

# Comparing the Usability and Users Acceptance of Open Sources Learning Management System (LMS)

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**Abstract-** Learning Management System (LMS) or online learning portal has become an electronic learning and communicating ways for many higher education institutions in Malaysia. The use of eLearning has increased in this few years and open source learning management systems have become a popular choice for these higher education institutions in Malaysia. Ensuring the LMS usability is an important factor that can affect the overall acceptance and success of the platforms. Therefore, in this paper the authors will evaluate the usability factor of three open source LMS platforms (Moodle, ILIAS and Atutor) on desktop/ pc environment; and the comparative evaluation results are then presented.

**Index Terms-** LMS, Usability Evaluation, Open Sources, Moodle, ILIAS, Atutor.

## I. INTRODUCTION

In this era of technology connectivity, internet and online system has become an important part of our life. The use of online systems is widely adopted by business organization, government and education institutions. Learning Management Systems or LMS is a platform that is designed to assist the delivery of online courses. Other than the term LMS is used, other commonly used term for such platform are Course Management Systems (CMS) and Virtual Learning Environment (VLE). In this paper, the authors will only use LMS as the term. LMS and other similar systems have been widely used in universities and colleges around the world.

The LMS used by many higher education institutions in Malaysia. Open Sources - 57.7%, Commercial - 34.6%, In House Develop - 15.4% [5] and recently the open source LMS has become a popular choice rather than commercial LMS systems because open source applications can be gets free of charges and it can be configured to run on most of the operating system. Other than that, the evolution of the open source LMS has increase the standard of the open source LMS and it can be competed with the commercial LMS systems [5] and the open source LMS also can be modified accordingly to the needs of the education institution by their own programmer.

One of the reason that contributed to the widespread of the LMS is because the rapid development of Information and Communication Technologies in Malaysia has necessitate all higher education institutions in Malaysia to move fast to embrace e-Learning among the lecturers and their students. With the

increasing of broadband subscriptions [1], students can easily connect to the system in their own house.

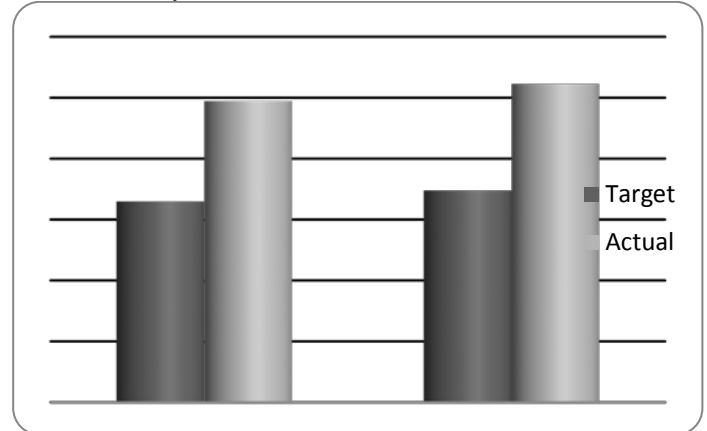


Figure 1: Total Broadband Subscriptions

Another reason that contributed to the widespread of the LMS in higher education is because the effort of Ministry of Higher Education formulates the National e-Learning Policy [6].

Users can be classified into two categories (Lecturer/educator and students/learners). In this paper, the authors will focus on the students/learners group. The purpose of this study is to evaluate the usability from the users' point of view of open source LMS such as Moodle, ILIAS and Atutor and comparing each other. These three platforms are completely free and developed by open source communities. In fact, good open sources LMS get acceptance not only focus on the technical part, cost and support but they also need to focus on the users' satisfaction.



Figure 2: Interface of ILIAS, Moodle and Atutor

## II. SIMILAR RESEARCH WORKS

In this recent year, educational institutions largely adopted LMS and a number of study have been done on the LMS such as Moodle [8][13][16]. The authors started the literature search with a broad systematic scan of online academic journal and conference databases for the results of past ten years from 2004 to 2014. The review was to determine the review scope and relevant source materials. The following databases were searched

are IEEE Xplore, Google Scholar for academic conference papers and ScienceDirect.

The classification process of paper is done based on:

- Title, abstract and discussion/conclusions sections of the paper and then determined its main topic.
- LMS of others researcher used and the methods they use to evaluate the usability of the LMS.

Table 1 (Table 1, in Appendix 1) show the previous similar work that has done to the study. Base on the study done at Table 1, it shows that the most popular methods for researchers to evaluate usability are using questionnaire based no matter it is paper base or online [9][12][13][15]. Follow by heuristic evaluation methods [10][11][14]. Other evaluation methods such as Shackel’s proposal [16], DECIDE framework by Preece [8] and evaluate technical aspect and functions [7] also been use by researchers. We summarized the criteria in Table II.

