faculty members and students employ Facebook, Wikis, Academia, and Google Calendar to accomplish various academic tasks. These tools are followed in magnitude of usage by MyExperiment, Google Drive, YouTube, LinkedIn and Blogs. Accordingly Youtube.ed and Mendeley were also deployed to foster teaching and learning. It is also noted that some faculty members and students used their personal blogs to accomplish academic tasks. The faculty members and students use Facebook for social networking. In addition, social bookmarking and reference management tools were found to be mostly used by faculty members and postgraduate students when writing their research proposals and papers. The findings show that delicious, Mendeley, Zotero, and CiteUlike are the commonly used social bookmarking and reference tools. During interview, one postgraduate student (No.3) said:

> Web 2.0 technologies such as Google Drive and Dropbox are so suitable for storing information that you can keep and share provided you are connected to the internet even by using your mobile phones.

Furthermore, it was revealed that social networking sites such as Facebook and Twitter were primarily used for social communication and sometimes for sharing ideas on academic assignments. In his words, one postgraduate student (No.4) explained that:

> Our class has a Facebook group account through which we share information. If there is any announcement from any lecturer, once one of us gets it, s/he always posts it on our page, and then everyone reads it. It is the easiest way to communicate and share information".

It was further established that students opened group accounts on Micro blogging platforms such as WhatsApp where they share information. Other tools such as Twitter and Skype were known to faculty members and students but their usage in academic and non-academic activities was rare.

Perceived usefulness of Web 2.0 technologies in teaching and learning

A question on perceived usefulness of Web 2.0 technologies to faculty members and postgraduate students was important in establishing how useful the technologies are in teaching and learning. Table 4 summarize the findings:

Table 4: Perceived usefulness of Web 2.0 technologies in teaching and learning process

Perceived usefulness (n = 350	**A**	**N**	**DA**
Support students in creating ideas and contents	311(93.1%)	17(4.8%)	6(1.8%)
Increase interactions among students and teachers	296(88.8%)	15(4.2%)	22(6.6%)
Make students more active in teaching and learning	300(89.8%)	28(8.4%)	6(1.8%)
Promote sharing of ideas and re-using study content	317(93.7%)	19(5.7%)	0(0%)
Can be used to organise documents and resources from individuals and groups of students	299(89.8%	27(8.1%)	7(2.1%)
Enable students and teachers to link to the relevant resources and share information and content with others	323(95.9%)	12(3.6%)	2(0.6%)
Enhance collaboration among students in solving well designed and meaningful educational problems	300(89.8%)	29(8.7%)	5(1.5%)
Make students accountable in the learning process even outside the classrooms	282(84.9%)	40(12%)	10(3%)
Enhance critical thinking and augmentation	264(80%)	45(13.6%)	21(6.3%)
Enable students to develop ideas and critique concepts and ideas	276(84.2%)	39(11.8%)	13(4%)
Help students complete their assignments and improve their performance	273(82.2%)	48(14.5%)	11(3.3%)
Can be used as a presentation tool (as an e-portfolios)	311(94.8%)	15(4.6%)	2(0.6%)

Note: A = Agree; N = Neither , D = Disagree

The results in Table 4 inform that majority of faculty members and postgraduate students agreed that Web 2.0 technologies foster teaching and learning. For example, majority of them agreed that Web 2.0 technologies support students in generating ideas and obtaining contents and enhance sharing of ideas and re-using study content. The other majority pointed out that the

technologies promote interactions among students and enhance collaboration among students in solving educational problems through well-designed and meaningful educational programmes. Accordingly, the results suggest that the use of Web 2.0 technologies provide faculty members and postgraduate students with abilities to organize documents, and teaching and learning resources; link to relevant materials; increase accountability, critical thinking and argumentation and; help students to accomplish assignments and provide presentation tools. During interviews, one student (No.1) made this comment:

> You know, in the Information Literacy Course, we learnt how to use Google Drive, Wikis and Mendeley. These are very interesting and useful tools in the teaching and learning process. We really enjoy using them.

