Investigating a Student Focused e-Learning System in Higher Education: A Case Study of Diploma Students

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ABSTRACT

Universiti Teknologi MARA (UiTM) has incorporated a Learning Management System (LMS), known as i-Learn, with cloud computing facilities for distribution of course contents, communication, collaboration, content management and assessments. Some studies have found that some learning management systems have followed a static and predefined representation of knowledge with the view to getting the right information to the right person. As a result, these e-learning systems are not being fully utilized. Many studies have suggested the failure of e-learning can be prevented if an e-learning system can accommodate student expectations of e-learning. In this study, a survey was conducted to investigate diploma level students' usage of e-learning technologies and also to determine web services used by the students in their various learning activities. Based on the questionnaires distributed to 112 diploma students at three campuses of a public university, it was found that students did use technologies extensively and they also utilized the i-learn portal and various web services in completing their learning activities. Based on the findings, researchers have proposed a student focused e-learning system that provides a Personal Learning Environment (PLE) that supports e-learning. It is suggested that a personalized e-learning environment should blend the web services that support e-learning in a hybrid cloud computing environment due to components and resources that can be freely accessed through cloud computing apps with the highest personalization. With the implementation of a hybrid cloud, the administrator would be able to control and maintain the infrastructure of the LMS.

Keywords: e-Learning, hybrid cloud, personalization, web services

INTRODUCTION

Many higher education institutions have set up e-learning systems which provide students with online access and learning content. The rapid development of cloud computing has enabled certain e-learning systems to incorporate cloud computing facilities. This integration of cloud computing and e-learning has enabled convenient usage of the e-learning system. Universiti Teknologi Mara (UiTM) has adopted the same practice where students are able to experience new technologies through the use of the web based learning management system called *i-learn* which is a comprehensive system allowing for access to course contents, communication, collaboration, content management and assessments.

One drawback of some current learning management systems (LMSs) is that the approaches have followed a static and predefined representation of knowledge with the view to getting the right information to the right person at the right time (Chatti et al., 2007; Sclater, 2008). Within those systems, experts create and identify what is most valuable and continually renew, validate and revamp the content offered in the system. As a result of the static implementation of LMSs, e-learning systems are not being fully utilized by students. Many studies (Leem & Lim, 2007; Liu, 2010) have suggested that the failure of e-learning can be prevented if e-learning designers carefully determine what students expect from e-learning. E-learning designers should be aware that learning should focus on the user, not the institution or the course (Attwell, 2007; Selviandro & Hasibuan, 2013) and design the content accordingly.

The purpose of this study is to investigate a student focused e-learning system for diploma students. Firstly, this report will determine the student usage of digital technologies during their studies at the diploma level. A survey was conducted to investigate students' level of usage of e-learning technologies at diploma level. The survey was also used to determine web services used by the students which include both *i-learn* and open access Internet services. Based on the above findings, researchers aimed to propose a student focused e-learning system that provides a personalized learning environment for the students.

LITERATURE REVIEW

Ferrer and Alfonso (2011) have defined e-learning as the use of the Internet to access learning resources and contents, as well as interact with instructors and other learners in order to obtain support during the learning process, with the aim of acquiring knowledge, constructing personal meaning and growing from the learning experience. Many existing LMSs have limited capabilities because they lack reusability, portability and interoperability (Kalagiakos & Karampelas, 2011). Integration of e-learning and cloud computing is one solution which can provide a platform to encourage lifelong learning for students. Cloud computing has many benefits for e-learning in particular and education in general by providing the platform for virtualization, centralized data storage and educational services (Ghazizadeh, 2012; Kalagiakos & Karampelas, 2011; Mokhtar et al., 2013). Cloud computing refers to both applications delivered as a service over the Internet as well as hardware and system software in the data centers that provide those services (Armbrust et al., 2010). Some benefits of cloud computing in e-learning are flexible and scalable infrastructure, increased mobility in the global workforce and reducing implementation concerns (Ghazizadeh, 2012).

