

The Deployment and Adoption of E-Learning Systems in Ghanaian Universities

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Abstract

E-learning has become the protagonist for change and serve as an avenue for the creation, storing and sharing of knowledge among members of the university communities. This study sought to explore the deployment and adoption of e-learning to facilitate knowledge creation, storage and sharing in Ghanaian universities. The survey and mixed method research approach were used to collect data from stratified sampled respondents of the universities. The general population for this study comprised all the categories of the universities in Ghana: public and private. The study established that the awareness, adoption and usage of e-learning to facilitate knowledge management (creation, processing, sharing and storage) at the universities were very high. In addition, there were adequate technology and infrastructure to support the e-learning at the universities. The study also established that the e-learning systems have benefited and enhanced teaching and learning at the universities. Despite these, the study established that the universities encountered some challenges in the implementation and usage of the e-learning systems. However, by implementing sound measures such as increasing the internet bandwidth; and providing adequate and functioning computers, these challenges can be solved.

Keywords: Learning, E-Learning, Knowledge, Knowledge Management, Universities

1. Background to the Study

With the current advances in Information and Communication Technologies (ICTs) by way of improved computer power, faster data transfer rates, and attendant lowering of costs, coupled with the fact that the effective integration of these technologies into educational curricula has been demonstrated to have positive effects on student learning (Harvey, 2003; Kiluk, 1994; Salpeter, 1998), technology-enabled instruction, especially online learning, has emerged as the most feasible and economically sound means of expanding access to quality higher education. Online learning is thus being rapidly adopted by educational institutions worldwide as an alternate or complementary mode of education delivery, and indeed has been heralded as the next democratizing force in education, particularly in higher education (Jones, 1997).

A promising direction regarding the generation and application of knowledge in universities is the development and implementation of e-learning. The main objective of this system is to establish a structure where knowledge is created and shared among the members within a domain. This system

also, helps the universities to structure and organise relevant knowledge for effective decision-making in a way that would position them positively for a competitive advantage.

The implementation of e-learning systems help universities to focus and protect their intellectual capital; re-orientate their culture by opting for an optimal knowledge-sharing strategy; improve decision-making through facilitated access to expertise and leading practices; and reduce loss of know-how by capturing explicit and tacit knowledge. The deployment of e-learning systems are most suitable in universities because: universities usually possess a modern information infrastructure; knowledge sharing is natural for members of the universities; knowledge acquisition is a natural desire of students, lecturers and administrators; and there is usually a trustful atmosphere at universities to the extent that members are neither hesitating nor afraid of publishing or otherwise disseminating their knowledge.

E-learning has evolved from its predecessor, namely distance learning. The flexibility of the distance learning did attract many learners irrespectively of their countries or places across the globe. In 2002, the global market for e-learning reached US \$90 billion this is because majority of companies are venturing into e-learning (Young, 2003).

E-learning may include delivery of course materials, tuition or assessment by means of asynchronous (one-way) learning where interaction occurs intermittently with a time delay and at the learner's own pace, and synchronous (two-ways) learning, or real-time online learning where learning takes place at the same time pace. The shift enhancing the adoption of e-learning in teaching and learning is not different with the four universities in Ghana, namely: University of Education (UEW), Kwame Nkrumah University of Science and Technology (KNUST), University of Ghana (UG), and Ghana Institute of Management and Public Administration (GIMPA).

Despite these, universities in Ghana experience some challenges with e-learning systems implementation:

- Inadequate information and communication technology (ICT) staff to support and implement the systems
- Lack of officers to manage the knowledge and e-learning systems
- Low motivation among lecturers to blend the e-learning systems and face-to-face systems
- Inadequate internet bandwidth to support the systems
- Inadequate content for the e-learning systems
- Lack of awareness of the use and benefits of e-learning systems for the universities and users of the systems
- Lack of framework to support the creation and sharing of knowledge in the system
- Poor financing for the acquisition of ICT infrastructure

There has not been an empirical studies and evidence on the role of E-Learning in KM Practices in Ghanaian universities. This has created a knowledge gap and uncertainty about whether E-Learning plays any role in KM practices in universities. This study therefore explores the role (deployment and adoption) of e-learning to facilitate KM practices in Ghanaian universities.

