

# Usability Evaluation of Academic Learning Management System (ALMS): A Pilot Exploration

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## Abstract

Currently researchers concentrate on adaptive systems that have long been driven by pre-defined characteristics that represent individuals' mental model for undertaking certain learning activities. However, different students are in possession of different state of cognition and emotion that have been extensively utilized as the way in the design of current Learning Management systems for academic purposes. The main goal of this study is to present a comprehensive preliminary study on adaptability/usability of an academic learning management system of UPM Learning Management System, based on usability factors of WAMMI and Nielsen.

**Keywords:** *E-learning, Virtual Learning System, Learning Management System, Learning Application, Usability Evaluation*

## 1. INTRODUCTION

With the increase in Higher Learning Institutions demand for providing effective mechanisms to aid teaching and learning in online adaptive systems has become a focal point of focus, in revolutionizing teaching and learning process in almost all the higher learning institutions. Currently researchers concentrate on adaptive systems that have long been driven by pre-defined characteristics that represent individuals' mental model for undertaking certain learning activities. For example, students' state of cognition and emotion has been extensively utilized as the criterion in the design of current Learning Management systems. It includes extracting some inputs (personality, performance test, cognitive style, etc.) from learners to suggest a learning session that characterizes the individual's preferences based on these inputs. The major differences in the learning

characteristics and preferences of individuals can be attributed to the differences in the formation of their mental model capacity to undertake a certain behavior, which is believed to provide the basic logic for information processing and decision making.

One of the popular phrases used in our present education sectors and it operates all over the world is the electronic Learning, which is synonymously abbreviated as e-Learning and is more or less related to other internet services such as e-research, e-library, e-commerce, e-payment and other e-transactions. This method evolves as a result of a sort of revolution taking place in the field of information technology (IT). In a nutshell, this newly emerged method of learning portrays itself as distance learning, which is globally made accessible to all and sundry irrespective of location, distance, cost or time. The method is electronically designed to be accomplished

through various electronic gadgets, such as internet, intranet, extranet, satellite, audio, video, CD ROM as well as through others sources audio-video media of information dissemination.

Close observation of the exponential development taking place in the field of information dissemination technology shows that, e-learning nowadays metamorphoses and becomes part and parcel of what is presently known as Learning Management System (LMS). Detailed analysis of the developmental trends of LMS over period of time concurs with the impressions of many educationalists and researchers world over that, the long awaited revolution in teaching methodology has evolved, i.e. the traditional method of acquiring and imparting knowledge is being replaced with e-learning or Learning Management System LMS. In line with this general concept (Frey, 2005) described LMS as a means of assisting learners and instructors to accomplish their instructional goals through the use of problem-solving team, simulation online, and questions and answers session, rather than be a tool that just allows printing lecture notes, evaluating lecturers or seeing any updated information made by the instructors.

## 2. LITERATURE REVIEW

In view of the numerous factors adduced to explain the importance of LMS to the world-wide learning sectors, many end-users discovered that, not all LMS are efficient; therefore careful assessments are needed in selecting the most suitable LMS. For instance, usability is one of the non-functional requirement for choosing any system especially LMS, which allows us to know the level of its usability. Different researchers and standard institute defined usability from different perspective, among them include [IEEE Std.610.12-1990] as “The ease with which a user can learn to operate, prepare inputs for, and

interpret outputs of a system or component”. In view of the fact that, usability is a component of Human Computer Interaction (HCI), ISO 9241 part ii, viewed usability as “extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use”. Recent reviews of the components of LMS, shows that, usability is becoming a strategic factor level that needs special attention, particularly in the software development processes. That is why (Juristo, Moreno, & Sanchez-Segura, 2007) said; usability evaluation has now become an increasingly major concern area of human-computer interaction (HCI).

Similarly, (Nielson, 2012) defined usability in relation to its factors, i.e. efficiency, satisfaction, memorability, learnability and error prevention. He continued to describe usability as an important factor in designing any web-site, especially LMS, which is of great concern to many web-site visitors all over the world. These Learning Management Systems LMS include that of University Putra Malaysia, UPM, where students from all walks of life avail themselves with UPM system. Reactions from end-users of UPM: LMS especially students revealed that UPM web-site visitors encounter with many problems in getting the result expected when working with the UPM: LMS due to some usability hurdles. Based on these encountered problems, the needs to know the usability strength and weaknesses level of UPM:LMS becomes absolutely imperative, as the result obtained could be of great helping to the management and website developers of not only that of UPM but also others institution LMSs. In view of the aforementioned, the researchers of this paper find it of economic importance to explore the presumed usability factors that affect UPM: LMS, and at the same time open up related areas for further research.

