Assessing the Usability of Learning Management System: User Experience Study

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Abstract. E-learning is an innovative way of learning that is both symbolic and derivative of 'the information age.' When used as part of the learning process, it provides users with greater flexibility in terms of time and location. For an E-learning application to be considered effective, it should provide its users with a certain standard of usability; otherwise, the learning process is likely to become cumbersome and frustrating for the learner. Focusing on this dilemma, this paper aims to assess the usability of the Jusur Learning Management System (LMS) that is used in higher education in Saudi Arabia. Nine factors have been incorporated into a survey to evaluate the system: content, learning and support, visual design, navigation, accessibility, interactivity, self-assessment, learnability, and motivation. The results show that E-learners who use the Jusur LMS tend to find that Jusur is a usable and desirable application in terms of its users' experiences and perspectives.

Keywords: HCI · Usability · LMS · E-learning · Jusur

1 Introduction

The emergence of computers and their associated technologies is responsible for revolutionising the way the world operates today. Powered by these tools, the technological revolution has resulted in greater ease of communication—and the effect of this on human life cannot be understated. This effect has been further enhanced by the ability of many individuals to acquire powerful computers and gain access to high-speed Internet services. The confluence of these factors is becoming increasingly pronounced and has consequently simplified access to information and knowledge. In education, this revolution has been translated into communication modes that provide opportunities for people to access quality learning without having to "go to school" in the literal sense. E-learning applications give people access to education from their homes and workplaces. Many such applications exist; while some provide users with an enjoyable and informative experience, others inflict stress and boredom while seemingly failing to educate them at all. If the field of E-learning applications is to develop further, it is necessary to achieve a better understanding of what makes an E-learning application positive or negative for the learner. An integral step in gaining this understanding is undertaking a quantitative and qualitative assessment of the effectiveness of E-learning applications. According to [1], Learning Management Systems (LMS) provide tools that can be used to manage teaching and learning

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activities and to integrate learning services in order to facilitate the procedures of both teaching and learning. The tools provided by LMS usually include: course-management tools for handling the provision of course content; tools for the management of online groups; communication aids; tools for collecting assignments; virtual classrooms; and tools that allow for learner assessments and course evaluations. The LMS software used in the Kingdom of Saudi Arabia is known as Jusur [10]. It was developed and is operated by the National Centre of E-learning and Distance Learning for use by universities within the Kingdom. The Jusur system is the subject of the assessment performed in this study, which seeks to determine Jusur's usability. For that evaluation, a certain set of factors has been selected to investigate users' experiences with the system and to assess the level of its usability. Motivation to learn has been selected as one of the factors in order to determine the extent to which users are motivated to learn through the use of the Jusur system.

This study is organised as follows. In the following section, we will review studies and methods that are relevant to the assessment of the usability of E-learning systems. Next, the methodology utilised in this research will be presented, followed by findings and results. Finally, this paper will end with a summary of the research.

2 Related Research

2.1 Usability

Usability is an easy-to-understand concept, but its practical, high-level application to a website can be more difficult to gauge. The definition of usability in [11] encapsulates five components: learnability, efficiency, memorability, general accuracy, and user satisfaction. The relevant literature makes it clear that usability reflects, and always connects with, 'ease of use.' Ease of use is one of the main goals of Human–Computer Interaction (HCI), which in turn involves the study of the interactions between users and technology [3]. Nevertheless, usability is a measure of more than simple ease of use; it refers to consumers' subjective experiences upon using an application. Usability also captures more measurable aspects, such as whether users, in using the application, are actually able to accomplish that which they set out to achieve. In E-learning applications, this second aspect is especially relevant. It is possible to assess how much an individual has learned through the use of an E-learning application, and this assessment reveals information regarding the effectiveness and efficiency of the application.