2. Literature Review

2.1 Learning

Learning is the act of acquiring new or modifying and reinforcing existing knowledge, behavior, skills, values or preferences and may involve synthesizing different types of information (Bernstein et al, 2006). Dunn et al (1989) revealed that the knowledge and skills acquisition is a complex process which involves a learner's biological characteristics or senses (physiological dimension); personality characteristics such as attention, emotion, motivation, and curiosity (affective dimension); information processing styles such as logical analysis or gut feelings (cognitive dimension); and psychological or individual differences (psychological dimension).

Traditional learning is a face-to-face interaction between the student and educator as well as between the students themselves and total organizational control over the process (Ntumy-Coleman, 2011). The learning process include lecture, case studies, team projects, and so forth and it is conducted in a synchronous environment, meaning that the students must be in the same place at the same time in order to learn (Black, 2002).

2.2 E-Learning

According to Diana (2004), e-learning is the use of electronic media and ICT in education to facilitate knowledge sharing. It uses the internet technologies to deliver a broad array of solutions that enhance knowledge and performance. Similarly, Dei (2017) asserts that e-learning is education and knowledge sharing based on modern methods of communication, including the use of computers and its networks, various audio-visual materials, search engines, electronic libraries and websites, whether accomplished in the classroom or at a distance. Browaeys (2006) concludes that e-learning is an umbrella term that covers learning and knowledge sharing almost anytime, anywhere on a computer, usually connected to a network to promote higher thinking and KM.

In the opinion of Lwoga (2012), e-learning mainly consists of five characteristics:

1. Learning takes place anytime and anywhere, not only in the classroom.
2. Learners take on the role of organisers. Instructors serve as both the distributors of educational content and facilitators of learning process.
3. Learning is a lifelong process and thus it is not linked solely to educational institutions.
4. Learning takes place in communities of learning or communities of practice, learners participate in formal as well as informal communities.
5. Learning is informal and non-formal takes place at home, at the work place and during leisure time and is no longer centred on teachers or institutions.

2.3. E-learning Systems

Various technologies are used to facilitate e-learning (Sendall et al, 2008). Most e-learning uses combinations of techniques: blogs, collaborative software, ePortfolios, and virtual classrooms in knowledge dissemination (Aljawarneh et al, 2010). According to Diana (2002), the technologies are interactive technologies that support many different types of capability. These include internet access to digital versions of materials unavailable locally, internet access to search and transactional services, interactive diagnostic or adaptive tutorials, interactive educational games, remote control access to local physical devices, personalized information and guidance for learning support, and simulations or models of scientific systems. Sendall et al (2008) also identified technologies such as the communications tools for collaboration with other students and teachers, tools for creativity and design, virtual reality environments for development and manipulation, data analysis, modelling or organization tools and applications, and electronic devices to assist disabled learners.

Diana (2002) and Okah et al (2011) expressed that in the educational settings, e-learning technologies and the Internet have opened new pathways of learning. Advancing this argument, Diana (2002) explained that computers provide diverse tools for students that encourage autonomous behaviour as well as increase the probability that they will interact with their learning environment. Further, technology-rich classrooms utilize multimedia to increase student interactions and enhance student learning. Jonassen et al (2003) stated that students can benefit from e-learning when technology is used for problem solving and information retrieving purposes.

Functionally, e-learning includes a wide variety of learning strategies and ICT applications for exchanging information and gaining knowledge (Diana, 2002).Muturi (2003) mentioned them as technology applications and processes. These are audio, video, computers, tablets and Mobile Devices, blogs, webcams, whiteboards, screen casting, learning management systems, learning content management systems, and electronic performance support systems. Lwoga et al (2007) also stated such ICT applications as including television and radio, Compact Discs (CDs) and Digital Versatile Discs (DVDs), video conferencing, mobile technologies, web-based technologies, and electronic learning platforms.

Marfo & Okine (2010) also opine that e-learning systems can be grouped on the basis of management of the system or on the basis of the cost and support of the system. On the basis of the management of the system, they consist of the course management systems (CMS) and learning management systems (LMS) while those based on cost and support consist of the open source systems (OSS) and commercial systems (CS).