### 3. METHODOLOGY

The main goal of this study is to identify the level of usability strength and weaknesses of UPM Learning Management System, based on

usability factors of WAMMI and(Nielson, 2012)and these has been achieved by adopting the methodological as shown in Figure 1.

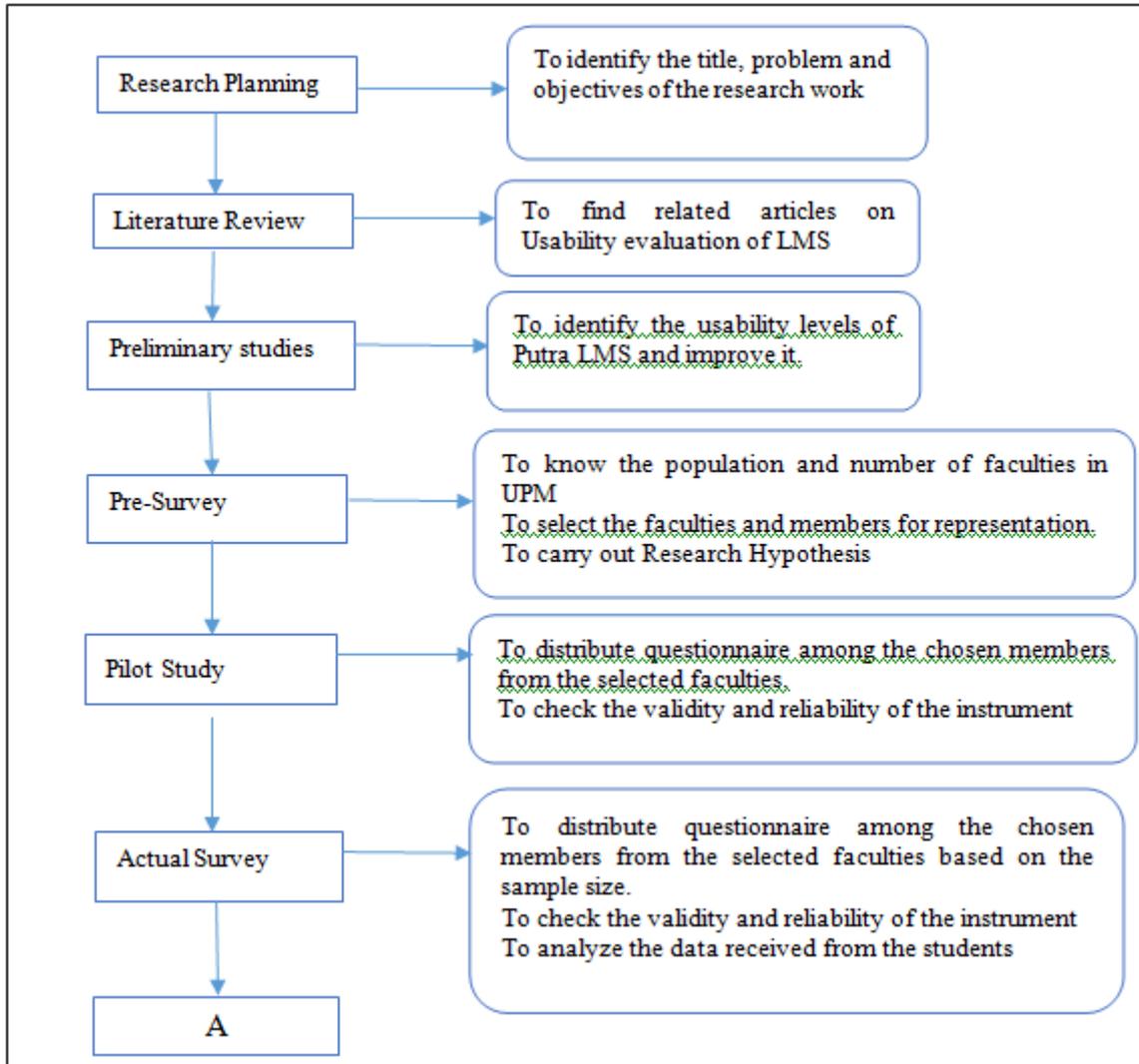


Figure 1. Flowchart of the Research Methodology (highlighted to Preliminary and Pilot Study)

