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Research paper

Learners' Perspective on Critical Factors to Cloud VLE Success: an Empirical Investigation

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Abstract

The use of Virtual Learning Environment (VLE) in academic institutions is becoming an imperative for many institutions. The growth of the advanced education system now is depending on the increased of Virtual Learning Environment (VLE) technology utilization. Education institution communities are encouraged to adopt a variety of VLE technology to support the process of teaching and learning. The objective of this research is to measure perspective of VLE acceptance among lecturers in the context of Moodle application by using data from 541 lecturers at selected Higher Education Institutions. A framework of research constructed based on a comprehensive study on the theory of service quality and the Technology Acceptance Model (TAM). Eight factors hypothesized which consist of five independent variables; organization support, knowledge support, technical assistance, system characteristics and lecturer style and innovation, two belief variables; perceived usefulness and perceived ease of use and one dependent variable; behavioral intention to use the VLE. All the factors were tested to determine whether they are important in influencing future use of the VLE and statistical analysis methods determined the key driving factors. Results of regression analysis showed that university lecturers have an above average level of VLE acceptance with the very high level of significant value.

Keywords: *Technology Acceptance Model; MOODLE; Success Factor*

1. Introduction

In recent years, there has been an increment of interest in the technology of education system named Virtual Learning Environment (VLE) supporting by cloud technology. The term of VLE, LMS, e-learning, learning portal, web-based learning, online learning, and distance learning is widely used alternately. It is an increasingly important part of educational systems in higher education industry. VLE application is Learning System which is defined as a web-based online system with a database that could help lecturers in getting resources on the web for students needs and also can facilitate all activities/ tasks related to the subjects. In general, technology is a supportable tool to make it possible to create, store, and share information for future use in the workplace (1,2). The technology of VLE is a new pattern of the education system, and many types of research have investigated the various factors that influence users' attitudes towards a VLE utilization. Presently, many of Higher Educational Institutions (HEI) are now promoting innovative online platforms services, growing their educational services anywhere, anytime and transforming their traditional class with online educational tools. Innovations from traditional offline job to online program are increased by both profit and non-profit institution.

The benefit of VLE are more economical and ability to increase the effective learning by providing high-quality teaching services. Not only private but also governmental institution has been forced to use Information System (IS) for various purposes at their institution (3). The tool of VLE used as a medium to enhance and supports the teaching and learning in education, and it has become increasingly important in higher educations and schools. As claimed by researchers in (4), VLE substitutes ICT learning which is the term that general expression for all learning involving the use of communication and network technologies to support both teaching and learning the process. VLE has been used as the basis of all term for any form of learning that delivered electronically. It is an online web-based teaching program that control/ monitor the properties and resources to create a great learning situation (5).

1.1. Open Source Mashup: MOODLE Doc Application Page Layout

There are a lot of VLE systems available such as Web Board, WebCT, Blackboard, Moodle, and Sakai. Several learning management systems (VLE) commercially available on the market such as Blackboard, WebCT, and Desire, while there are also many, open-source or free VLE application, such as Moodle, Coursework, Author, and Interact. Moodle is one of the standard open source systems for online learning and usage of information technologies (6). Moodle application is an open source application for Learning Management System, is also known as a Virtual Learning Environment (VLE), Web-based Management system or Course Management System. It has become a common system that is very popular among instructors around the generating online mashup portal.

Moodle Doc was an acronym for Modular Object-Oriented Dynamic Learning Environment supported by cloud computing, which is a popular open-source course management system (Moodle.org) and most useful to programs and education theorists. It not only provides freeware learning system, but Moodle was also

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able to make the learning process more innovative, flexible, and attractive. Many numbers of colleges and universities fully use of VLE platform in their learning process, while others uses it to add on to the existing face-to-face courses. This technology platform is very good and beneficial for education services and this application allows the instructor to manage and monitor all the features of the course. This paper tries to provide suitable information for education organizations which need to make an improvement on VLE system in the context of Moodle application based on acceptance factor constructed. This study is important for the institution to know which elements are significant to the organization and try to provide them. With the purposes to share and contribute the innovative network technology body of knowledge, this writing is structured as follows: the next section, a summary of the literature review of the concept of VLE and the benefit of it in teaching and learning process are discussed. In section three, the research model of VLE acceptance by users are stated followed by the details analysis and result. The last section concludes the paper with the discussion for future research of the study.