2.4 Learning Management Systems in Education

Learning Management Systems (LMS) is learning organized and managed within an integrated system (Dalsgaard, 2006). LMS basically organizes the learner's materials or information into a harmonized format, to include segmented course units with assignments, assessments and discussions (Downes, 2005). Some of the widely known examples of LMS are WebCT, Aculearn, TopClass, Desire2Learn, Moodle, Blackboard, Sakai, and LearnLink. These systems facilitate incorporation of videoconferencing, online chat, digital whiteboard, screen captures, polling, voice messaging; with video, graphics, audio and animation import; presentations with voice narration, interactive quizzes as well as threaded discussions (Siemens, 2004). They sometimes serve as course management systems (CMS) by providing virtual spaces for learner interaction, streamlining the course design process for instructors, and allow instructors to author, re-use or re-purpose content effectively with little competencies (Downes, 2005).

Some common features and tools of LMS include chats, e-mails, wikis, discussion forums, file sharing RSS feeds, weblogs, and social bookmarking" among many others (Dalsgaard and Mathiasen, 2008). These tools facilitate learning and teaching strategies. As Dalsgaard (2006) puts it, it introduces and provides the definition of educational social software as, "networked tools that support and encourage individuals to learn together while retaining individual control over their time, space, presence, activity, identity and relationship"

However, in implementing LMS to manage online courses, the institutions face some challenges which include the issue of cost. As a result, some institutions opt for the free and open source LMS that are equally efficient in its functions (Aydin and Tirkes, 2010). The open source software (OSS) have the flexibility to redesign the source code to increase quality and user assurance, to create space for innovative design and development, to make updates that echoes the needs of the user and to give a higher level and control of native security features which is not permissible with some commercial software (Okmen, 2008; Aydin and Tirkes, 2010).

3. Methodology

The mixed method approach was applied in this research. The use of mixed research for this study is justified based on Cooper and Schindler's work (2011) as it increases the perceived quality of the research, especially when the qualitative study follows the quantitative and provides a validation for the findings. Again, the researcher made use of the survey research since the study involved a large population and covered a geographically dispersed population. The general population for this study comprised the categories of the universities in Ghana: public and private. Out of these, the researcher purposively selected one from each category of university to represent the specific population for this study. From each university, the researcher used the stratified sampling technique to divide the population into two strata, which consisted of staff (strata 1) and students (strata 2). Purposive sampling was adopted at this stage to select staff and students. From each university, twenty (20) staff were selected: 15 lecturers, 1 registry staff, 1 librarian, 1 quality assurance officer and 2 ICT personnel). In addition, the students strata/sample consist of (thirty)

30 students from each university.

The main data sources for this study were from both primary and secondary sources. Questionnaire (consisting of both closed and open-ended questions) was used to collect primary data. Secondary data was collected from libraries, journals and databases. Data analysis went through two main stages. The first stage was the data preparation which involved organising, piling up, typing field-notes and recordings, and sorting the data. The second component was the analysis itself where the researcher analysed the data by coding the refined (prepared) data and made it ready for analysis. The SPSS was employed at this stage of the analysis.

4. Presentation of Findings

4.1. Demography of Respondents

Table 1: Demography of Respondents

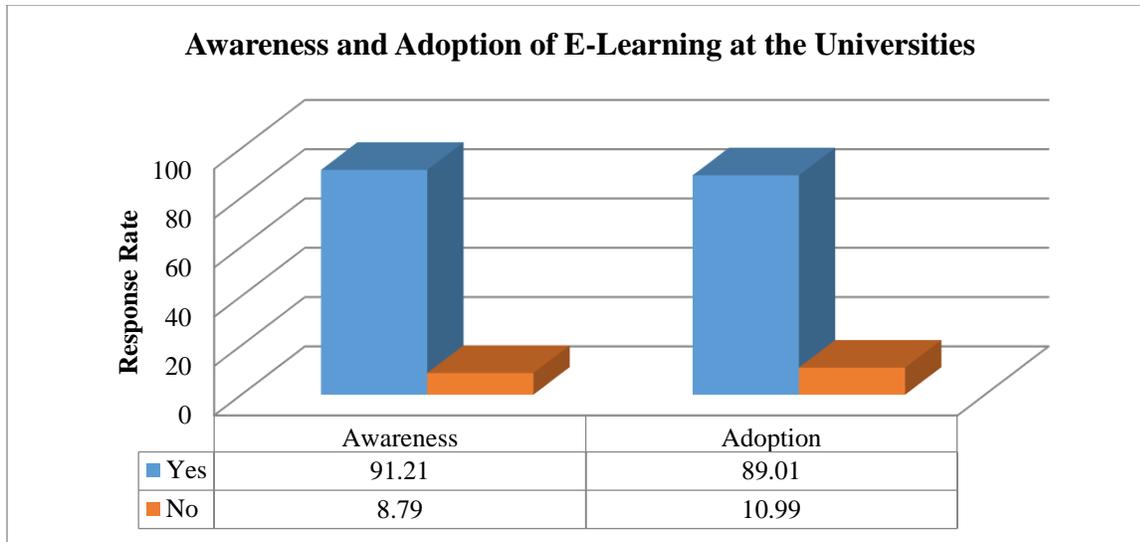
	Public University		Private University		NET	
	Sample	Responses (%)	Sample	Responses (%)	Sample	Responses (%)
Students	30	26 (86.67%)	30	28 (93.33%)	60	54 (90%)
Lecturers	15	13 (86.67%)	15	14 (93.33%)	30	27 (90%)
Registry Staff	1	1 (100%)	1	1 (100%)	2	2 (100%)
Librarians	1	1 (100%)	1	1 (100%)	2	2 (100%)
Quality Assurance	1	1 (100%)	1	1 (100%)	2	2 (100%)
ICT Personnel	2	2 (100%)	2	2 (100%)	4	4 (100%)
Total	50	44 (88%)	50	47 (94%)	100	91 (91%)

