Application of Virtual learning Technologies in Teaching and Learning in Tertiary Institutions in Ghana

UJAKPA MARTIN MABEIFAM
Ghana Technology University College, Ghana

RAJESH ARORA
Padmashree Dr. D. Y. Patil Institute of Management Studies, India

NUSRAT-JAHAN ABUBAKAR, VERONICA AGBLEWORNU & CHRISTO-
PHER DICK-SAGOE
Ghana Technology University College, Ghana

ABSTRACT Widespread introduction and use of Virtual Learning Environment Technologies (VLETs), has led to its use to support teaching and learning especially at the tertiary level. Early work on the use of Virtual Learning Environment Technologies to support teaching and learning has established the percentage of schools in Korea, Ireland, UK, Ireland and some other places as well. In the case of Ghana, it is unknown how many schools are using Virtual Learning Environment Technologies. This study therefore attempts at determining the percentage of tertiary schools using Virtual Learning Environment Technologies to support teaching and learning. The other supporting sub-objectives set for the study includes the determination of the Information and Communication Technology (ICT) proficiency level of participants of the study, participant institutions and the use of technology to supports teaching and learning and finally participant institutions and the use of online management systems. Using the stratified probabilistic sampling, a sample of 45 was selected from the population of 140 accredited tertiary institutions. A total of 493 participants made up of students, lecturers and IT personnel were then selected randomly from the 45 Institutions. This constitutes 45 lecturers, 400 students from tertiary institutions and 48 IT support staff of tertiary institutions. The study found out that 39 percent of Ghanaian tertiary institutions use Virtual Learning Environment Technologies to support teaching and learning, whereas 58 percent was recorded for those institutions who do not use Virtual Learning Environment Technologies in teaching and learning. Again, ICT proficiency in tertiary institution was found to be 83 percent whiles 76 percent of the institutions uses technology to support teaching and learning in their schools. The paper makes a number of recommendations for the development and application of Virtual Learning Environment Technologies for

tertiary institutions in Ghana was made since the study revealed its prospects. The prospects lied in the fact that most of the respondents were ICT proficient and that most of the respondent institutions uses ICT in teaching and learning in their institutions.

Keywords: Virtual Learning Environment Technologies, Online Learning, Tertiary Institutions, Ghana, e-learning, Learning Technologies and Management System.

Introduction

Supporting teaching and learning using technology at the tertiary level of education has become a fundamental ingredient in the experience of many students, lecturers and administrators. One reason for this trend is the widespread introduction and use of Virtual Learning Environment Technologies (VLETs). VLETs combine a variety of tools, facilities, techniques and resources into a single integrated system which organizes and provide access to online learning services (including teaching and learning) for students, teachers, and administrators. Systems that come with tools, facilities, techniques and resources include Content Management System, Course Management Systems, Learning Platform and Learning Content Management System. Asunka (2008) revealed that VLETs are used to support teaching and learning in Ghanaian tertiary Institutions. However, data on the number of schools using VLETs to support teaching and learning, remains unknown. Unwin and others (2008) argues that the use of VLETs to support learning and teaching in Africa is still young and needs to be developed. The question that still remained unanswered was the number of schools using VLETs to support teaching and learning. On this note, this study was carried out to fill the gap; which is to estimate the percentage of Ghanaian tertiary Institutions that use VLETs to support teaching and learning.

Literature Review

Evidence of the use of VLETs to support Teaching and Learning

In an empirical study, Asunka (2008) observed that user-students were not interested in collaborative activities and in the use of the discussion boards. They observed that discussion threads were initiated by instructors and none of the students joined, even though opportunity was given to students to start any discussion on topics of their choice. This study looks into the use of VLETs in the Ghanaian Universities. The study will fill the gap by addressing the percentage of universities using VLETs? It can also be argued that Asunka's (2008) study is old and needs to be updated to reflect current trends on the use of VLETs and to find out if those findings still exists. These justifications encouraged the need for the study to be conducted.