### 4. PERFORMANCE MEASUREMENT

This study adopts WAMMI-Nielsen questionnaire based evaluation techniques of(Caglar & Menten, 2012)together with three (Nielson, 2012)usability factors (memorability, error prevention and satisfaction). The questionnaire comprised of two sections, the first part contained the information about the respondents, such as age, internet experience, gender, faculty, nationality and access to UPM LMS. The second section consisted of thirty

two questions, four questions from each of the 8 categorized factors namely: attractiveness, satisfaction, memorability, efficiency, learnability, controllability error prevention and helpfulness. The questionnaire aims to identify the usability level (strength and weaknesses) of UPM LMS.In-order to evaluate the usability of UPM LMS from students' point of view, responses will be evaluated based on the adopted merit point of(Islam & Tsuji, 2011).

**Table 1. Usability Merit point of UPM LMS**

Option	Strongly Disagree	Disagree	Agree	Strongly Agree
Merits	1	2	3	4

Table 1 above shows four usability likert scale with their corresponding merit points, ranging from 1 to 4. According to (Abdullah & Koh, 2008) usability point for a category,  $x$ , is defined as:  $X = [\sum (\text{Merit for each question of$

the category)] / [number of questions]. Overall mean, minimum mean, maximum mean, range and standard deviation were all calculated to get the usability strength and weaknesses level of the UPM LM as shown in Table 2.

**Table 2. Usability level And Corresponding Usability Points.**

Usability level	Point X
Very low	$0 \leq x \leq 1.49$
Low	$1.5 \leq x \leq 2.49$
High	$2.5 \leq x \leq 3.49$
Very High	$3.5 \leq x \leq 4.00$

In any survey research work, there is need to conduct a pilot study to know whether the instrument used is appropriate for the study or not. Because it is very difficult for usability evaluation to be free from error. The pilot study determines the workability of the actual study. Four faculties were randomly selected from the 15 faculties of the University Putra Malaysia where 30 postgraduate students were selected for the study, and in the process of conducting this research,

Reliability and validity are the main elements used, as instrument in measurements evaluation, such as questionnaire. Reliability is the extend in which the questionnaire (instrument) gives the same result consistently, whereas validity refers to the degree in which

an instrument such as questionnaire measures what is intended to measure. The value of alpha measures the internal consistency of the test (Cronbach, 1951) and it is defined “as number ranging from 0-9” (Cronbach, 1951). (George & Mallery, 2009) provide the following rules of thumb: “> .9 – Excellent, > .8 – Good, > .7 – Acceptable, > .6 – Questionable, > .5 – Poor and < .5 – Unacceptable”. Cronbach’s alpha, is the most widely used objective measure of reliability and it is used to measure the reliability of the questionnaire adopted for this study. The closer the Cronbach’s alpha coefficient is 1.0 the greater the internal consistency of the items in the scale. Reliability test was conducted on the data that was obtained from the pilot study shown in Table 3.

**Table 3. Reliability statistic of Pilot study**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.822	0.823	8

In the study, a probability sampling called cluster sampling method was applied. University Putra Malaysia was grouped into two clusters, cluster1 consists of institutes and cluster2 consists of faculties. Simple random sampling was randomly applied, in which cluster was chosen. All the faculties were numbered

from 1 to 15 and each numbers was written in a small piece of papers, and the papers were folded and thrown in a bowl. Hence, 4 numbers were randomly selected from the 15 numbers and the numbers that correspond to such faculties are the faculty of economic and management, science, engineering and

computer science. The sampling size obtained from slovins formula was compared with that of (Krejcie & Morgan, 1970) which sample size of 370. The difference between the number of samples size obtained from the slovins formula and that of (Krejcie & Morgan, 1970) is  $384 - 370 = 14$  which is negligible, therefore sample size of 384 was used for this study.