2. Literature Review

2.1. Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is one of the popular models used to integrate technology into educational settings (7) found that TAM is one of the widely used frameworks in Information System (IS) research. While (1), in their study were stressed that the acceptance of VLE by academicians is critical to the effective adoption of teaching and learning system in the workplace (1). Based on the theory of TAM, the acceptance VLE system can be measured by analyzing the usefulness and perceived ease of use (8). Recently (9), investigated the extent to which a person believes that using a particular technology will enhance the performance of their work. The elements can be recognized as the degree to which a person believes that using a particular system would be free of physical and mental energy. Perceived usefulness is the belief that if a person uses a particular technology, it will help improve work performance. People have high chances to take full advantage of the application when it is useful in completing their daily tasks. The perceives of usefulness valuable if the user's belief that technology will help the teaching process and easy to monitor over knowledge contents transaction process. The ease of used also depends on the real and internal motivations towards using technology.

The acceptance of technologies in education such as VLE refers to the ability of users to perform and handle the system (10). According to (11), there are many determinants of acceptance of technologies such as computer self-efficacy, computer skill training, personal use of computer technology, instructor's confidentiality and a positive attitude towards computer technology and knowledge and experience. All paragraphs must be justified alignment. With justified alignment, both sides of the paragraph are straight.

2.2. Users Acceptance of Virtual Learning Environment (VLE)

2.2.1. Organization Factors

Organizational factors which could affect the use of technology in teaching are technology knowledge training, policy, organizational motivation and technical support. According to (12), in the process of teaching and learning, support by managers is essential for trainers to accept and implement the learning system. So, It is necessary to encourage the use of online computer system in an educational environment. (13)) identified that two critical factors to inspire users to use information technology are motivation support from the management while Volery and in their related study, found that the lecturer, technology and experience of students as an important aspect to success in the online learning system.

Organization policy were key factors that play the important role to success in VLE implementation (14). In many cases, unsuccessful conversion of VLE occurs due to improper policies, organizational obstacles, infrastructure problems and financial reasons (7). Besides, Institution policymakers have a set of technology integration as the essential part of educational improvements while seeing instructors as the main driver of this process to bring technology into classrooms. Several researchers in their study also focus on several factors like management and development of business, such as business model, policies, regulations and market forces. Above statement supported by (15), that management support was ranked as a critical factor that influenced the use of teaching and learning technology application.

Knowledge Training: Based on research by (15), most of the instructors had little or no experience with online teaching environment. Thus, to succeed in this innovative technology, every instructor must have great understanding and skill toward online teaching. In fact, this author found that technical support such as training competencies, availability of knowledge and materials plays a major role in the acceptance of system and technology. Besides, the factors of sufficient users training, organization commitment, management support, sufficient training to engineers also contribute to the Institution's acceptance of technology of VLE (16)(17). Staff knowledge training/development time was key factors in the effectiveness of VLE utilization. This is according to research by Zakaria & Daud, as in (18), one of the problems identified by the instructors regarding the use of Moodle is the lack of training in using Moodle. Although there was an increment in the use of online learning, there have been limited discussions about how lecturers views and their reaction to the element of VLE especially in higher education institution in Malaysia.