Age of VLETs in Ghanaian Tertiary Institutions

A study conducted by Unwin and other (2008) showed a wide variety of different e-learning practices in Africa. They also observed the youthful stage of VLETs introduction and application in Africa. A specific case was conducted by Blankson (2015) on Ghana's e-learning in tertiary institutions. Blankson argues with an estimated internet penetration of 1 in 250 people, compared with the global average of 1 in 15, it will be difficult, if not impossible, to use VLETs in tertiary education in Ghana. Blankson further argues researchers have shown that teaching resources are inadequate in the higher education and that Ghana is more familiar with the traditional lecture mode of instruction delivery. This assertion still makes VLETs adoption at its infancy stage in Ghana. From this one can state that e-learning is in its infant stage in Ghana and if this is so, then the use of VLETs in Ghana is at its infancy. This study seeks to confirm this.

A study in 25 African countries shows two extreme pictures (Njenga, 2011). One is that of the enthusiastic advocates of e-learning systems and the other is that most African educators presently have little knowledge and/or interest in e-learning and its usage (Unwin et al., 2009). If Ghanaian educators are among those advocates, then it is possible that only a small percentage of Ghanaian Tertiary Institutions will use VLETs to support Teaching and Learning.

Use of VLETs elsewhere

The Case of UK—In the case of UK, Jenkins M., Browne T. & Susan Armitage (2001) found that the use of VLETs is widespread. The study revealed that 80 percent of UK Institutions have VLETs and 40 percent use them.

The Case of Ireland—A survey of five Irish tertiary institutions on the usage and uptake of VLETs by Cosgrave et al. (2011) found that VLETs are frequently used by higher education students.

The Case of Korea—With reference to Leem and Lim (2007), Capper, (n. d.) stated that 85 percent of Korean universities and colleges have implemented e-learning: hence using VLETs to support teaching and learning.
Results of this study will allow for the percentage of Tertiary Institutions in Ghana that use VLETs to support teaching and learning to be unveiled.

Methodology

The research design employed in the study was the Survey Research Design. Specifically one time short design or the cross-sectional survey research design was employed. The reason for the selection of one time short or the cross sectional survey is that data for this study will be collected at one point in time from a sample selected to represent the larger population. This study is also qualitative. With this method, the researcher was able to capture complexities of phenomena by

carrying out an in-depth survey on the target population, thereby, collecting a lot of data. The target population for the study is Ghanaian Tertiary Institutions. This is made up of the one hundred and forty accredited tertiary Institutions. Among them are public/private universities/Colleges, Polytechnics, public/private Teacher Training Colleges and public/private Nursing Training Colleges. Because of the availability of non-overlapping homogeneous subgroups in the population, the study employed the stratified probabilistic sampling. In all, 493 participants (Lecturers, Students and IT Personnel) were used for the study. The instrument employed for the study was questionnaire. To test and measure the instrument, the content validity approach was used. Data for the research was collected from Primary source.

Due to the qualitative nature of the study, the study objectives for the research and the study design (survey) for the research, the study adopted a descriptive statistics. Coefficient alpha (Cronbach's alpha) was used to estimate test-score reliability for the study. The result was 0.90, making the result more consistent and sufficient. The words on the questionnaire were understood by all the respondents for the study. This validity was established during the pre-test stage of the data collection exercise. The sample and sampling procedure for the study was done this way. A list of all the 140 accredited tertiary institutions operating in the country was obtained from the national Accreditation Board. To ensure equal representatives, the institutions were grouped according to types (universities, polytechnics and training colleges). From sample size determination software (http://fluidsurveys.com/university/calculating-right-survey-sample-size/), a sample size of 103 institutions was considered appropriate for the study. Proportional stratified sampling procedure was then adopted to select sample sizes proportionally and allocated to each stratum (university, polytechnics and training colleges). The distribution was as follows: 58 universities, 15 polytechnics and 30 training colleges. From the list of the 80 universities, 20 polytechnics and 40 training colleges, making 140 tertiary institutions, lottery method of the simple random sampling technique was employed to select the selected institutions. The selected institutions were then contacted and the list of students, IT personnel and lecturers populated to constitute the sampling frame for the study. The sample size calculating software was then employed again to get an overall sample size for the study. This stood at 493 and proportionally allocated to the lecturers, students and the IT personnel based on their population. The lottery method of the simple random sampling procedure was then employed again to select the samples. The result was (45 lecturers, 400 students and 48 IT personnel).

Discussions

Participants' ICT proficiency Level

Table 1 shows the ICT proficiency level of participants. Out of 493 participants, 121 (representing 24%) were excellent in ICT use, 165 (representing 33%) were very good in ICT use, 128 (representing 26%) were good in ICT use, 33 (representing 7%) were fair in ICT use and 19 (representing 4%) were poor in

ICT use. However 27 (representing 6%) participants did not declare their ICT proficiency level.