Most LMSs provide users with content distribution and communication facilities to interact with instructors and other learners. Cloud computing is a consolidation of multiple relatively low cost calculation entities which are integrated into a strong web system of powerful computing capability (Wang & Xing, 2011). The *i-learn* system at UiTM can be considered a private cloud computing, built by one client and which provides data security and quality of service (Aljenaa et al., 2011; Ghazizadeh, 2012). There are many services available through *i-learn* such as accessing learning content (ie. downloading and reviewing course material), communication between students and lecturers (ie. public announcements and forums), data management (ie. storage through *mydrawer*), assessment (ie. online quizzes and tests) and evaluation (ie. student evaluation as well as entrance and exit surveys). With the development of online services that support e-learning, it is important to not only use web services from a private LMS but to include components and resources that can be freely accessed through most cloud computing apps with some degree of personalization. Some of the significant milestones in public cloud computing applications that could benefit e-learning are search engines (1993), e-mail services (1996), online

messaging services (1995), social networks (2007) and online software (2006) (Mokhtar et al., 2013).

An LMS has become an essential platform to monitor the progress and data management of users and, at the same time, support the learning process within an organization. Aljenaa et al. (2011) suggested that the learning sector should adopt a private cloud for monitoring which should also be able to host e-learning programs/apps of public cloud implementation within its system to motivate e-learning. Within a private cloud computing environment, services provided to users are constrained by the control of the administrator. With the current development of web technologies that support e-learning, a public cloud environment is another component needed to support e-learning within an organization (Selviandro & Hasibuan, 2013). The combination of private and public cloud computing produces a hybrid cloud. Within a hybrid cloud, the availability of a modern and responsive e-learning system could support a personalized learning environment for students.

Personal Learning Environment (PLE) supports independent learning that incorporates the largest collections of tools under the control of an individual (Leem & Lim, 2007; Wilson, 2008). As stated by Wilson (2008), PLE employs a variety of tools and web services such as chat messaging, groupware, calendaring, scheduling, blogging, social software and collaborative tools. A PLE can maintain student individualities and differences according to personal preferences selected from a variety of tools and web services (Mavromoustakos & Papanikolaou, 2010). Conde et al. (2013) have stated that the future of e-learning is dependent on the implementation of PLE with tools or web services that support customization. Some of the learning activities within a PLE, as suggested by Hamid et al. (2015) and Mavromoustakos and Papanikolaou (2010) are communication between friends and with lecturers, as well as obtaining and sharing information and collaborating on tasks. Ritter and Lemke (2000) have suggested that a learning principle that requires prompt feedback for Internet-enhanced education is vital for students to do evaluation or exercises online.

METHODOLOGY

This quantitative study involved 112 diploma students from Seremban, Kuala Pilah and Jasin Campuses of UiTM, a Malaysian public university. The students were given a set of questionnaire to determine the level of usage of technologies and identify the technologies used for learning activities such as communication with friends, communication with lecturers, obtaining information, doing collaborative tasks (with friends) and doing exercises or evaluation. To determine the level of usage of technologies for the learning activities, students were asked to rate items indicating the level of usage according to the following scale: 0 – never, 1 – a little, 2 – moderately and 3 – a lot. To determine the technologies used by students for the stated learning activities, students were given a list of different web services that support the stated learning activities where they could select more than one service used or add other services if applicable. Table 1 shows the twenty different types of web services used by students based on the stated learning activities.

Table 1: List of Web Services Used by Students for Different Learning Activities

Table 1. List of web sevices used by students for different type of learning activities

No.	Web Services or Apps	Learning Activities				
		Comm. with friends	Comm. with lecturers	Obtaining information	Doing collaborative tasks (with friends)	Doing exercises or evaluations
1.	*i-learn*	X	X	X	X	X
2.	Facebook	X	X		X	
3.	Whatsapp	X	X		X	
4.	gmail	X	X			
5.	Yahoo mail	X	X			
6.	twitter	X	X	X	X	
7.	Instagram	X	X	X		
8.	Blog	X	X	X		X
9.	sms	X	X			
10.	wechat	X				
11.	Blendspace		X		X	X
12.	Wikipedia			X	X	
13.	youtube			X		
14	Google search			X		
15.	Yahoo search			X		
16.	Slideshare			X		
17.	Google drive				X	
18	Dropbox				X	
19.	Online forum				X	
20.	Google forms					X