In general, the quantitative results tally with the results from qualitative data. Apparently, regular training on the proper use of Web 2.0 technologies as part of e-learning in universities increases interaction with Web 2.0 technologies and the possibility of enhanced application of such tools in teaching and learning.

Perceived ease of use of Web 2.0 technologies in teaching and learning process

The results show that 249 (75%) respondents support that the ease of use of Web 2.0 technologies as platforms has a bearing on their use in teaching and learning process as Table 5 summarises:

Table 5: Perceived ease of use of Web 2.0 technologies in teaching and learning

Perceived ease of use of Web 2.0 technologies (n = 350)	A	N	DA
The technologies can be integrated in teaching and learning more easily	249(75%)	17(5.1%)	66(18.9%)
The technologies are more user friendly	264(80%)	45(13.6%)	21(6.4%)
Accompanied with low level of complexity	276(84.1%)	39(11.9%)	13(4%)
It is easy to access different teaching and learning resources using Web 2.0 technologies	273(82.2)	48(14.5%)	11(3.3%)
Make preparation of teaching and learning materials easy	173(52.7%)	17(5.2%)	139(42.1%)
They do not require much efforts to understand and apply in teaching and learning	169(50.9%)	59(17.8%)	104(31.3%)
Sharing of content among users is much easier than in the past	167(49.6%)	34(10.2%)	156(46.3%)
It is easier to create and publish teaching and learning materials	311(93.1%)	17(5.1%)	22(1.8%)

Note: A = Agree; N = Neither , D = Disagree

The results reveal that faculty members and postgraduate students agreed that ease of use of Web 2.0 technologies predict the usage. It is evident that a significant percentage of faculty members and students inform that Web 2.0 technologies are easier to integrate into teaching and learning, and provide easier access to teaching and learning resources. Along these, the results disclose

that the technologies are accompanied with low level of complexity and make preparation of teaching and learning materials easy. Furthermore, through these technologies, creating, publishing teaching and learning materials are made easier than in the past. Evidence from interviews shows that Web 2.0 technologies are perceived as easy to use; hence their adoption for academic activities. For example, one faculty member (No. 3) had this to say during an interview:

> In the courses that I am teaching, students sometimes submit their course assignments using Google drive. It is the easiest way to receive assignments from my students and sending them feedback. However when there is no power or internet, you won't be able to access the assignment nor send them feedback.

In all, the results testify that perceived ease of use is an important factor for predicting the usage of Web 2.0 technologies in the surveyed higher learning institutions in Tanzania.

Discussion

Web 2.0 technologies usage in academic tasks

The study has explored perceived usefulness and ease of use of Web 2.0 technologies by faculty members and postgraduate student in higher learning institutions. The findings testify that diverse Web 2.0 technologies (e.g. Facebook, LinkedIn, YouTube, Academia, Mendeley, Google applications) are in use to support teaching and learning. While some web tools are fostering networking among students and faculty members, others are supporting teaching and learning models, and management of teaching and learning materials. For example, the findings inform that Facebook is mainly used to support networking while LinkedIn, Academia and YouTube have been found to enhance access to teaching and learning resources.

Accordingly, Web 2.0 tools such as Mendeley have been found to support management of teaching and learning materials. The findings further reveal several uses of Web 2.0 technologies. The study findings show that faculty members and students make use of Web 2.0 technologies for posting lecture slides and tutorials and students' access to lecture slides, sharing materials and academic discussions. Furthermore, Web 2.0 technologies have been found to be used as a platform for posting/accessing announcements to/from students and lecturers. Other studies (see Kazoka, 2016; Jabr, 2011; Chao, 2007) corroborate these findings. In support, Armstrong and Franklin (2008) assert that new pedagogical drivers come from innovative faculty, teaching communities and students. For example, the uses of Web 2.0 technologies in the classroom environment to accomplish academic tasks are relevant to the current technological development.