Technical Support plays important roles in VLE implementation. A study by Gilakjani, in (11), highlighted that physical computer hardware, software, and technical assistance are important elements of this technology. The lack of material support, effective training, and planning for computer technology integration may affect negatively to the motivation of technology utilization. VLE administrators of HEI also should be careful on the high budget in technical strategy in the early planning stage (14). Failure in solid technical may occur due to poor accessibility of access point, slow on network communication in the workplace and lack of system software. Researchers from the previous study also use technical technology and network performance, such as location management, security, and roaming as a factor in technology adoption (19). Apart from technical support, factors such as an easy-to-use tool, VLE initiatives, adequate workforce, availability of information on the VLE portal and support from other departments are also taken into account in determining the acceptance of technology (16).

2.2.2. Technological Factor

System Characteristic refers to the quality of the VLE system implemented (20). According to the (21), the factor that influences users acceptance toward the technology is the technology itself to help and support the tasks. Others element of system characteristic are internet performance and inaccessibility to internet plays a major role to several states in lagging behind underdevelopment in term progression of the information technology. Technology support had been defined as "The Effort of providing the suitable infrastructure, the needed appliances, internet access and software for using the technology (22). The high quality of VLE services has been successfully developed because of the growth of telecommunications infrastructure globally with speed of Internet connection (1). Also, (23), in their study, implemented an extended model to measure the quality of service, information, and sys-

tem in influencing user acceptance and continuing the uses of a VLE system in Malaysian universities.

Information Quality refers to the supposed outcome formed by the VLE system. According to (22), in their research review, the characteristics of information quality include adequacy, timeliness, completeness, accuracy, understandability, sufficiency and content format. The information quality is important factors that affect user satisfaction in applying VLE. According to (14)), sometimes difficult for students to access learning materials in a place due to the physical limitations of computers.

2.2.3. User Attitude, Style and Innovative

The positive attitude of users was one of the factors of acceptance toward the technology (16) and lecturers attitude toward VLE utilization is another concern related to the acceptance of Learning Management System. Hence, the users' attitude is one of the elements that should be considered in the analysis of VLE acceptance also has a similar finding to confirm that the attitude of lecturers toward VLE have a positive effect the finding of VLE utilization. Moreover, Aypay et al., as in, (7) found that the lecturer's less of confidence level and lack of professional also contribute to the unsuccessful implementation of VLE. A positive attitude described the lecturer's teaching style and intention to use advanced tools in teaching and learning as a part of their self-innovation. These factors also were highlighted in the previous studies by Teo et al., in (24) who said that lecturers would be more willing to implement VLE when they want quality in their teaching.

Lecturer with interactive teaching style in manipulating the VLE contents is important for learning outcomes (20). The classification that proposed in teaching style is an expert, personal model, formal authority, and facilitator. Besides, individual innovativeness is recently stressed in the literature review. The context of information technology, innovative personal means that people's attitudes reflect a tendency to try and adopt new information technology application independently from the experiences of others; innovative people may be aware of the usefulness and ease of use of the new system faster than non-innovative.

To the author best knowledge and experience on previous studies of VLE acceptance, most previous studies only focused on the general context of VLE and only a few studies discussed in Moodle tool context. In a specific application of Moodle, most of the open literature on the areas was focused mainly on the student's perception, especially in individual country level. Very few studies have examined the combination three elements; application context (Moodle tools), user perspective (Lecturers) with applying Technology Acceptance Model (TAM) as conducted in this paper.

3. Research Model and Hypotheses

3.1. Research Model

Technology Acceptance Model (TAM) has been used by many different researchers as a ground theory of study. This model is focused on Information Technology, can be used to study fundamental and has the element of intention to use in future. In the previous study, TAM has been used once in the context of Moodle application and researchers believe that a comprehensive study is needed to assess the intent to use VLE by the present and future lecturers (1).