DATA ANALYSIS

Based on the set of items to determine the level of usage of technologies for their studies, it was found that students did use technologies for the five stated learning activities. On the average, students used technologies at a moderate level. Figure 1 shows the comparison of level of usage for the different learning activities, where it can be seen that students mostly used technologies for *gathering information* with a scale value of 2.61 and *communicating with students (their friends)* with a scale value of 2.53.
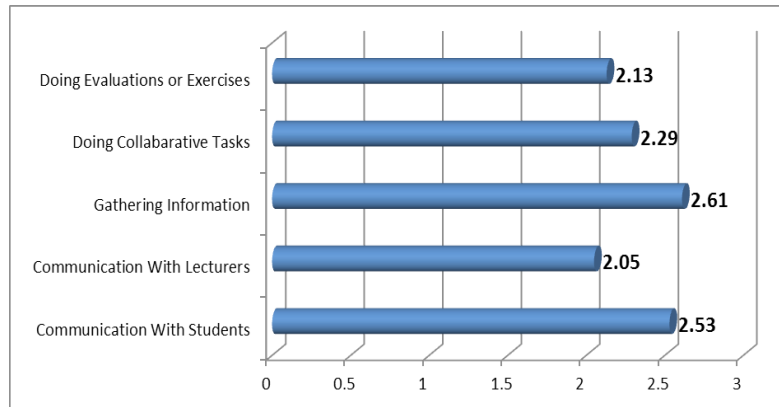
Figure 1: Level of Usage of Learning Activities

Table 1 above shows 10 different web services that support learning activities for communication with friends. The five web services most often used by the students are shown in Figure 2. 106 (out of 112) students used *Whatsapp* to communicate with their friends, whereas only 49 students used the *i-learn* system to communicate with their friends. The other web service frequently used by students is *Facebook*. The comparison of the number of students for the five different web services most often used by students to communicate with their friends is shown in Figure 2.
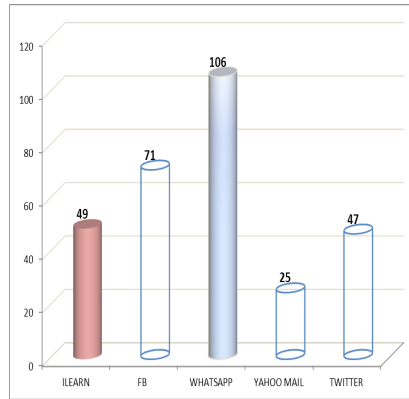
Figure 2: The Five Web Services Mostly Used for Communication With Friends

Table 1 shows that students used various web services to communicate with lecturers. It was found that students mostly used *Whatsapp* to communicate with lecturers. At the same time, students also used *i-learn*, *Faceboook*, *Yahoo mail* and *gmail* to communicate with lecturers. The comparison of the number of students using different services to communicate with lecturers is shown in Figure 3 which highlights that out of 112 students, 94 used *Whatsapp* and 83 used *i-learn* to communicate with lecturers.
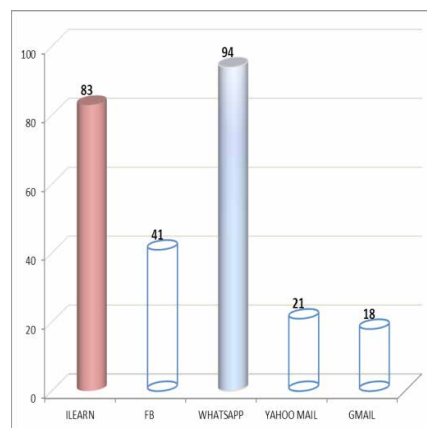