Response	Lecturer	Students	IT Support Staff	Total	Percentage
Excellent	-	92	24	121	24
Very Good	21	123	21	165	33
Good	7	119	2	128	26
Fair	3	30	-	33	7
Poor	9	10	-	19	4
Missing	-	26	1	27	6
Total	45	400	48	493	100

Table 1: ICT proficiency level by category of participant
Source: Field Construct, 2015

The percentage distribution of the information in Table 1 is shown in Figure 1
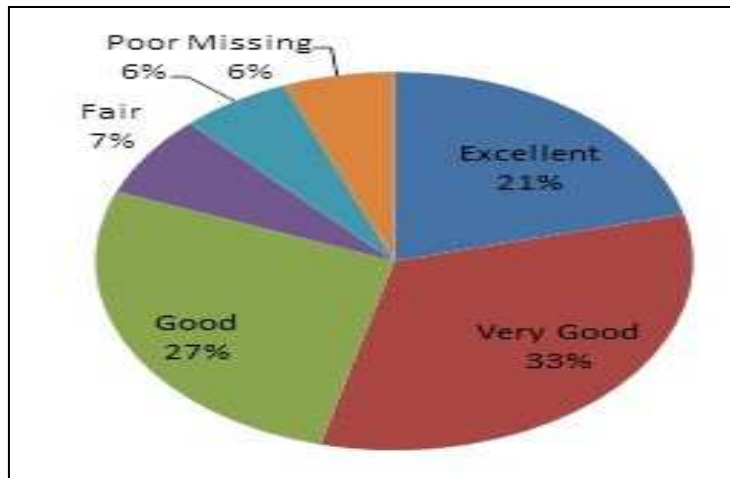

Figure 1: Percentage Distribution of Participants' ICT proficiency Level
Source: Field Construct, 2015

Out of the 121 participants who were excellent, 5 were lecturers, 92 were students and 24 were IT Support staff. Of the 165 that were very good, 21 were lecturers, 123 were students and 21 were IT support staff. Of the 128 that were good, 7 were lecturers, 119 were students and 2 were IT support staff. Of the 33 that were fair, 3 were lecturers and 30 were students. For 19 that were poor, 9 were lecturers and 10 were students. Those who did not declare their ICT proficiency status were 26 students and an IT support staff. For details please refer to Figure 2.
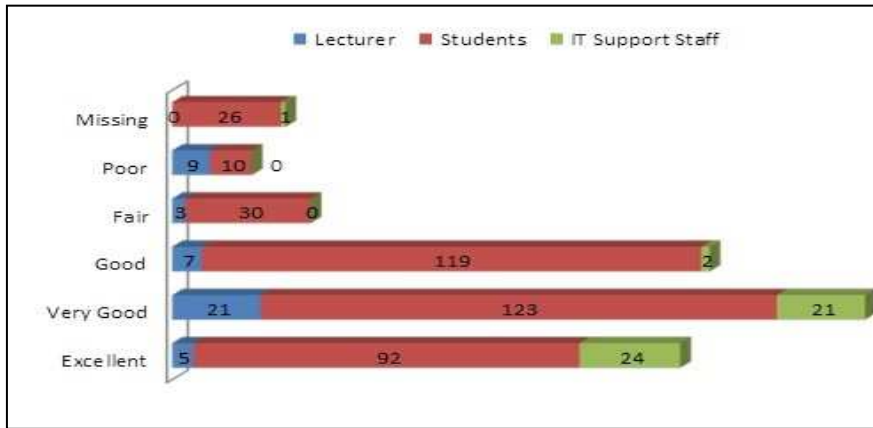
Figure 2: ICT Proficiency Level by category of respondents
Source: Field Construct, 2015

Participant Institutions and the use of technology to support teaching and learning

From Table 2 and Figure 3, 103 out of 493 participants (representing 21%) strongly agreed that their school uses technology to support teaching and learning. 269 (55%) also agreed that their institutions were using technology to support teaching and learning. 58 (12%) do not know whether their institution uses technology to support teaching and learning. 27 (5%) disagreed that their institution uses technology to support teaching and learning. Another 27 (5%) strongly disagreed that their institutions use technology to support teaching and learning.