Source: Field data, 2017

From the above table, out of the 100 questionnaires distributed, the researcher was able to retrieve 91 representing 91% response rate. Out of the 91 responses, 59.34% were students, 29.67% were lecturers, 2.2% were registry staff, 2.2% were librarians, 2.2% were quality assurance officer and 4.4% were ICT personnel.

4.2. Familiarity and Adoption of E-learning

The researcher aimed to find out whether the respondents were familiar with the existence and adoption of the e-learning systems in their universities. While 91.21% of the respondents said “Yes” (familiar with e-learning systems in their universities), 8.79% said “No”. Again, 89.01% of the respondents said e-learning systems were adopted and used at the universities and 10.99% responded negatively (No). These results showed that the awareness and adoption of the e-learning systems at the universities were very high. The responses are reflected in figure below.



Source: Field data, 2017

4.3. Types of e-learning systems adopted/used at the universities

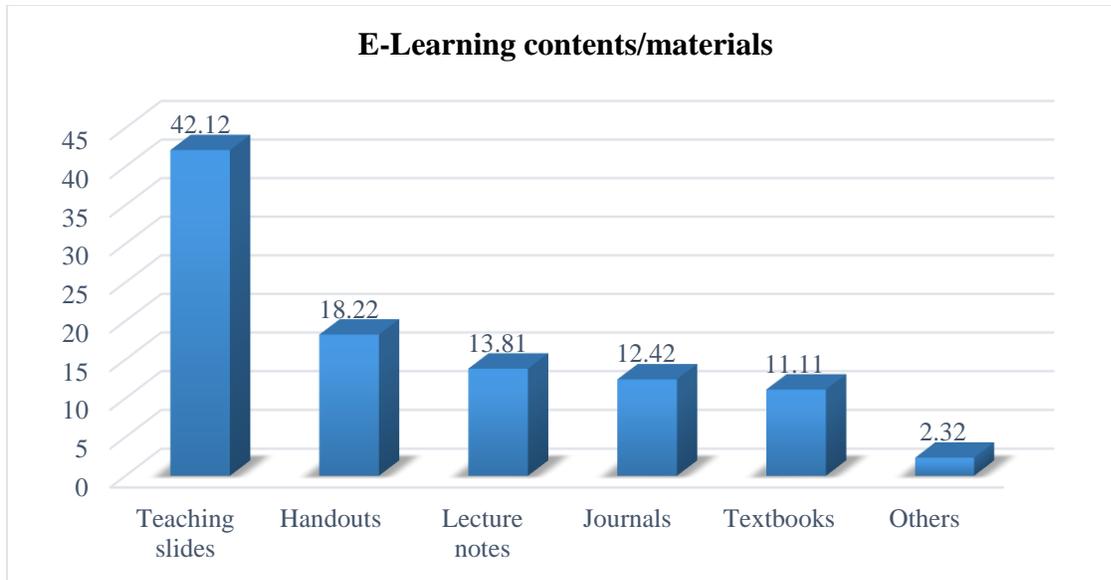
For the question of what type of e-learning systems adopted and used at the universities, 16% of the respondents said it’s a commercial system (CS), 17% said it’s an open sources system (OSS), 26% said it’s a learning management system (LMS), 30% said it’s a course management system (CMS) and 11% mentioned other types of e-learning systems.