Table II: DIFFERENT EVALUATION METHODS USED IN REVISED PAPERS TO EVALUATE USABILITY OF LMS

Evaluation Methods	Number of Papers
Questionnaire Based	4
Heuristic Evaluation	3
Shackel’s Proposal	1
DECIDE Framework	1
Technical Aspect and Functions	1

### III. EVALUATION METHODS

#### A. LMS Evolution

This study took place in January 2015 where three platforms Atutor(Version 2.2)[2], ILIAS(Release 4.4.6)[3] and Moodle(Version 2.8.1)[4] have been setup earlier using the latest stable version of these LMS and, default layouts and configurations. Some contents were uploaded into these same LMS’s standards templates such as class introduction, assignment, slide, video and quiz to simulate the real environment. The content is exactly same for the three demo LMS platforms.

#### B. Students Profile Test Plan

Eighteen students are participating in this study base on a voluntary basis. The participants are from COIT (College of Information Technology, UNITEN) and their age is between 19 to 23 years old, (profile given in Table III).

Table III: STUDENTS PROFILE

Sex		Experience with online systems		Experience with LMS	
M	F	Yes	No	Yes	No
13	5	18	0	18	0

#### C. Test Plan

This study involves usability testing and user’s acceptance test of these LMS’s. During the usability testing phase, goal is set by the researcher and the researcher and tester will brief the participant for the tasks that participant will involves using LMS to work on the tasks using the demo system and in real time.

Each time after completing the set of LMS tasks, participant is requested to give comments in the online survey forms made available through the LMS system for the user acceptance results. The final result from this real-time test can be used to show how the usability and user acceptance of the LMS.

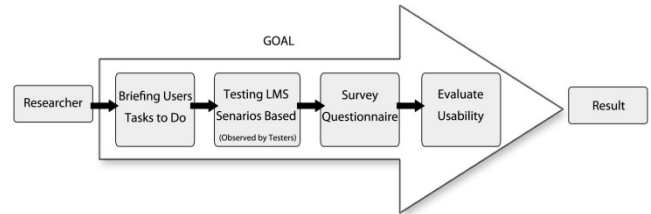


Figure 3: Performance Measurement for LMS

#### D. Data Collection

During the usability test, test participants been separate into 6 groups, refer Table IV. Each group will have to start with different sequence of LMS; this is to make sure the test is fair and not bias for any of the LMS.

Table IV: GROUP WITH DIFFERENT LMS SEQUENCE

Group	LMS 1	LMS 2	LMS 3
Group 1	Moodle	ILIAS	Atutor
Group 2	Moodle	Atutor	ILIAS
Group 3	Atutor	ILIAS	Moodle
Group 4	Atutor	Moodle	ILIAS
Group 5	ILIAS	Atutor	Moodle
Group 6	ILIAS	Moodle	Atutor

All participants have been requested to perform a set of tasks for the usability test. The default username and password has been given to the participant. The tasks are:

- Task 1 – Login, update information and change password
- Task 2 – Enroll in class and download a specific document
- Task 3 – Do online quiz or test
- Task 4 – Upload specific assignment to the LMS system
- Task 5 – Do the online survey and submit it to the system

A tester will record the time use by the participant to complete each of the task and the error they made when doing the tasks. Each task has been given a maximum time of 5 minutes to complete it. If the participant cannot finish the tasks in the given time, 5 minutes will be records as the time for the tasks. When the participant starts the usability test, testers are not allowed to interacting with the participant because it will affect the performance data.

### IV. RESULTS AND DISCUSSIONS

Figure 4 shows the overall average time used by participants to complete the tasks in different LMS. From the result, we can see that participant’s use less time in Moodle platforms compare to Atutor and ILIAS in task 1, task 2 and task 5. However for task 3 and task 4, participant’s use less time in Atutor compare to Moodle and ILIAS. In the results, we also can see that ILIAS using the longer time for all five tasks compare to other two LMS. This is because ILIAS interface is not attractive to

participants and the system is not easy to use compare to other two LMS platforms.

However, no participants choose ILIAS because they feel that ILIAS is complicated and not user friendly.

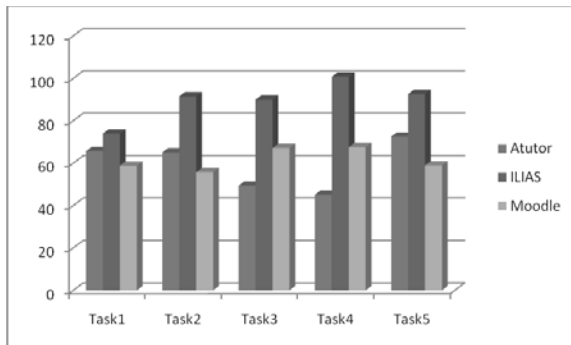


Figure 4: Average time (in second) used by participant in each task and different LMS

Figure 5 shows that the average time used by participant to complete the task based on different groups. From our tester's observation toward participants during usability testing, most of the users like to use the back button rather than use the correct link to the tasks. These phenomena can be seen not only in one of the LMS but in all three LMS platforms. Participants are aware of the correct link location but them still using the back button to go back certain page to complete the tasks. Due to these phenomena, it makes most of the participants take longer time to complete the given tasks and reduce the efficiency of the LMS.