Figure 3: The Five Web Services Mostly Used for Communication With Lecturers

7

For *obtaining information*, it was found that students used a variety of web services. Some web services mostly used by students are *i-learn*, *Wikipedia*, *YouTube*, *Google search* and *Slideshare*. More than 50% (>56 students) of students used the stated web services to obtain information during their learning activity as shown in Figure 4 below.
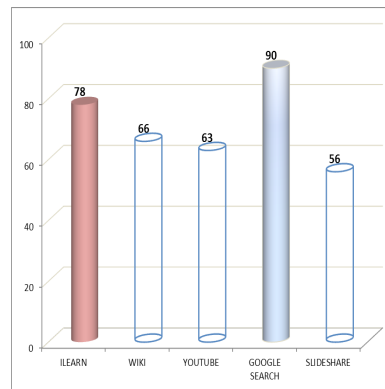

Figure 4: Five Web Services Mostly Used for Obtaining Information

For *doing collaborative tasks* with friends, the comparison of the five web services revealed that *i-learn* was the most frequently used service for this learning activity while *Facebook* was the second most often used. The breakdown of other web services used by number of students is shown in Figure 5.
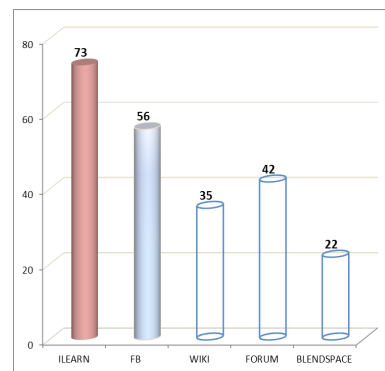

Figure 5: The Five Web Services Mostly Used for Doing Collaborative Tasks (With Friends)

Out of 112 students, 100 used *i-learn* to do exercises or evaluations. The other selected web services used by students for this learning activity were the *Google forms*, *Blendspace* and *Blog*. The breakdown of the number of students for each web service is shown in Figure 6.
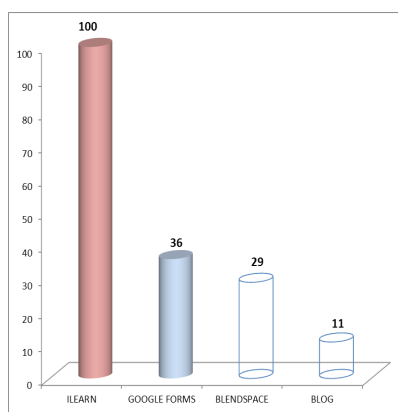

Figure 6: The Four Web Services Mostly Used for Doing Exercises or Evaluations

FINDINGS AND RESULTS

It can be concluded that students in this study used a variety of web services to complete different types of learning activities such as communicating with friends, communicating with lecturers, obtaining information, doing collaborative tasks (with friends) and doing exercises or evaluations. The preferred web services varied according to the necessity of different learning activities. The summarized data for the top three ranking of web services and its corresponding number of students for each learning activity are shown in Table 2 below.

Table 2: Ranking of the Three Most Often Used Services and the Corresponding Number of Students for Different Learning Activities

No.	Learning activities	Ranking of web services and its number of students		
		No. 1	No. 2	No. 3
1.	Comm. with friends	Whatsapp (106)	Facebook (71)	*i-learn* (49)
2.	Comm. with lecturers	Whatsapp (94)	*i-learn* (83)	Facebook (41)
3.	Obtaining information	Google search (90)	*i-learn* (78)	Wikipedia (66)
4.	Doing collaborative tasks (with friends)	*i-learn* (73)	Facebook (56)	Online forum (42)
5.	Doing exercises or evaluations	*i-learn* (100)	Google forms (36)	Blendspace (29)

The *i-learn* portal which is the official LMS for e-learning in UiTM remains an important component for e-learning of diploma level students. The *i-learn* is considered a private cloud computing which allows for distributing of course content, communication, collaboration, content management and assessment. But, at the same time, web services provided through the Internet are also important components of the students' e-learning. The web services such as the *Whatsapp*, *Facebook*, *Google search*, *Google forms* and *Blendspace* are some of services provided through a public cloud computing environment. It can be concluded that a hybrid cloud computing should be one of the methods to support a Personal Learning Environment (PLE) for diploma students. Within a hybrid cloud computing, students are able to use a variety of web services which cater for personalized preferences of services for e-learning.