Those who indicated the other option, there were again asked to mention or specifically state the type of other e-learning systems. They mentioned Blogs; CD/DVD/VDC; Computer/laptop; Dropbox; electronic database; electronic journals; Internet and Web courses; electronic library; e-mail; Online registration systems; Online sharing of materials among students; PowerPoint presentation; Search engine; Slide share; SMS; Tele-conferencing; Turnitin; Web 2.0; WhatsApp; Wiki and Moodle learning system.

These responses showed that the CMS was the most adopted and used e-learning system at the universities, followed by the LMS, OSS and CS respectively. The results also indicate that most of the other e-learning systems mentioned by the respondents are OSS.

4.4. Adequacy and relevance of contents or materials in the E-Learning system

This section sought to establish whether the e-learning systems contained adequate and relevant contents or teaching materials to support teaching and learning at the universities. 66.67% of the respondents said “Yes” (the materials were adequate and relevant to support teaching and learning at the universities) while 33.33% responded negatively. It was further established that the main materials available in the e-learning systems included: teaching slides (42.12%), hand-outs (18.22%), lecture notes (13.81%), journals (12.42), textbooks (11.11%), and others (2.32%).



Source: Field data, 2017

4.5. Technology to Support E-Learning

This section looked at whether there were adequate technology and infrastructure to support the e-learning systems at the universities. The responses showed that while 52.75% of the respondents said there were adequate technology and infrastructure to support the e-learning systems at the universities, 47.25% responded negatively.

The respondents were further asked to indicate the various facilities or technologies available to support the e-learning at the universities. The respondents mentioned the following:

- ICT hardware infrastructure
- Computers and computer laboratories
- internet facilities with good bandwidth
- computer servers and dedicated servers

4.1. Impact of E-Learning on the Universities

To ascertain whether it was advantageous for the universities to have e-learning system, the question was asked if the e-learning system has enhanced teaching and learning. To this question, 79.12% responded positively (the e-learning systems have enhance teaching and learning at the universities) whiles 20.88% responses were negative. Furthermore, views outlined by respondents on the advantages of the e-learning systems include:

- It removes geographical barriers as the e-learning system does not require physical attendance of lectures by students or lecturers
- Courses and slides are available 24 hours daily
- Easy access and download of course materials at any time
- Effective collaboration and learning among students

- It provide computer and literacy and internet skills for both students and lecturers
- Facilitates quick and effective information sharing and dissemination
- Promotes effective and better collaborative learning among students and among technological tools
- Materials/information can be updated, re-used and modified for new class or batch of students
- It promotes greater students and lecturer contact.

4.2.Challenges of E-Learning

Despite the benefits derived from the implementation and usage of e-learning systems at the universities, quite an appreciable respondents, 58.24% agreed that the universities had some challenges in the implementation and usage of the e-learning system. Views gathered from the respondents indicated the following:

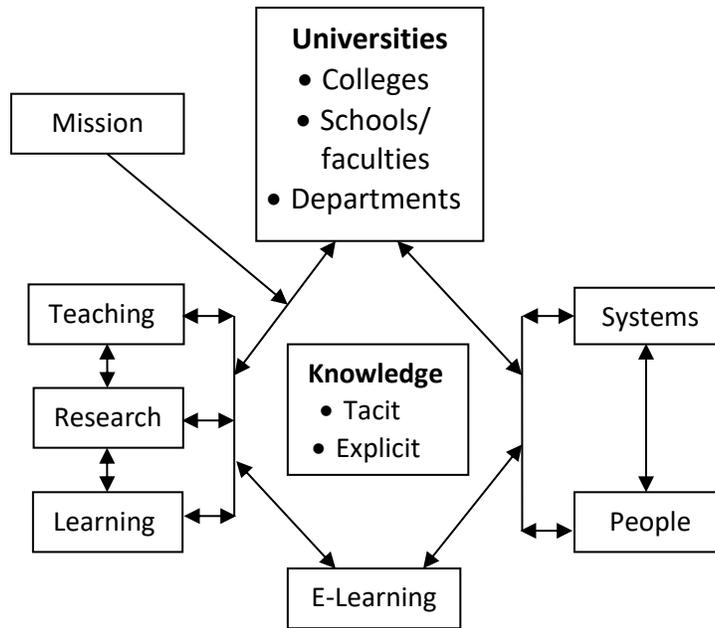
- Limited bandwidth
- Inadequate computers and other ICT infrastructures
- Low appreciation for e-learning by faculty members
- Limited support and motivation (orientation, training, funds etc) for faculty members to encourage and facilitate e-learning
- Limited skilled labour and support staff to manage the e-learning systems
- High cost of accessing e-learning (course/contents/materials) by none-residents (staff and students living outside campus)