Perceived usefulness of Web 2.0 technologies

The findings of the present study signify that perceived usefulness is among the determinants of the usage of Web 2.0 technologies in teaching and learning activities. In particular, a significant proportion of faculty members and students found Web 2.0 technologies to foster participation, collaboration and social networking; aspects that are critical in teaching and learning process.

This is associated with the fact that Web 2.0 technologies provide students with opportunities to collaborate in knowledge creation and sharing (Jimoyiannis et al., 2013; Mohammad, 2012). In fact, the tools provide multiple opportunities to students to engage in active and self-directed learning. In support, studies (see Elkaseh, Wai Wong, & Che Fung, 2016; Jabr, 2011) reveal that social media have made communication more efficiently among students. From the findings, it is evident that the use of Wikis or Google Drive facilitates students' collaborative work in assignments given to them by their course instructors remotely. In this regard, Armstrong and Franklin (2008), Elkaseh, Wai Wong, and Che Fung, (2016) and Jabr, (2011) report that new ICTs, most notably Web 2.0 technology, offer increased opportunities for a range of collaborative learning activities.

Apart from that, the study findings revealed that Web 2.0 technologies provide opportunities for students' participation in teaching and learning processes. Students' ability to post and access teaching and learning resources is an important step towards promoting problem based learning. In support of these findings, Kim *et al.* (2009) indicates that Web 2.0 tools such as blogs can be designed to improve and facilitate massive students' interactions in learning processes with low barriers. In fact, this feature is rooted in promoting students' engagement in teaching and learning process and making tasks easy for both teachers and students (Jimoyiannis *et al.*, 2013). As Web 2.0 technologies operate in a virtual environment, academic staff and students can send information and receive feedback more quickly than when they meet physically. O'Reilly (2003) discloses that a collaborative feature is rooted in open source software development communities notably Web 2.0 tools. Such communities organise themselves to lower barriers to participation and create a market for new ideas and offer suggestions that are adopted by popular acclamation. On the whole, Web 2.0 tools make it possible for learners to participate in creating and sharing ideas even when they are outside the university environment.

Moreover, the study findings revealed that Web 2.0 technologies provide opportunities for students to create social networks whose goals are to build and maintain their social connections. Studies such as Gaffer, Singh and Thomas (2011) suggest that the adoption of social networks is credited with the ease with which end-users can become members of various virtual communities, communicate, socialise, share information and keep abreast with current affairs. Web 2.0 technologies offer opportunities for students to create social groups geared towards learning. Social groups are important for students' learning activities. For example, students remind themselves to do class assignments, attend lectures or encourage themselves in their social groups and contribute towards quality teaching and learning process. It is important to note that not all Web 2.0 are effectively utilised by faculty members and students. However, WhatsApp has become an important platform for exchanging information, news and educational materials; making it more interactive and popular in Tanzania (Kazoka, 2016; Mohammad, 2012; Anderson, 2007). The platform allows users to create ideas and get comments from colleagues alongside creation of interactive educational portfolio with Web 2.0 technologies. Armstrong and Franklin (2008) support that "Web 2.0 portfolio allows users to record their reflections and control who can read them at the individual posting level". Basically, a Web 2.0 portfolio is good for students in making their own reflections on courses they pursue.

Perceived ease of use of Web 2.0 technologies in teaching and learning process

The TAM theory developed by Davis shows that enabling technology use depends on the ease of use for the user (Long, 2010). In fact, the usage of Web-based technologies such as LMS, Web 2.0 technologies, MOOCs, Smart blackboard and other e-learning technologies depend on their ease of use. This study's findings reveal that faculty members and postgraduate students agreed that ease of use of Web 2.0 technologies predict their usage. It is evident that a significant percentage of faculty members and postgraduate students have informed that Web 2.0 technologies are easier to integrate into teaching and learning, and make access to teaching and learning resources easier. Along these, the results disclose that the technologies are accompanied by low level of complexity and easing of the preparation of teaching and learning materials. Furthermore, creating, publishing teaching and learning materials are made easier than in the past.