	Lecturers	Students	IT Support Staff	Total	Percentage
Strongly Agree	4	95	4	103	21
Agree	32	201	36	269	55
Do not know	2	56	-	58	12
Disagree	5	18	4	27	5
Strongly Disagree	1	8	-	9	2
Missing	1	22	4	27	5
Total	45	400	48	493	100

Table 2: Participant Institutions use of technology to support teaching and learning
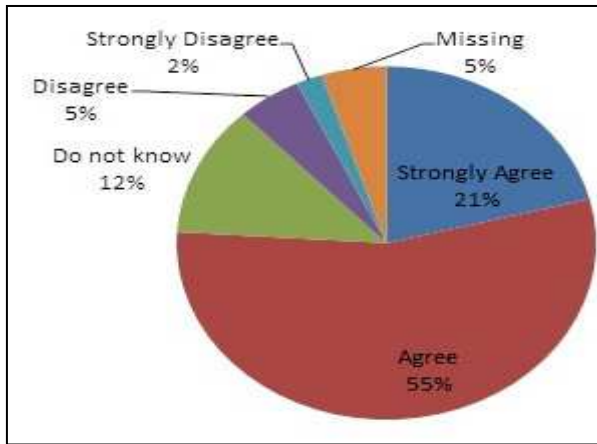*Source: Field Construct, 2015*

Figure 3: Institutional use of Technology to support teaching and learning
Source: Field Construct, 2015

Reasons participants gave for saying that their institutions used technology to support teaching and learning includes the following:
- Availability of internet provided by the institution
- Provision of computer labs by the institution
- Use of projectors in teaching
- Use of resources from the internet for teaching and learning
- Provision of online journals that the institutions have subscribed to
- Provision of e-libraries or links to e-libraries that students are given access
- Provision of lecturer notes and assignments on schools' system
- Communication with lecturers through emails, chats and also by the schools' system

Participant Institutions and the use of Online Management System

Table 3 below provides a breakdown of Institutions that are using Online Management Systems to support teaching.

Response	Lecturer	Students	IT Support Staff	Total	Percentage (%)
Uses online Management system	9	165	20	194	39
Do not use online Management System	35	227	24	286	58
Missing	1	8	4	13	3
Total	45	400	48	493	100

Table 3: Participant Institutions and the use of Online Management System
Source: Field Construct, 2015

From Table 3, 194 respondents (representing 39%) of the participants attested that their institutions were using Online Management Systems to support teaching and learning. 286 (representing 58%) of the participants were not using Online Management system to support teaching and learning. Figure 4 shows the detail breakdown.
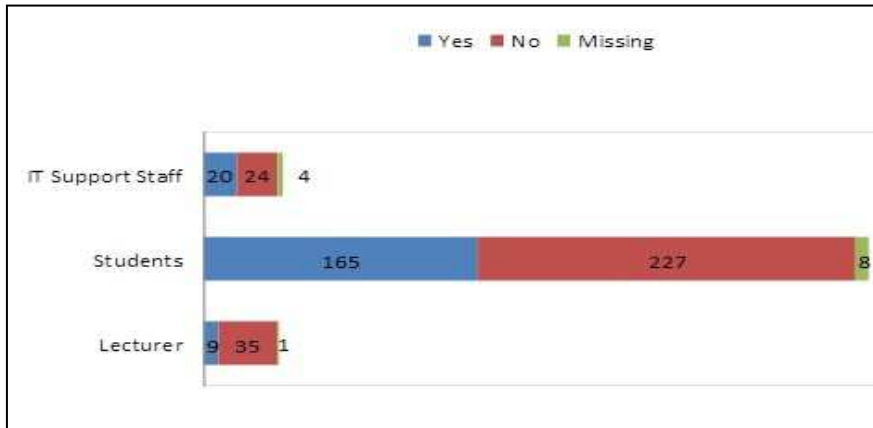

Figure 4: Participant institutions and the use of online system by category of participant
Source: Field Construct, 2015

Conclusion

Participants ICT proficiency

The Figures from Table 1 reveal that 414 (representing 84%) participants are ICT proficient. By this result, it is conclusive that 84 percent of Ghanaian students and lecturers are IT proficient.

Participants Institutions and the use of technology to support teaching and learning

From Table 2, 372 (representing 76%) of the participants affirmed that their institutions use technology to support teaching and learning. Among reasons given by participants for agreeing that their schools use technology include availability and use of internet, computer labs, projectors, internet resources, online journals, e-libraries or links to e-libraries, lecturer notes/assignments on school management system, emails facility and chat facility. However 35 (representing 7%) participants disagreed that that their institutions are using technology to support technology.