RECOMMENDATIONS

Hybrid cloud is a mix of two or more types of cloud computing (Armbrust et al., 2010; Ghazizadeh, 2012). Based on the findings of this study, it is recommended that *i-learn* should be implemented as a hybrid cloud computing which combines web services from both private and public clouds. Organizations adopt hybrid cloud computing when the capacity of the organizational infrastructure is inadequate and needs to expand to meet its business requirements (Aljenaa et al., 2011; Mokhtar et al., 2013). This study reveals that a hybrid cloud computing is needed since most students were found to be using the web services available from the Internet, while at the same time, using the services provided by the *i-learn* system. By creating a hybrid cloud computing platform, students are able to select and use multiple web services based on their own preferences. This situation

10

is best described as a Personal Learning Environment (PLE) since each student would have their own preferences of web services to complete different learning activities.

As stated by Mohd and Shahbodin (2013), a PLE would facilitate students to take charge of their learning processes via a selection of tools and resources which, in turn, will help students learn better. The PLE would also facilitate individual learning time and space where students are able to develop and share the ideas which link distant resources and contexts. (Attwell, 2007; Ghazizadeh, 2012;Jafari Navimipour &Zareie, 2015). A hybrid cloud computing for e-learning can benefit students because students still need some guidance to become effective self-regulated learners (Dabbagh & Kitsantas, 2012). The LMS administrator would be able to implement and control its content by hosting external web services where the features of the external web service could be customized for security levels, content, searches, and access (Ghazizadeh, 2012).

CONCLUSION

Learning is a social activity involving communication, communication formation, information exchange and resource sharing between teachers and students (Mavromoustakos & Papanikolaou, 2010). This study is aimed at recommending a student focused e-learning system for diploma students which is based on the creation of a personal learning environment (PLE) within a hybrid cloud computing environment. This system is able to support e-learning for students which would enable them to access web services both from *i-learn* and the Internet platform. One advantage of implementation of PLE within a hybrid cloud computing is that the administrator of the LMS is able to control and maintain the infrastructure of the existing LMS. In the future, this method can also support any new policy regulation of e-learning within the organization. LMS with hybrid cloud implementation is the way forward to promote self-learning for students and self-administering for the *i-learn* system.

REFERENCES

Aljenaa, E., Al-Anzi , F. S., & Alshayeji, M. (2011). Towards An Efficient E-Learning System Based On Cloud Computing. In *2011 2nd Kuwait Conference on e-Services and e-Systems (KCESS),* 13. http://doi.org/10.1145/2107556.2107569

Armbrust, M., Fox,A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., Lee,G., Patterson, D., Rabkin, A., Stoica, I. & Zaharia, M. (2010). A View Of Cloud Computing. *Communications of the ACM 53*, 50-58. http://doi.org/10.1145/1721654.1721672

Attwell, G. (2007). Personal Learning Environments - The Future Of Elearning ? *Lifelong Learning,* 2(January), 1–8. http://doi.org/10.1080/19415257.2011.643130

Chatti, M.A., Jarke, M. & Frosch-Wilke, D. (2007) The Future of e-learning: A Shift To Knowledge Networking And Social Software. *International Journal of Knowledge and Learning,* 3(4/5), pp.404-420. http://doi.org/10.1504/IJKL.2007.016702

Conde, M. Á., García-peñalvo, F. J., Casany, M. J., & Forment, M. A. (2013). Personal Learning Environments and the Integration with Learning Management Systems. In M. D. Lytras, D. Ruan, R. D. Tennyson, P. O. De Pablos, F. J. García Peñalvo, & L. Rusu (Eds.), *Information Systems, E-learning, and Knowledge Management Research,* 278, 16–21. Springer Berlin Heidelberg. http://doi.org/10.1007/978-3-642-35879-1_3

