Usability Evaluation of E-learning Systems in Al- Madinah International University

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Abstract

The Usability of e-learning systems plays significant role in their success. Yet, many studies showed that even advanced and popular e-learning systems are not ideal in terms of usability from the end users perspective. Therefore, it is important to evaluate the usability of any vital e-learning system in use. Thus, this study was to evaluate the perceived usability of the two e-learning systems in MEDIU University ALIM and the student portal (LCMS). An empirical study was conducted to evaluate the systems from MEDIU students' perspective. The study data was collected using self-administered survey instrument, then analysed using statistical methods. Then the study results presented and discussed.

Keywords: E-learning system, Usability Evaluation, SUS.

1. Introduction

In recent years, there was a dramatic development of technology in general and utilizing it increasingly in learning in particular. E-learning is now recognized as an established presence within the global higher education industry [1]. Moreover, Reports show that e-learning is becoming more popular and e-learning market trends to grow in fast rates over recent years. According to [2] E-learning market size was valued over USD 165 billion in 2015 and is likely to grow at over 5% from 2016 to 2023, exceeding USD 240 billion.

This rapid growth and popularity can be attributed to many features available in e-learning; as it is cost and time effective. In addition, it is very flexible, because learning can be delivered anytime, anywhere. Furthermore, educational content can be easily accessed, stored, reused and shared.

For all of the above, e-learning has gained more interest in academic researches. From the technological point of view, the most common issues of concerns within e-learning are related to e-learning systems. Some of the most popular e-learning systems are Course Management Systems (CMS) and the Learning Management Systems (LMS). These systems are considered the backbone of e-learning in higher education [3]. They are basically used to host courses and learning materials online, enrol students to courses, track the students' performance, store their submissions and mediate communication between the students as well as their instructors [4]. They are also sometimes called Virtual Learning Environment (VLE). In this paper all these systems will be mostly referred to as e-learning systems.

E-learning systems have been subjects of studies from many aspects; and since its usability is considered to be one of the most important quality factors that have great effect on their success [5], [6], [7], e-learning system usability evaluation was the subject of many researches and many usability studies for e-learning systems were conducted.

Different usability evaluation methods have been used to evaluate e-learning systems. In general, usability evaluation methods can be categorised into two types, the inspection methods and testing methods. The first type is mostly based on experts, while the second one usually involves end users and mostly done based on questionnaires.

There are numerous usability evaluation questionnaires that designed to assess the perceived usability of a system or web application. In this paper an industry standard questionnaire called the system usability scale (SUS) [8] is used to evaluate the usability of the e-learning systems utilized in Al- Madinah International University (MEDIU).

MEDIU University used to rely mainly on a customized Moodle learning management system namely ALIM as a core system for e-learning since it was started on 2008. Besides ALIM, MEDIU has a Campus Management System called (CMS) that used to manage students' registration, courses enrolment, academic and financial records, and to synchronize the related information to ALIM. Recently, MEDIU extended this (CMS) system to be used as a learning management system (LMS) as well, and thus, interfaces for academic and students were developed (Academic portal and Student portal) to eventually replace ALIM. In this paper the perceived usability of both systems ALIM and the Student Portal - which will be referred to as (LCMS) - was evaluated based on (SUS) questionnaire.

2. Related Studies

Numerous e-learning system usability studies followed a user-based approach, through which an empirical research was conducted using questionnaires to identify users' perspective toward the system usability. Several of these studies were conducted using standard questionnaires, namely the system usability scale (SUS).

SUS for Perceived Usability Evaluation of Systems

According to [8] SUS is considered a 'quick and dirty' usability evaluation questionnaire which intended to provide more generalized and subjective assessments of usability, that could bear cross-system comparison, it consists of 10 items with five points rating scale range from strongly disagree to strongly agree. To calculate SUS scores the score contribution for a positive item is considered as the scale position minus 1, and for a negative item as 5 minus the scale position. The total score for each user is calculated by summing the total items contributions then multiplying it by 2.5. The total score have a range from 1-100. However, it should be noted that SUS scores are not percentage, according to [9], [10] the average score is about 68.