2.2 E-Learning

E-learning is the process of learning through the use of software and via electronic media, such as the Internet, satellite broadcasts, and traditional computer-supported learning [6]. When using an E-learning application, the end user can have a positive experience; this can, in turn, be good for the business of the company that is presenting that application. However, certain flaws in E-learning applications have been identified in [4], and such flaws can result in a negative end-user experience. For instance, when

an E-learning application is used for training purposes, it often tends to ignore objectives and to focus instead on technological aspects; as a result, it does not always provide the user with the learning that the training had promised. Research conducted vis-à-vis the usability of E-learning applications for disabled learners has found that many applications lack appropriate accessibility tools for those who require assistive technologies [7]. In [12], the authors evaluated the effect of individual preferences and differences; they found that an individual's E-learning experience can be dominated by his or her disability, prior E-learning experience, and preconceived notions regarding the use of computers as learning tools. Therefore, learners with disabilities might have experiences with E-learning that differ completely from those of individuals without disabilities, even within similar environments.

2.3 Assessing the Usability of E-Learning Applications

With specific reference to E-learning applications, the meaning of the term usability can vary. For example, the aesthetics of an application must be considered; a poorly laid-out application can lead to confusion on the part of the user. The authors in [16] performed a multi-method usability assessment using questionnaires, guided interviews, eye-tracking, and the annotation of multimodal behaviour. This complex approach revealed interesting information that other methodologies had failed to identify, such as software problems. The authors in [8] derived an evaluation methodology called e-Learning Systematic Evaluation (eLSE), which combines inspection tools with user-testing. Their technique, called Abstract Tasks (ATs), has been validated by their results, which show the benefits of using AT inspection techniques and illustrate why they are effective tools.

2.4 The Use of Questionnaires in Usability Assessment

Questionnaires and other survey instruments (e.g., interviews) are tools that are commonly used to obtain data regarding people's perceptions. Questionnaires have a proven track record in the assessment of interactive applications. They have been applied to the assessment of E-learning applications [5] and are considered highly appropriate for this purpose because they are inexpensive and easy to use [17]. Existing questionnaire methods relating to the usability of E-learning applications cover several areas. For example, the researchers in [15] divided their questioning into three categories: general interface usability criteria, website-specific criteria for educational websites, and learner-centred instructional design that is grounded in learning theory and aims to provide effective learning. Additionally, the author in [2] used a questionnaire approach to assess ten areas: general system performance, software installation, manuals and online help, online tutorials, multimedia quality, information presentation, navigation, terminology and error messages, learnability, and overall system evaluation. The authors in [17] developed a questionnaire that covered several areas and included 'motivation to learn' as a new attribute by which one could assess the usability of an E-learning application.

2.5 Motivation to Learn in Usability Assessment

The study in [17] is not the only work to make use of the 'motivation to learn' attribute in undertaking a usability assessment. The researchers in [13] also did so while defining the usability of E-learning applications in the following terms: "usability = usable + learnable + useful + motivating." The author in [14] lists "Web feature and motivation," along with six other categories of motivation-study issues, with regard to web-based learning. In [9], the author assesses usability while using the usability testing method and focusing on user motivation.

2.6 The Target E-Learning System

The target E-learning system assessed in this study is the Jusur LMS. The Ministry of Higher Education of Saudi Arabia owns the system, and the National Centre of E-Learning and Distance Learning manages it. The Jusur LMS allows its users (i.e., university students enrolled and studying in Saudi Arabia) to register, record, and manage their personal data; to schedule their courses and course structures; and to view the corresponding content as selected and uploaded by the faculty [10].

3 Methodology

As stated above, the broad aim of this study is to evaluate the usability of the Jusur LMS from a user perspective using the measures that have been suggested by [17], which integrate the attribute of 'motivation to learn' with the existing criteria of web usability and design instructiveness. Therefore, a web-based survey consisting of 11 sections was created. The aim of the first section was to collect demographic information about the respondents, such as gender, length of computer utilisation, and length of Jusur LMS utilisation. The next nine sections covered the usability of the Jusur LMS, including content, learning and support, visual design, navigation, accessibility, interactivity, self-assessment, learnability, and motivation; the questions in these sections were phrased as positive statements, and the respondents were required to indicate the extent to which they agreed with each statement using a five-point Likert scale from one (strongly agree) to five (strongly disagree). The last section in the survey included two open-ended questions asking respondents what they liked and disliked about the system.