Dabbagh, N., & Kitsantas, A. (2012). Personal Learning Environments, Social Media, And Self-Regulated Learning: A Natural Formula For Connecting Formal And Informal Learning. *Internet and Higher Education,* 15(1), 3–8. http://doi.org/10.1016/j.iheduc.2011.06.002

Ferrer, N.F. & Alfonso, J.M. (2011). Content Management For E-Learning. *Content Management for E-Learning,*1-215

Ghazizadeh, A. (2012). Cloud Computing Benefits And Architecture In E-Learning.*In2012 17th IEEE International Conference on Wireless, Mobile and Ubiquitous Technology in Education (WMUTE)*, 199-201. http:// do.org/10.1109/WMUTE.2012.46

Hamid, S., Waycott, J., Kurnia, S., & Chang, S. (2015). Understanding Students' Perceptions On The Benefits Of Online Social Networking Use For Teaching And Learning.*The Internet and Higher Education*, 26, 1–9. http://doi.org/10.1016/j.iheduc.2015.02.004

Jafari Navimipour, N., & Zareie, B. (2015). A Model For Assessing The Impact Of E-Learning Systems On Employees' Satisfaction. *Computers in Human Behavior,* 53, 475-485. http://doi.org/10.1016/j.chb.2015.07.026

Kalagiakos, P. & Karampelas, P. (2011). Cloud Computing Learning. *In2011 5th International Conference on Application of Information and Communication Technologies (AICT),* 1(4), 12-14. http://doi.org/10.1109/ICAICT.2011.6110925

Leem, J., & Lim, B. (2007). The Current Status Of E-Learning And Strategies To Enhance Educational Competitiveness.*Korean Higher Education,* 8(1).

Liu, C.-H. L. C.-H. (2010). The Comparison Of Learning Effectiveness Between Traditional Face-To-Face Learning And E-Learning Among Goal-Oriented Users. *In 6th International Conference on Digital Content, Multimedia Technology and Its Applications (IDC)*, 255–260.

Mokhtar, S. A., Ali, S. H. S., Al-Sharafi, A., & Aborujilah, A. (2013). Cloud Computing In Academic Institutions.*In2013 7th International Conference on Ubiquitous Information Management and Communication (ICUIMC),* 1–7. http://doi.org/10.1145/2448556.2448558

Mohd, C.K.N.C.K. & Shahbodin, F. (2013). Personalized Learning Environment (PLE): Need Analysis In Malaysian's Secondary School. *In2013 IEEE Conference on e-Learning, e-Management and e-Services (IC3e),* 79-82.http://doi.org/10.1109/IC3e.2013.6735970

13

Mavromoustakos, S. & Papanikolaou, K. (2010) E-learning Engineering In The Web 2.0 Era. *In 2010 2nd International Conference onEducation Technology and Computer (ICETC),* 3, 534-538. http://doi.org/ 10.1109/ ICETC.2010.5529483

Ritter, M. E., & Lemke, K. A. (2000). Addressing The 'Seven Principles For Good Practice In Undergraduate Education' With Internet-Enhanced Education. *Journal of Geography in Higher Education,* 24(1), 100-108.

Sclater, N. (2008). Web 2 . 0 , Personal Learning Environments , And The Future Of Learning Management Systems.*EDUCAUSEResearch Bulletin,* 13, 1–13. http://net.educause.edu/ir/library/pdf/ERB0813.pdf

Selviandro, N. & Hasibuan, Z.A. (2013). Cloud-Based E-Learning: A Proposed Model And Benefits By Using E-Learning Based On Cloud Computing For Educational Institution. In K. Mustofa, E.J. Neuhold, A.M. Tjoa, E. Weippl and I. You (Eds.), *Information and Comm. Technology,* 192-201. Berlin: Springer.

Wang, B., & Xing, H. (2011). The Application Of Cloud Computing In Education Informatization. *In2011 International Conference on Computer Science and Service System,*2673–2676. http://doi. org/10.1109/CSSS.2011.5973921

Wilson, S. (2008). Patterns Of Personal Learning Environments. *Interactive Learning Environments*, 16(1), 17-34.http://doi.org/10.1080/1049482 0701772660