Furthermore, an interpretation of the SUS mean score was added by [11] where they found that if the SUS score is over 85 the system is highly usable, over 70 to 85 it is characterized from good to excellent, and for the values between 50 to 70 the system is considered acceptable but it has some usability problems and needs improvement, while the system is considered unusable and unacceptable if SUS scores is below 50.

Moreover, SUS found to be reliable and valid tool to evaluate systems usability [11]–[13]. The results of this study [12] implied that SUS provide reliable results for usability evaluation; and that SUS is able to reliably distinguish between the ratings of one site vs. the other. It also found that SUS produces among the most reliable results across different sample sizes. Furthermore, comparing to other different usability questioners, SUS is the only tool whose items addressed different aspects of the user's reaction to the website as a whole. In addition, the association found between the SUS scours and the 7 points adjective scale to evaluate the system user-friendliness in this studies [11], [13] strengthen the SUS validity.

SUS for E-learning Systems Usability Evaluation

Many studies have used SUS to evaluate the usability of e-learning systems. For instance, in this study [10] SUS was applied to evaluate the usability of Moodle e-learning environment used by the Distance Education Center of the Federal Institute of Espírito Santo – Brazi. In addition to SUS, the researchers used two other methods to evaluate the system usability from different standpoints; SUS was used for users' satisfaction assessment, then heuristic evaluation method was used to evaluate the interface design, and at the end a cooperative evaluation method was applied to identify the points on the interface which make the user interaction more difficult. 59 students participated in this study, the results showed that there was a sever usability problems in the e-learning environment, and the researchers reported that SUS helped to highlight some of those issues and that it was an effective tool to evaluate the system usability.

Another study [11] used SUS to evaluate the usability of a specific proposed tool to be used for remote collaboration in Moodle e-learning system. The evaluation was done by comparing the usability of Moodle with and without the tool in a collaborative context. Therefore, 10 participants students were asked to perform same collaborative tasks using Moodle standard features first, then using the proposed drag and share tool, where the collaborative task was performed in pairs (student A and student B) and was divided into several steps for both A and B students. Two things were evaluated then; the level of the productivity which was measured using tasks time, and users' satisfaction which was assessed based on SUS. The study results proved the perceived usability of the proposed tool as the reported SUS scores for the Moodle system with and without the tool Drag & Share were 89.5 and 46.75, subsequently.

Furthermore, in this study [12] SUS was used to evaluate the usability of a collaborative e-learning system, specifically, an online discussion board called Collab2learn, where 57 participants were involved in the study. They were divided into two groups 28 and 29 to test Collab2learn DB in different feedback formats (respectively textual and iconic). The overall results showed that the system was usable and had positive SUS scores in both formats, furthermore, it reviled that there were technical improvements needed in some aspects.

Another empirical research, included 11 studies involving 769 university students was done by [14]. This study evaluated the usability of two e-learning systems Moodle and Eclass -an open platform based on Claroline-. However, the main goal of the study was to conduct an empirical evaluation of the SUS questionnaire in the context of LMSs' perceived usability evaluation. In addition, another purpose of the study was to investigate associations (if any) between SUS score and students' characteristics. Thus, in addition to SUS items, the questionnaire contained general demographics questions including gender and age and questions related to the participants' Internet self-efficacy (ISE) and Internet user attitude (IUA). Furthermore, it included questions about the students' previous experience with the systems and the frequent of their usage. The analysis of study results that the SUS questionnaire is a valid tool for the assessment of LMSs' usability. The usability of the evaluated LMSs was at a satisfactory level, as all study scores were more over than 72/100. Furthermore, the results showed no significant difference in SUS score between women and men, a small, non-significant negative correlation between the SUS score and age of students, and a significant difference between users with prior experience with the system and first time users. Moreover, a significant positive correlation was found between the SUS score and each of those attributes:

Internet self-efficacy, students' attitude towards the Internet as a learning tool, and usage frequency of the system.