4 Results Analysis and Discussion

4.1 Respondents' Profile

This section presents the results and analysis of the collected responses to the questionnaire. The response rate to the questionnaire was high in terms of the researchers' expectations, with 808 learners who use the Jusur system completing the questionnaire. According to the collected data, 299 respondents (37 %) were male, while 509 (63 %)

were female. Most learners had used computers for more than three years (84 %), while 9 % had used computers for one to three years and 7 % had used computers for less than a year. From this, it can be assumed that respondents had a relatively high level of IT literacy and computer ability. Most participants (66 %) had not used any other E-learning system, while 34 % of learners had used other E-learning systems. Therefore, most participants in the sample were not able to make comparisons between the E-learning system in question and other systems; this means that they analysed the system impartially.

4.2 Overall Assessment for the Jusur LMS

Figure 1 shows the learners' overall response to the system. When asked about the usability of the system, over half of the learners (58 %) responded positively. In contrast, only 21 % of the sample responded negatively. This result shows the strength of the system, given the extent of overall user satisfaction. For additional clarification, Fig. 2 shows the learners' ratings for each usability factor. It appears that most of the students tended to agree with each statement regarding the usability factors. Interestingly, most learners provided positive ratings for the first four factors (i.e., content, learning and support, visual design, and navigation), thus indicating the strong usability of the system in terms of these attributes. The overall rating of the system will be discussed further in the following sections.

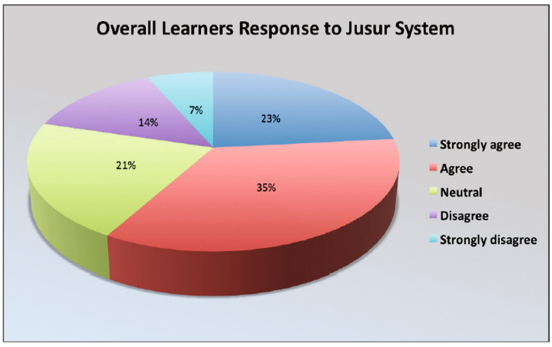

Fig. 1. Overall response

4.3 Overall Impression, Likes, Dislikes

In the last section of the survey, the questions were designed to elicit more subjective information. There were two questions: the first asked what learners disliked about the system, while the second asked what they liked about it. The learners provided often detailed answers to these questions, thereby offering insight into the usability issues and the weaknesses and strengths of the system. The following two sub-sections will present the different issues and positive points regarding the Jusur system, as collected via the responses to these questions.

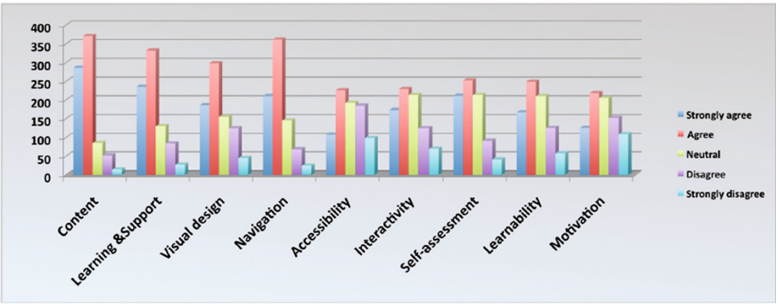

Fig. 2. Overall response with factors

4.3.1 Number and Nature of Problems Identified

In terms of analysing the qualitative data, a code-based analysis was designed to classify the answers. Regarding the first question, which asked learners what they disliked about the system, there were 502 statements submitted by 479 learners. Table 1 shows the different classifications of answers regarding the first question.

Some of the statements (8 %) were classified as general statements of opinion, such as "complicated system" and "boring system." The majority of the statements (92 %), however, reflected a mixture of different issues that were classified into five categories,

Table 1. Classification of issues

Statements	Frequency	Percentage
General statements of opinion	39	8 %
Specific Issues	463	92 %
Nature of Specific Issues	**Frequency**	**Percentage**
Technical issues	127	28%
Technical limitation issues	29	6%
Management issues	96	21%
Instructor issues	71	15%
Usability issues	140	30%
Usability Issues	**Frequency**	**Percentage**
Help and support	9	6%
Visual design	64	46%
Navigation	27	20%
Accessibility	5	4%
Interactivity	6	4%
Self-assessment	10	7%
Learnability	6	4%
Motivation to learn	2	1%
Availability	11	8%