Going by the information in the foregoing paragraphs, it can be concluded that 76 percent of Ghanaian tertiary institutions use technology to support teaching and learning and 7 percent do not. 17 percent of the participants were unclear whether their institutions use technology to support teaching and learning or not.

Availability of online Systems in tertiary Institutions

Per reasons given by participants for their response that their institution use tech-nology to support teaching and learning, 6 percent of the participants stated the use of institutional online management system as their reason for agreeing that their institutions use technology to support teaching and learning.

From Table 3, 194 (representing 39%) participants say their institutions use online management system to support teaching and learning. Apart from the 13 (representing 3%) who did not state whether their school uses an online manage-ment system to support teaching and learning; the rest 286 (representing 58%) say their institutions are not using online management systems to support teach-ing and learning. Based on this, it can be concluded that less than 50% tertiary institutions (58%) in Ghana do not use online management system to support teaching and learning. However 38 percent of schools use online management systems to support teaching and learning.

The result above confirms the finding that "…higher educational institutions in Africa are still reluctant to develop systems that can enable learning resources to be made available to students through VLEs" (Unwin el at., 2008).

Summary and Concluding Remarks

From the foregoing, it is found that the ICT proficiency of lecturers and students in Ghana tertiary institution is high; the study supports that 84 percent of students and lecturers who are ICT proficient; most tertiary institutions in Ghana use tech-nology to support teaching and learning; 76 percent of tertiary institutions use technology to support teaching and learning; less than 50 percent Ghanaian terti-ary institutions use Virtual Learning Environment Technologies to support teach-ing and learning; and approximately 39 percent institutions use VLETs to support teaching and learning. The findings from this study have implications for teach-ing and learning in Ghana tertiary institutions. The main one is the prospect in the application of the VLETs in the Ghanaian tertiary institutions since most of the respondents were willing and had some level of ICT proficiency level. However, it is recommended that the stakeholders of the VLETs in tertiary institutions in Ghana should pay a particular attention to the development and use of VLETs in the tertiary institutions since the prospects exists. Prospect for the use of VLET lies in this fact: 87 percent of respondents were ICT proficient and 76 percent of the institutions uses ICT in teaching and learning.

Limitation of the study

Though it did not affect its result, the study limited itself to only 493 samples due to problems of finance. However, the study could have involved a wider sample size than what was used.

Correspondence
Ujakpa Martin Mabeifam
Faculty of Informatics/IT Business
Ghana Technology University College
P. O. Box MC. Takoradi, Ghana
Email: mujakpa@gtuc.edu.gh

Notes

Definitions of terms

- Virtual Learning Environment Technologies:- a wide range of tools, facilities, technique and resources that form a system which organizes and provide access to online learning services for students, teachers, and administrators.
- Online Learning Management System: in the context of this studies, online management system is used interchangeable with VLETs. It organizes range of tools, facilities, technique and resources that form a system which organizes and provide access to online learning services for students, teachers, and administrators.
- School: just like institution, in this study, school is used interchangeable with institution to refer to tertiary schools. Note that there are exceptions if stated explicitly.
- Tertiary Institution: - This is the educational level following the completion of a secondary or senior high education level of education. It can also be referred to as the third stage of education; thus after the basic and senior high stages. This however does not include vocational education and training beyond senior high or secondary education.
- Online Learning: it is the use of a range of technologies such as the intranet/ internet to allow for communication between lecturers and students. Example, sending email to a student about their assignment or a student posting a question to a course discussion group for others to respond.
- National Accreditation Board:- This is a Ghanaian regulatory agency of the Ministry of Education that ensure that the country's tertiary education system continues to be responsive to a fast changing world and producing competitive graduates.
- Institution: except where it is stated explicitly as a different school (primary, junior high or senior high), in this study, the name institution is used in reference to tertiary schools.
- ICT proficiency is the ability to use digital technology, communication tools, and /or networks appropriately to solve information problems in order to function in an information society. This includes the ability to use technology as a tool to research, organize, evaluate, and communicate information and the possession of a fundamental understanding of the ethical / legal issues surrounding the access and use of information.
- Information Technology:- it is the use of Computer technology such as software/hardware to process or and store information, and communication technology for transmitting information.

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