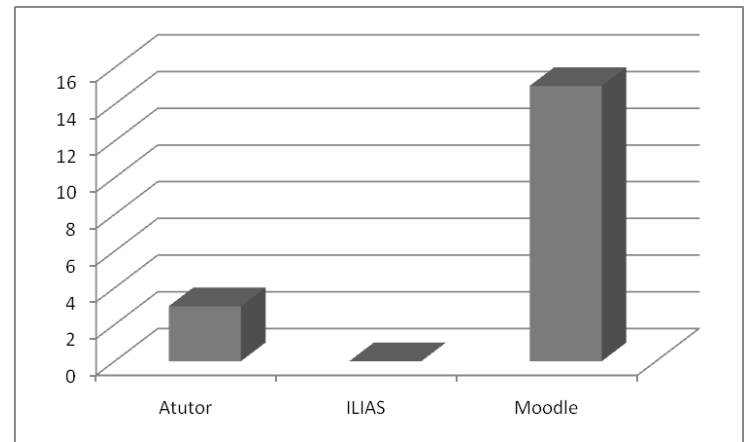


Figure 6: Best LMS based on participant's opinion

## V. CONCLUSION

This paper has presented a usability evaluation of three well known open source LMS: Atutor, ILIAS and Moodle. Base on the results we obtain from our study, it shown that Moodle are most easy to use follow by Atutor and lastly are ILIAS that no participant chooses. However it does not mean that ILIAS system are not good because the three LMS is having the similar functions just the default interface of ILIAS is more complicated compare to the other two LMS and not accepted by our participants.

In future work, we plan to include wider testing participants including students with different profiles such as engineering student and business students or students that don't have experience with LMS. Our work will continue with the usability test in search for an improved user experience and user acceptance with open sources LMS.

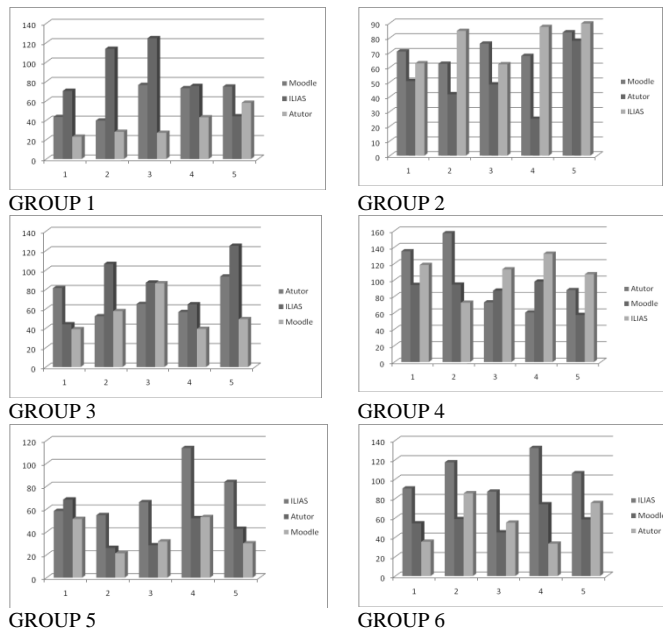


Figure 5: Average time (in second) used by participant in each task and different group

Figure 6 shows the satisfaction results of the LMS base on participant's opinion. We can see that Moodle is the popular choice follow by Atutor based on our study. Participants choose Moodle because they feel the interface is clean and the content is all place in same page. Participants that choose Atutor feel that the icons in Atutor are attractive and the LMS are easy to use.