Table 2. Classification of positive points

Statements	Frequency	Percentage
General statements of opinion	70	8 %
Specific positive points	761	92 %
Nature of Specific Positive Points	Frequency	Percentage
Technical	13	2%
Management	3	0%
Usability	745	98%
Usability Positive points	Frequency	Percentage
Content	25	3 %
Visual design	18	2 %
Navigation	12	2 %
Interactivity	228	31 %
Learnability	66	9%
Motivation to learn	23	3 %
Availability	373	50 %

as illustrated in Table 1. The taxonomy for these categories was based upon the researchers' understanding of the statements' core meanings and the type of the issues. While other researchers may have different taxonomies, this will not affect the totality and nature of the problems. As can be seen, 28 % of the problems identified were technical issues, including connection interruptions and difficulty with logging onto the system. The most significant problem cited in this category was that the E-learning application was considered slow. This is obviously a serious potential problem for an E-learning application system. Past research concurs that this is a major barrier to the relevance and success of any E-learning application. Technical limitation issues accounted for 6 % (n = 29) of the total issues cited. To illustrate, 13 users noted that notifications and synchronisation between the E-learning application and their mobile devices/e-mail were issues. This observation is notable because it shows that social media is expected to overlap with IT and E-learning today, especially among student users. The most frequently cited issue (n = 39) was that the registration procedure for the system was considered complicated. The students could not register automatically and receive benefits from all the features of the system directly. Rather, the learners were required to get permission from their instructors or support staff members in order to be added to view the content for a specific course. The instructor issues that were cited were related to the learners' instructors and their utilisation of the system. Specifically, some students (n = 22) mentioned that most of their instructors did not use the system, while others argued that their instructors were lacking the appropriate technical background. Instructor issues were raised by 15 % of the sample, and thus were quite commonly raised issues. The usability issues identified in the open-ended questions were further analysed. They were divided into nine categories, as shown in

Table 1. There were 140 statements submitted by the learners. It appears that the greatest number of problems cited was with the visual design. In summary, the findings suggest that the system has some usability problems, the most significant of which are related to the file upload and the forums features, which can be considered to be visual design problems.

4.3.2 Number and Nature of Positive Points Identified

When asked what they liked about the Jusur LMS, users expressed their satisfaction with the system, which indicates that the system has a wealth of positive points. The total number of statements submitted was 831 by 588 learners. A few of these (8 %) were general statements of opinion, such as "successful system" and "it is the system that can help users,"while 92 % of the statements referred to other aspects (see Table 2). Table 2 shows that the most significant positive aspect of the system was its usability, with 745 statements reflecting the users' positive impressions of the system.

This usability aspect is further classified into seven categories, as shown in Table 2. It appears that half of respondents (n = 373) liked the availability of the features in this particular E-learning system. These features include submitting coursework, viewing marks, voting, participating in surveys, completing online exams and online mock exams, accessing announcements, and participating in discussion forums and virtual classrooms. In addition, a significant number of students (n = 228) indicated that the system has features that encourage interactivity with their classmates and instructors (e.g., through group discussions and projects). The findings also show that learners (n = 23) believe that the system motivates their learning. These findings reinforce the importance of motivation and learnability as attributes to measure the usability of an E-learning application. These findings, along with the others, suggest one main conclusion: that most students (n = 588) like the system, as reflected by their opinions regarding the features they most liked about the system.

5 Conclusion

This paper has presented an evaluation for the usability of the Jusur LMS used in Saudi Arabia. The findings were based on a questionnaire that was designed to evaluate specific factors, including 'motivation to learn,' in order to discover the strengths and weaknesses related to the usability of this LMS, as well as to investigate the importance of any learning management system to motivate its users to learn. We presented detailed findings based on data collected from 808 learners who responded to the survey. From a statistical standpoint, the data gathered found that the Jusur LMS is viewed as a usable system from a user perspective. In this study, the research process concentrated on eliciting phenomenological data to assess what is problematic and what is good about the system from the reflexive view of its users. From the findings obtained, the system can be seen to be a usable and desirable example of an E-learning application from a student user perspective. However, some problems in the system were also identified, and these need to be considered by the system's providers. Finally, the results from this

study affirmed that the questionnaire suggested by [17] was able to successfully determine the extent to which users are 'motivated to learn' by this particular E-learning system.

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