The respondents were asked to outline some suggestions to improve on the e-learning systems at the universities. The following were their suggestions

- Increase the internet bandwidth on the campuses to facilitate easy access and usage of the e-learning system and their content.
- Provide adequate and functioning computers at the computer laboratories for use by both students and staff (teaching and non-teaching)
- Organise training and workshops for the students and lecturers on the usage and benefits of the e-learning systems
- Persuade and motivate both lecturers and students to use the e-learning system
- Implement incentive and reward schemes for the users of the system
- Provide adequate support staff (ICT staff) for e-learning training and management
- Provide adequate infrastructure to support the deployment and usage of the e-learning system
- The government through the Ministry of Education and the National Accreditation Board should provide support services to promote e-learning at the universities

4.3.Proposed Model for E-Learning in Universities

Based on the findings from the study, the researcher proposed a model/framework that could be adopted and used for e-learning (teaching, research, learning and innovation) in universities. This framework identifies some basic elements: university (colleges, schools and department); e-learning; mission of the university; teaching, research and learning; systems and people; and knowledge.



In this framework, the researcher proposes an integration and linkages between the all the identified element. Central to these is the knowledge which is the core ingredient of any e-learning system in universities. In addition, the teaching, learning and research activities in any university is all about knowledge (tacit and explicit). Finally, the e-learning for teaching, research and learning in universities are facilitated by systems (technology and infrastructure) and people (staff and students) for knowledge gathering, creation, usage, storage, and dissemination.

5. Conclusion

This study sought to assess the implementation and adoption of e-learning systems in universities. A high response rate (91%) was achieved. The awareness of the e-learning systems and their adoption/usage at the universities were very high. The course management system was the most adopted and used e-learning system at the universities, followed by the learning management system, open source system and commercial system respectively. Other open source e-learning systems adopted and used were Blogs; CD/DVD/VDC; computer/laptop; Dropbox; electronic database; electronic journals among others. Also, the study again established that the contents of the e-learning systems were adequate and relevant to support teaching and learning at the universities. The main contents in the e-learning systems include: teaching slides, handouts, lecture notes, journals and textbooks.

There were adequate technology and infrastructure such as ICT hardware and infrastructure; Computer laboratories; internet facilities; and servers to support the e-learning systems at the universities. The e-learning systems have benefited and enhanced teaching and learning at the universities (it removed geographical barriers; courses and slides were available 24 hours daily; easy access and download of course materials at any time; ease of use, reuse and modification of materials for new class; effective collaboration and learning among students among others).

Despite the benefits derived from the implementation and usage of e-learning systems at the universities, quite an appreciable respondents, 58.24% agreed that the universities had some challenges in the implementation and usage of the e-learning systems. The challenges range from limited bandwidth; inadequate computers and other ICT infrastructures; low appreciation for e-learning by faculty members; limited support and motivation for faculty members to encourage and facilitate e-learning; limited skilled labor and support staff to manage the e-learning systems; high cost of accessing e-learning (course/contents/materials) by non-residents (staff and students living outside campus). However, these challenges can be solved by measures such as increasing the internet bandwidth; providing adequate and functioning computers at the computer laboratories, motivating both lecturers and students to use the e-learning system; and providing adequate infrastructure to support the deployment and usage of the e-learning.

6. Recommendations

Based on the findings, the researcher recommends that the universities should:

1. Comprehensively invest in technological infrastructure that supports e-learning.
2. Establish strategy on financing, management and usage of e-learning systems
3. Institute awareness, training and reward system for the staff (teaching and non-teaching) and students on the usage of e-learning

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