APPENDIX 1

TABLE I: PREVIOUS SIMILAR WORK DONE BY RESEARCHERS

AUTHORS	YEARS	LMS	METHODS	OUTCOME
Lengyel et al	2006	Moodle and Atutor	Examine, Compare and Evaluating: Technical flexibility, Learning tools and Usability	Both platforms are compatible with SCORM standards
Melton	2006	Moodle	DECIDE framework by Preece	Language and lacking the skills may affect the usability
Hatzilygeroudis et al	2007	EX-COFALE based on ATutor	Questionnaire based evaluation studies	Improvements on the use of videos and photographs could provide helpful visual aid to the training experience.
Kakasevski et al	2008	Moodle	Heuristics Evaluation	Moodle was tested as systems and the results along with expert's opinions are share to all users of the system for a compact and coherent user friendly in Moodle.
Martin et al	2008	Moodle, Sakai and dotLRN	Heuristics Evaluation: 10 Nielsen Heuristics	dotLRN got the highest score from the heuristics study, Sakai obtained a second position, and Moodle is significantly behind.
Al-Sarrayrih et al	2010	ISIS based on Moodle	Questionnaire based on SUS and CSUQ	Evaluate ISIS based on ISO-9126 Standard, which are Functionality, Usability, and Reliability
Baytiyeh	2011	Moodle	Online survey - based on the five usability attributes based on Nielsen's theory	Testing the usability of the CMS and show the importance of competitive Free Open Source Software
Almarashdeh et al	2011	Distance Learning Management System (DLMS)	Heuristic Evaluation	Reviewed and discussed the strengths and weaknesses of the DLMS prototype
García-Solórzano et al	2012	AdVisor	Online Questionnaire	Most of the current CMS are far from having pedagogical foundations and more research in this field is needed.
Thuseethan and Kuhanesan	2014	Moodle	Shackel's proposal	Show the overall level of the effectiveness of LMS constructed in students point of view

<sup>a</sup> SCORM: Shareable Content Object Reference Model

<sup>b</sup> SUS: System Usability Scale

<sup>c</sup> CSUQ: Computer System Usability Questionnaire

APPENDIX 2

EVALUATION FORMS

**Profiling – Ask the question below before start the task**

M/F – √ at table below.

Experience with online systems? Yes/No √ at table below.

Experience with LMS? Yes/No √ at table below.

**GROUP – Each group start with different LMS**

Group 1	Moodle	ILIAS	Atutor
Group 2	Moodle	Atutor	ILIAS
Group 3	Atutor	ILIAS	Moodle
Group 4	Atutor	Moodle	ILIAS
Group 5	ILIAS	Atutor	Moodle
Group 6	ILIAS	Moodle	Atutor

**Task – Explain the task to the users. Record the time for each task.**

Task 1 - Login & change password/update info

Task 2 - Enroll in a class and download document

Task 3 – Do online quiz/test

Task 4 – Upload assignment to system

Task 5 – Do the online survey and submit it

No.	M	F	Yes	No	Yes	No	Group	Task 1	Task 2	Task 3	Task 4	Task 5
1.												
2.												
3.												
4.												
5.												

APPENDIX 3

Survey Questionnaire – Based on List of System Usability Scale (SUS) questions (John Brooke, 1986) and IBM Computer Usability Satisfaction Questionnaires: Psychometric Evaluation and Instructions for Use. International Journal of Human-Computer Interaction, 7:1, 57-78. (Lewis, J. R, 1995)

Please use the 5-Scale ranking for the following sections

1 - Strongly Disagree  
2 - Disagree  
3 - Neutral  
4 - Agree  
5 - Strongly Agree

No.	Questions	1	2	3	4	5
1	I think that I would like to use LMS frequently					
2	I found unnecessarily complex LMS					
3	I thought LMS was easy to use					
4	I think that I would need the support of a person with technical knowledge to be able to use LMS					
5	I found the various functions in LMS were well integrated					
6	I thought there was too much inconsistency in this system					
7	I would imagine that most people would learn to use LMS very quickly					
8	I found LMS very cumbersome to use					
9	I felt very confident using LMS					
10	I needed to learn a lot of things before I could get going in browsing LMS					
11	Overall, I am satisfied with how easy it is to use the system					
12	It was simple to use the system					
13	I can effectively complete my work using the system					
14	I am able to complete my work quickly using the system					
16	I am able to efficiently complete my work using the system					
17	I feel comfortable using the system					
18	It was easy to learn to use the system					
19	I believe I became productive quickly using the system					
20	The system gives error messages that clearly tell me how to fix problems					
21	Whenever I make a mistake using the system, I recover easily and quickly					
22	The information (such as online help, on-screen messages, and other documentation) provided with this system is clear					
23	It is easy to find the information I needed					
24	The information provided for the system is easy to understand					
25	The information is effective in helping me complete the tasks and scenarios					
26	The organization of information on the system screens is clear					
27	The interface of this system is pleasant					
28	I like using the interface of this system					
29	This system has all the functions and capabilities I expect it to have					
30	Overall, I am satisfied with this system					

1. In your opinion, which of these LMS is more easy to use (Atutor/ILIAS/Moodle)? Why?

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. In your opinion, which of these LMS interface is better (Atutor/ILIAS/Moodle)? Why?

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. In your opinion, which of these LMS you prefer to use (Atutor/ILIAS/Moodle)? Why?

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**THANK YOU!**

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