Based on TAM guidelines, this study proposed a model that consists of five independent variables, two credence variables, and one dependent variable. The five independent variables were system characteristics, user characteristics and three organization service quality constructs; organization support, knowledge support, and technical assistance. System characteristics are defined as the degree to which lecturer concerned, supportive, self-technology innovative and accommodating themselves to students. These elements also involved the lecturer pattern and style to meet the latest technology in teaching and to learn to fulfill the student needs. System characteristic is defined as the degree to which learning materials and tools are suitable for VLE while. Two dependents are considered credence variables are perceived usefulness and perceived ease of use. Perceived usefulness is the extent to which a person believes that a Moodle VLE application service would enhance lecturers teaching performance. Perceived ease of use is the degree to which a person believes that using Moodle as VLE service would be free of effort while the intention to use is a dependent variable and targeted as a finding of this research. Figure 1 shows the conceptual model of the research.

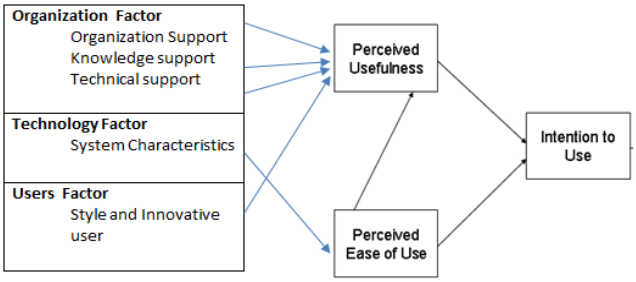


Figure 1: Research model of TAM

3.3. Hypotheses Development

Three external factors support organization factor; organization support, knowledge training and technical support by top management. Organization support refers to the organization service quality to the user of Moodle application, and this factor can influence perceived usefulness in the context of Moodle. Many of researchers mentioned that organization support is important for lecturers to accept and adopt VLE in their teaching process. Management support of end-users significantly increases the use of a computer. We proposed the following hypotheses:

H1: Organization supports will have a positive effect on perceived usefulness toward using MOODLE

H2: Knowledge supports will have positive effects on perceived usefulness toward using MOODLE.

H3: Technical supports will have a positive effect on perceived usefulness toward using MOODLE.

H4: System characteristics positively affect perceived ease of use of MOODLE.

H5: Lecturer characteristics positively affect perceived usefulness using MOODLE.

H6: Perceived ease of use will have a positive effect on perceived usefulness toward using MOODLE.

H7: Perceived usefulness has a positive effect on their intention to use MOODLE.

H8: Perceived ease of use positively affects their intention to use MOODLE.

4. Research Methodology

4.1. Participant's Profiles

This study included 545 lecturers from Universiti Kuala Lumpur (UniKL) 13 branch institutes. UniKL currently adopting open-source Moodle LMS. Instructors can voluntarily adopt VLE to supplement their traditional classes. UniKL is a top Higher Education Institution in engineering technology which owned by Majlis Amanah Rakyat (MARA), under the Ministry of Rural and Regional Development, Malaysia. The university was given the mandate to upgrade the status of technical education in Malaysia by the government. UniKL offers various foundation, diploma, an undergraduate and postgraduate program whereby each UniKL's branch institutes offers a varied program in their niche areas of

specialization. UniKL is strategically located all over peninsular Malaysia.
All participants were volunteers to answer the questionnaires during this study after an invitation email. In the initial memo, all lecturers at all branches were told on the purpose of this study and no any reward was an offer to them. Respondents were taken about 5-10 minutes to complete the online system questionnaire.