### 5. ANALYSIS AND DISCUSSION

As showed in Table 4 below, more than half of the students were males, whereas 42.3% were females. For Access to UPM : LMS 12.3%, 8.2%, 29.7% and 41.0% students have access to the UPM: LMS daily, after 2 days, weekly and more than 2 weeks respectively. More than 60% of the students were below 23-33 years. 28.9%, 8.8% are students within the age 34-43 and 44-53 years of age respectively, whilst 5% of the students were above 54 years of age. This result is obviously true because of the students' academic nature of age. 51.3% of the students were from faculty of engineering. This result is

not surprising because faculty of Engineering has the highest number of students among the other three faculties thus; hence more participants are expected from the faculty. 13.8% of the students are from the faculty of economics and 18.4% from the faculty of science, whereas 16.5% of the students comes from the faculty of science. More than 80% of the students have computer experience for more than 6 years whereas 16.2% and 2.7% of the students have one to five years' experience and less than one years' experience respectively. 89.6% are found to be the users of UPM LMS, whereas 10.4% were not using the UPM LMS. This result is also not surprising if we consider the students that offer a course while studying, hence most of the students happen to take one or two courses before graduating from his or her study, therefore this necessitates the students to make use of the LMS. 59.6% and 40.4% of the students were local and international students studying in UPM respectively.

**Table 4. DescriptiveStatistic**

Factors	Category	NQD	NQR	Percentage
Gender	Male		217	57.7
	Female	422	159	42.3
Access To UPM LMS	Daily		47	12.5
	After 2 days	422	31	8.20
	Weekly		105	29.7
	Two weeks and above		154	41.0
Age	23-33		229	60.9
	34-43	422	112	28.9
	44-53		33	8.8
	54 and above		2	5
Internet Experience	< 1 Year		10	2.7
	1-5 years	422	62	16.2
	6 Years and above		304	80.9
Faculty	Science	71.74	69	16.35
	Economics and Management	55.95	52	12.32
	Engineering	226.74	193	45.73
	Computer Science	67.52	62	14.69
Have you ever used Putra LMS?	Yes	422	337	89.6
	No		39	10.4

Students	Local	422	224	59.6
	International		156	40.4

NQD = Number of questionnaires distributed

NQR = Number of questionnaires returned

## 6. CONCLUSION

This paper presented a preliminary study on usability evaluation of UPM LMS from student's point of view. A survey was carried out among four chosen faculties in University Putra Malaysia. An improved UPM LMS was developed to overcome the usability problems faced by the students. The outcome of the survey reveals some usability strength and weaknesses level of UPM LMS. In recommendation for future research, the experts are requested to suggest a way forward to improve the UPM LMS. This study can also be extended to assess the usability levels of other Learning Management system beside UPM and outside Malaysia. However there is great need to employ other users such as lecturers, administrators to participate in the study.

## 7. REFERENCES

- [1] Abdullah, R., & Koh, T. W. (2008). Usability Measurement of Malaysia Online News Websites. *IJCSNS International Journal of Computer Science and Network Security* (Vol. 8). Retrieved from [http://paper.ijcsns.org/07\\_book/200805/20080524.pdf](http://paper.ijcsns.org/07_book/200805/20080524.pdf)
- [2] Caglar, E., & Mentis, S. A. (2012). The usability of university websites – a study on European University of Lefke. *International Journal of Business Information Systems*, 11(1), 22. <https://doi.org/10.1504/IJBIS.2012.048340>
- [3] Frey, B. A. (2005). *Enhancing Face-to-Face Courses with A Course Management System*.
- [4] George, D., & Mallery, P. (2009). *SPSS for Windows Step by Step*. Allyn & Bacon, Inc. Needham Heights, MA, USA. Retrieved from <https://dl.acm.org/citation.cfm?id=1803802>
- [5] Islam, A., & Tsuji, K. (2011). Evaluation of Usage of University Websites in Bangladesh. *DESIDOC Journal of Library & Information Technology*, 31(6), 469–479. <https://doi.org/10.14429/djlit.31.6.1322>
- [6] Juristo, N., Moreno, A. M., & Sanchez-Segura, M.-I. (2007). Analysing the impact of usability on software design. *Journal of Systems and Software*, 80(9), 1506–1516. <https://doi.org/10.1016/J.JSS.2007.01.006>
- [7] Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30(3), 607–610. <https://doi.org/10.1177/001316447003000308>
- [8] Nielson, J. (2012). Usability 101: Introduction to Usability. Retrieved February 13, 2019, from <https://www.nngroup.com/articles/usability-101-introduction-to-usability/>