3. Research Methodology

This study followed user-based usability evaluation methods. An empirical study was carried out to evaluate the overall usability of MEDIU e-learning systems ALIM and LCMS. To fulfil this goal a survey was conducted for both online and on campus MEDIU students, where the survey instrument was based on SUS questionnaire

Participants and Procedure

The survey used cross-sectional design in which the students of the chosen sample were surveyed just once. The survey took the form of online questionnaire.

For the Survey sample, the eligibility criteria were defined as the following: the survey participants should be from Mediu students who have experienced both systems ALIM and LCMS for an adequate, relatively similar period of time. Therefore, and since LCMS was lunched on Feb 2016, the sample was chosen from Mediu students whose intakes were Feb 2015, or Sept 2014 and registered in Bachelor and Master Courses (with course work structure) from all four faculties. A total 130 invitations were sent via email. It was received 74 completed responses with a response rate (56.92 %). The responses number is considered adequate as according to [19], the minimum required number of the users participants for questionnaire usability evaluation method is 30, and according to [18] SUS score whiten e-learning systems context of a sample of 6 to 14 users does not differ from the total score at least 90% of the time. The data collection process lasted about one month.

Table 1
Participants' distribution according to gender, learning mode, learning level, and faculties

| | Gender | | Learning mode | | Learning level | | Faculties | | | |
	Male	Female	On campus	Online	Bachelor	Master	FIS	FLAN	FFAS	FCIT
Frequency	42	32	26	48	57	17	44	6	7	17
Percentage %	56.8	43.2	35.1	64.9	77	23	59.46	8.1	9.46	22.97

The Survey Instrument

The survey instrument was divided into 3 parts. The first part covered general demographic information, where items about the followings were included: Gender, learning mode, learning level, and faculty. Second and third parts were dedicated for Alim usability and LCMS usability subsequently, where SUS items were inserted.

Data Collection and Analysis

The survey instrument was created and deployed through google forms platform, no login was required or any other identification data. The collected data was processed and analysed using PASW Statistics software version 18.

4. Results And Discussion

ALIM SUS Results

The frequencies of the SUS scores for Alim are presented in the Table 2; also the distribution of the scores is illustrated in the Fig 1. The SUS mean score for ALIM was found as 64.09 with standard deviation 15.67.

Table 2
ALIM SUS Scores Frequencies

Range	Frequency	Percent	Cumulative Percent
10-19	0	0	0
20-29	1	1.4	1.4
30-39	4	5.4	6.8
40-49	8	10.8	17.6
50-59	16	21.6	39.2
60-69	15	20.3	59.5
70-79	16	21.6	81.1
80-89	9	12.2	93.2
90-99	5	6.8	100.0
Total	74	100.0	

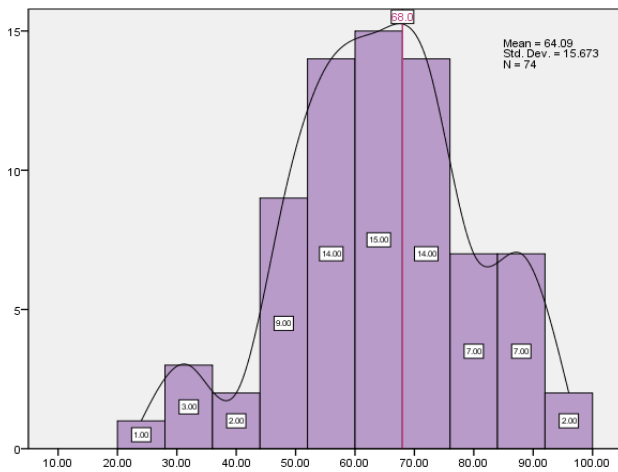Fig. 1. ALIM SUS scores distribution

Fig. 2. LCMS SUS scores distribution

It can be observed from the data provided that the scores mean 64.09 is below the average score (68). However, it is clear that most of the scores falls around the average, as 37 (50%) of the participants' scores were in the range 50-70, and 47 (63.51%) of the scores were in the range 50-80. Furthermore it can be observed that 59.5% of the participants scores were < (68), 54,9% were <=60, and 20.3 % <= 50.