4.2 Instrumentation

The data were collected through an online questionnaire. An invitation to participate in the questionnaire, including the website link of the questionnaire, was posted on the email a month. The questionnaire included indicators related to the study constructs to be measured for quantitative analysis, along with demographic questions (e.g., gender, age, degree, VLE usage experience, work experience, and job title).
The data was collected over an online close-ended survey which was originally developed and employed for the purpose of the study. Lecturers who are the participants received the online questionnaires via the internet and were assured of confidentiality by the institution management. Closed-ended questions require the respondents to provide their opinions, ideas or comments on the options provided in the same questionnaire. The measurement indicators of constructs were phrased according to a five-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree, and 5 = strongly agree). To ensure the questionnaire was well structured and have good content, a pilot study was conducted by distributing thirty-five questionnaires to experts and academicians who work in IT and VLE departments in different branches of UniKL.
Some statements were revised based on the comment from the VLE management team and IT experts, and the comments were considered in the final version. From the original 65 statements, 55 were then selected and used as the research instrument. A random sample of 13 branches Institute of UniKL was used.

4.3. Data Collection

The sample contained 554 participants, and after 1eliminating the unacceptable questionnaires, only 541 (97.65**%)** questionnaires were used in the analytical stage. The 13 (2.87%) questionnaires were considered unacceptable due to participants has skipped many items. The data were collected by using online survey form and can be accessed anywhere and anytime over the Internet. This survey also allows participants to answer with unlimited time. Statistical analysis of the data was performed to test the hypotheses. Development of measurement instruments, process sampling, and analysis of the data are defined in this section.

5. Data Analysis and Results

Data analysis and result findings were provided in this section. Respondents profiling is presented in the first subsection using demographic statistics, and in the following subsections, the results of hypothesis testing measurement are shown and described regarding structural analysis model. Finally, Visual graphics β value is used to describe the relationship between each of the variables in this study.

5.1. Demographic Characteristics

The profile of respondents is shown in *Table 1*. The typical respondents are 31-40 years old with 3-5 years of teaching experience in the organization. In 63% of the respondents use Moodle every day and more than half use Moodle for 3-5 courses per year.

Table 1: Respondent demographics

Item		Frequency	Percentage %
Gender	Male	243	43.78
	Female	312	56.22
Age	25 – 30	170	30.63
	31 – 40	211	38.02
	41 – 50	103	18.56
	Above 51	70	12.61
Number of courses (Per year)	1	1	0.18
	2	7	1.26
	3-5	545	98.20
	5-8	2	0.36

5.2. Descriptive Statistics

Table 2 shows the means, standard deviations, skewness, and kurtosis indices. The mean values of all items were above the midpoint of 4.00 and ranged from 3.354 (OS4) to 3.931 (SC1). The standard deviations ranged from 0.696 to 1.191, reflecting a narrow spread of scores from the mean. The mean score for this study sample is 67.8, suggesting a medium level of VLE acceptance.

Table 2: Hypothesis testing

HY	IV		DV	Path Coefficients	t-value	p-value	Remarks
H1	Organization Support	→	PU	0.291	6.754	0.000***	Supported
H2	Knowledge Support	→	PU	0.324	9.748	0.000***	Supported
H3	Technical support	→	PU	0.393	12.200	0.000***	Supported
H4	System Characteristic	→	PEOU	0.254	7.083	0.000***	Supported
H5	Lecturers style and Innovation	→	PU	0.619	22.566	0.000***	Supported
H6	Perceived ease of use	→	PU	0.746	18.615	0.000***	Supported
H7	Perceived usefulness	→	BIU	0.776	22.566	0.000***	Supported
H8	Perceived ease of use	→	BIU	1.109	34.354	0.000***	Supported