The findings disclose that perceived ease of use is associated with cost-effective ways of sending and receiving feedback to and from lecturers, retrieving teaching and learning materials, submitting assignments and sharing lecturer notes online. In one way or another, the tools lower physical barriers and time constraints. In turn, this makes teaching and learning more convenient and friendly. On the same note, Anderson (2007) argues that ease of use lowers barriers to participation. Basically, Web 2.0 tools and services offer flexibility in the learning processes and allow for easy publication, sharing of ideas and re-using of study content, commentaries, and links to relevant resources in information environments managed by teachers and learners themselves. Surprisingly, despite ease of use, large proportion of faculty members are not effectively utilising Web 2.0 tools to support teaching and learning in higher learning institutions (Kazoka, 2016). Worse still, university libraries are ineffectively integrating Web 2.0 tools to support access to teaching and learning resources. In all, the opportunities Web 2.0 offer have not potentially been ultimately utilised to support teaching and learning in Tanzania (Mwantimwa & Nkhoma-Wamunza, 2016). In contrast, Robinson (2009) revealed that new ideas, innovations and technologies that are easier to understand are adopted more rapidly than those that require adopters to develop new skills and understandings.

Implications of the study

The findings of this study built upon existing literature on the use of Web 2.0 technologies. In particular, the findings minimize the disparity of prior empirical studies related to the use of Web 2.0 technologies to support teaching and learning in higher learning institutions. The findings further increase understanding on the factors influencing the application of Web 2.0 technologies, particularly perceived usefulness and ease of use. Besides, the study's findings contribute to the understanding of the deployment of TAM in gauging perceived usefulness and ease of use of Web 2.0 technologies in teaching and learning in Tanzanian context. In general, this study contributes to the growing body of knowledge in Web 2.0 technologies usage in education context. While this study examined perceived usefulness and ease of use of Web 2.0 tools in university teaching and learning, future studies should examine other factors influencing the integration and application of Web 2.0 technologies in teaching and learning.

Conclusion and recommendations

Based on the study findings, it is evident that Web 2.0 technologies are viable in today's teaching and learning environment in Tanzanian universities. The most notable perceived usefulness of these technologies in teaching and learning activities identified in this study is ensuring collaboration in knowledge production, communication and development of new ideas by students in learning activities. The Web 2.0 tools mostly used for sharing course contents and bibliographic information are Dropbox, Google Drive, wikis, Mendeley and Delicious. It is evident from the findings that the application of Web-based technologies tends to improve students and faculty members' performance and makes them accountable to their learning process. Moreover, it has been learnt that Web 2.0 technologies help in creating portable and interactive educational portfolios that support students' management of their learning activities. Eventually, if properly integrated, Web 2.0 technologies could support more activity-oriented and student-centred teaching. This would greatly provide opportunities for students to develop their Personal Learning Environments (PLEs).

To strengthen the application of Web 2.0 technologies in teaching and learning, faculty members should be encouraged to integrate them in their teaching activities. It is also recommended that faculty members should develop habits of attending short training aimed at enhancing their knowledge and skills in the application of technologies such as Web 2.0 in teaching and learning activities. Improvement of ICT infrastructure is necessary in higher learning institutions. This includes acquisition and installation of good and modern ICT infrastructures such as computers, wireless internet connectivity, fibre optic network, and high internet bandwidth. Furthermore, technical support on the use of Web 2.0 technologies should be provided to faculty members and students. In fact, support from ICT experts on the proper design and use of Web 2.0 technologies in teaching and learning activities is highly recommended. Undeniably, organising regular workshops, training for faculty members and students on how to use Web 2.0 to accomplish academic activities is important for smooth use of the technologies.

Abbreviations

ICT: Information and Communication Technology, TAM: Technology Acceptance Model, MOOCs :Massive Open Online Courses.

Declarations

The authors declare that the manuscript is original and has not been published in whole or substantial part by another publisher and that it is not currently under review by another journal.

Availability of data and material

The datasets from this study are available from the first author on reasonable request.

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