LCMS SUS Results

The frequencies of the SUS scores for LCMS are presented in the Table 3 below;, also the distribution of the scores is illustrated in the Fig. 2. The SUS mean score for LCMS was found as 68.11 with standard deviation 18.58.

Table 3
LCMS SUS Scores Frequencies

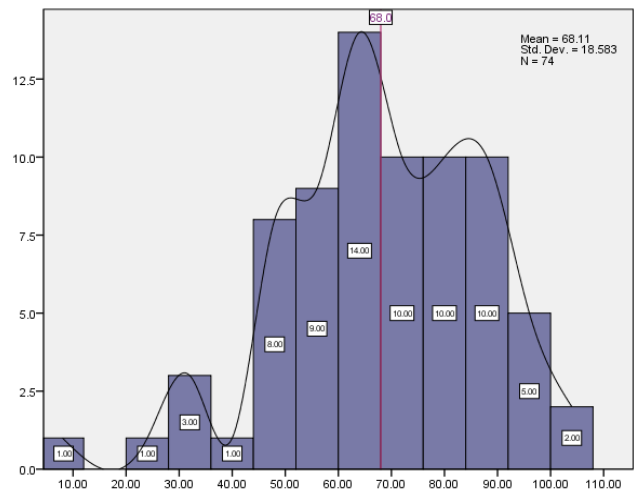| Range	Frequency	Percent	Cumulative Percent
10-19	1	1.4	1.4
20-29	1	1.4	2.7
30-39	3	4	6.8
40-49	3	4	10.8
50-59	15	20.3	31.1
60-69	14	18.9	50.0
70-79	14	18.9	68.9
80-89	12	16.2	85.1
90-99	9	12.2	97.3
100	2	2.7	100
Total	74	100.0	

It can be observed from the data analysis provided that the scores mean 68.11 is at the average point and that 43 scores value (58.11%) are in the range 50-80, while 32 (43.3%) of the participants' scores were between 50-70. Furthermore it can be observed that 50% of the participants scores were <= (68), 31.1% were <= 60, and 18.9% were <= 50.

5. Discussion

A comparison between the most important descriptive statistics for ALIM and LCMS for SUS results is presented in Table 4. First observation from the comparison is that the dispersion of the SUS scores values is more stretched in LCMS than in ALIM. This means that the students attitudes toward LCMS varies more than in ALIM from the most negative attitude (10) to the most positive (90) and this can be attributed to the human nature, since LCMS is still relatively new and there is always variance in the individuals attitudes toward new things.

Furthermore, according to [9], [11] the SUS results can be interpreted using the scale in Figure 3, and therefore it can be found that 20.3% of ALIM scores, & 18.9% of LCMS's were in the not acceptable range, while 50% of ALIM scores , and 43.3% of LCMS's are between ok and good. In addition to that, the overall results for SUS shows that LCMS usability is slightly better than ALIM, as SUS Mean score and median are around the average for LCMS, while it is slightly below the average for ALIM. Yet, it still needs improvements as 50% of participants scores were below good.
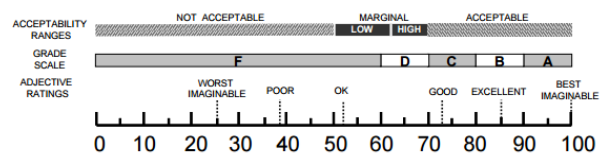

Fig. 3. Determining SUS Scores meaning

Table 4
Participants' distribution according to gender, learning mode, learning level, and faculties

	N	Range	Min	Max	Median	Mean	Std. Dev
Alim SUS score	74	67.50	27.50	95.00	65.00	64.0878	15.67311
CLMS_SUS score	74	90.00	10.00	100.00	68.75	68.1081	18.58344

6.   Conclusion

The study results showed that LCMS usability is slightly better than ALIM, but it is still around the average, which reflects that usability improvements still needed, as the means for the results still not at the satisfactory level.

It is recommended that future work involve more diagnostic evaluation methods such as heuristic evaluation, cognitive walk through and task driven evaluation to identify specific usability problems that need to be improved.

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