*Notes: * $p< 0.05$; ** $p< 0.01$; *** $p < 0.001$; ^{NS} $p > 0.05$*

Based on a study by Stevens, (1996), the rule of thumb is to have at least 15 cases per measure. The discussion of the results begins with a regression model to show the finding of the hypotheses tested. *Table 5.2* summarizes the test results of regression analysis. All determinant constructed are significant in explaining the relationships of every hypothesis. Organization support ($\beta = 0.291$, $p < 0.001$), knowledge support ($\beta = 0.324$, $p < 0.001$), and technical assistance of Moodle ($\beta = 0.393$, $p < 0.001$) have positive influence to perceived usefulness as hypothesized. Hence, hypotheses 1, 2 and three are supported. System characteristic ($\beta = 0.254$, $p < 0.001$) is positively correlated to the perceived ease of use, so supporting hypothesis 4. Lecturer style and innovation ($\beta = 0.619$, $p < 0.001$) is positively correlated to perceived usefulness and confirming hypothesis 5. Perceived ease of use ($\beta = 0.746$, $p < 0.001$) is resulted to have positive effect on perceived usefulness and intention to use with ($\beta = 0.746$, $p < 0.001$), thus confirming hypothesis 6 and 7. Finally, perceived usefulness ($\beta = 0.109$, $p < 0.001$) is related to intention to use Moodle as a importance level of 0.001, provide strong support for Hypothesis 8. As a summary, all eight hypotheses for this study are statistically very strong and suggesting a high level of VLE acceptance. Figure 2 illustrated the graphical presentation of the β-value for each of the factors.

6. Discussion and Conclusion

This research examined the VLE acceptance of lecturers drawn from a private university, UniKL in Malaysia. In this empirical study, an analysis was conducted on users acceptance of VLE in the contexts of Moodle application services from lecturers per-

spective and the finding shown that lecturers had a high level of acceptance toward VLE utilization.

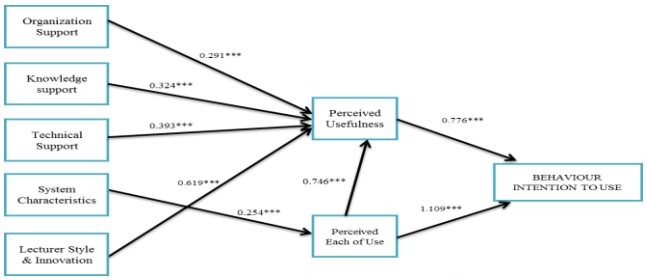


Figure 2: Graphical representation of β-value
*Significant at $p < 0.05$, ** Significant at $p < 0.01$, *** Significant at $p < 0.001$*

First, we examined the relations between the three service quality constructed; lecturer characteristics, system features and organization factor and the two belief constructs; perceived usefulness and perceived ease of use. Second, the relationships between the believe constructs; perceived usefulness and perceived ease of use and intention to use Moodle were analyzed. These results presented that all the service quality constructed a positive significant toward belief variable; perceive usefulness and perceive ease of use is also highly important toward behavior intention to use Moodle application. The biggest factor contributed to the acceptance of Moodle application is perceived ease of use (PEOU) whereas this factor also directly influenced by system characteristics. This highest value can be examined, if VLE is easy to use, then VLE will receive more attention from users. The next factor that was also given high significant value is lecturer characteristics, followed by others factors. For lecturers to continue to use VLE, the application must be well designed and developed to deliver great output. Evaluation of other factors could be seen that all the factors viewed are very significant toward acceptance of Moodle system. By providing better VLE services without increasing the difficulty of the VLE process, the usefulness can be enhanced. Moodle is an official system used by UniKL as a medium to assist and support the teaching and learning process. There is a policy to ensure all campuses and academicians utilize this application. Also, Moodle system has simple, easy and user-friendly characters to attract users' interest. This task might be the reason for the highly significant relationship found between all related variables constructed. These findings showed that a positive attitude and life experience with Moodle may enhance user efficiency and leads to the behavioral intention to use VLE.

7. Limitations and Future Research

This study has limitations. First, the sample was collected from one academic institution in Malaysia; more research can be conducted at several organizations in different countries to improve the generalization of the findings. Second, the study assessed LMS success from the learner's perspective; further research may assess it from an instructor's perspective. Third, in this study, instructors could voluntarily adopt LMS to supplement traditional classes. Further investigations are needed in the context of mandatory use. Moreover, future research might also examine in detail the benefits of LMS for learners and the critical factors influencing organizations' deployment of LMS.

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