

Usability testing of Moodle application in the Context of M-learning in HE in India with Special Reference to MBA and MCA courses

Kamlesh A. Meshram^{1*}, Manimala Puri²

¹Dept. of MCA, JSPM's Jayawant Institute of Management Studies, Savitribai Phule Pune University, Pune, India

²JSPM Group of Institutes, Savitribai Phule Pune University, Pune, India

**Corresponding Author: kamlesh.meshram2007@gmail.com, Tel.: +91-9850228842*

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Abstract— This paper presents a usability testing of a Moodle mobile application which is Learning Management System (LMS) in the context of HE students and teachers perspectives. This paper begins with discussing how mobile learning could help in teaching learning process. Digitization has changed the complete teaching-learning process in higher education in India. During last decade or so usage of mobile devices has been increased tremendously as mobile technology allows the learners to perform various tasks as far as education is concerned. In M-learning technology, usability of mobile applications plays a vital role in the context teaching-learning process. ISO defines usability as “The 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”. Aim of this research study is to test Moodle application in the context of HE (Higher Education) in India with special reference to MBA and MCA courses. With this research, we tried to acquire important finding and information for administrator, teachers and students on how Moodle is effective in teaching-learning process. In this paper researchers have used convenience sampling method to collect qualitative and quantitative data from students and teacher of MBA and MCA courses. This research study conducted using One hundred forty three (143) students and seventy two (72) teachers from the professional courses like MCA and MBA. The paper concludes with a discussion of how various usability dimensions makes impact on M-Learning application in the context of Higher Education is concerned.

Keywords— Moodle, Usability Testing , M-Learning, Higher Education, Learning Management System

I. INTRODUCTION

The new era of digital education has been started in which teacher and learner both are accepting ICT tools; the most prominent ICT tool for getting and providing knowledge is through mobile technology. The world of education is moving very fast in the process of accepting and transforming new teaching-learning tools in the context of Higher Education (HE). Mobile users are massively increased in India, according to “Statista” an online portal, 358.46 million mobile users are active in the year 2018 and it will increases to 492.68 million mobile users by the year 2022. The internet connectivity in India is in the growing phase, due to high-quality 4G connectivity huge increased in smartphone users. Various studies have been given encouraging result for using mobile technologies to support students and teachers in the teaching-learning process. Usability term can be defined through various types, “The 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” [1]. Usability defined as something which is convenient and practicable to

use [1]. According to Interaction Design Foundation, Usability is part of the broader term “user experience” and refers to the ease of access and/or use of a product or website [3]. A design is not usable or unusable because of, its features, together with the context of the user (what the user wants to do with it and the user’s environment), determine its level of usability. Nielson-Norman Group defines usability as a qualitative attribute that assesses how easy it is to use a specific user interface, as well as the process of improving said interface, starting with the designing phase [2]. Mobile learning is exceptional modern technology in the context of teaching-learning process in the field of higher education. According to the past research finding, results shows success of this technology is majorly depends on human factors which concerned with usability of M-learning application. A portable device comes with a very important feature i.e. they are not fixed, so that learners have the flexibility to learn anywhere they choose. M-learning is considered as the next step beyond electronic learning (E-learning) and distance learning (D-learning) by using smartphone devices with internet connectivity to facilitate formal and informal learning [16]. Over the past decade M-

learning has become gradually popular in higher education settings by providing mobile access to learning resources, collaborative learning and to exchange formative evaluation and feedback between students and teachers. Therefore, M-learning involves learning activities that are not restricted to a specific time & place or context in which learning is being done. Usability of a mobile application plays vital role to implement M-Learning methods in the context of higher education. Usability refers to methods for improving the ease-of-use, effectiveness, memorability, adaptability and satisfaction in the application design. Usability testing of mobile application on the other hand generally involves the evaluation of the accessibility of an application from the users' perspective with regard to different aspects of the application functions.

The aim of this research work is to test usability of Moodle application in the context of teaching-learning process. The research is conducted in various management colleges which are affiliated to Savitribai Phule Pune University, Pune Maharashtra. Data were collected from MBA and MCA students and teachers using online questionnaire. The outcome of this research is to guide and find out various usability concerns in a Moodle mobile application.

Section II contain the related work of usability testing of mobile learning applications, specifically Moodle, Section III contain the research gaps which has found during Section II, Section IV specifies the objective of the study, Section V prepare research questions based on research gaps and objective of the study, section VI formulate the research hypothesis based on the objectives of the study, Section VII contain the research methodology, Section VIII contains research analysis, Section IX contains research findings and Section X concludes research work with future directions.

II. RELATED WORK

The field of Electronic learning is not new in India; many E-Learning Management System (ELMS) service provider are providing their E-learning solutions to the various state as well as private Universities and Institutions. There are many challenges to execute and employ E-learning application in the institutional environment. The challenges associated with e-learning are due to the technical limitations of computers and the internet, and these challenges need to be reduce [31]. Universal problems encountered by e-learners contains of the following: without any formal training to the teachers, they have to utilize e-learning application which is technically difficult. These E-learning applications are specialized software in which users needs to have expertise in it.

This research study were studied the demographic profiles of the learner and their amount of usage of mobile technology

through mobile learning application. The study shows that less than 5% of population does not own smartphones. This study also shows that learner and instructor are found mobile learning application easy to use in their studies [14].

In this research paper researchers evaluate existing Moodle application in the context of users. Focus group interviews method was used in this research, data were collected from students as well as lectures from the New Era College. Five students and lecturers voluntarily participate in these focus group interviews. Interviews were separated into two groups; both of which consisted of five users of the same category, but with different education fields. The total numbers of participants for the user testing process in this study are five instructors and five learners. Instructor's ages ranged from 26 to 42 and students ranged from 18 to 23 [31].

Several previous research studies have mentioned to this innovative type of teaching-learning method as Learning Management Systems (LMS), which incorporate other learning technologies to get better learning in a variety of setting. A broadly used LMS in various universities and other educational institutes is Moodle (Modular object-oriented dynamic learning environment). Moodle is a Learning Management System (LMS) which is open source application which provides support to various learning stages. This LMS application is undergoing continuous evaluation and feature-enhancement. It was intended to help teachers create and manage a quality online learning environment for students [32].

This research study conducted for the period of a semester in 2006 at the California State University found that when preference were asked among using the commercial Blackboard LMS or Moodle, 75% of the students preferred Moodle (confirming two prior studies), however going by functionality only, the results were mixed, with no clear winner. The researchers of this study on the other hand point out that 65% of students considered their prior experience with an LMS, beneficial and valuable [22].

In this research study researcher had tried to provide an answer the problem "Why Moodle" through evaluating the open-source platform to other existing solutions, from a variety of perspectives. In this research study researchers have found several advantages and also mentioned concern over disadvantages of this emerging technology [3].

This research study investigates ten e-Learning platforms from two perspectives: the list of features they possess, and the technical requirements. Since their LMS of choice was also Moodle, they then proceeded to analyze in depth the security of said platform, especially from the point of view of authentication. The conclusion of the study was that

Moodle is the optimal solution (according to the parameters of the study), but further work were needed in order to secure the platform against online attacks [21].

The various factors have specified to give the impression of Moodle as a learning platform, which evaluates the students' preference for each of the main aspects and communication tools. The findings were by and large positive, while still highlighting the areas (tools, modules, etc.) where work was needed [16].

The transfer from a Blackboard-based LMS to Moodle can be done with few problems, while being a novice user of an e-Learning platform (at least from the point of view of the professor) is a welcome change to the learning process [11]. In this research study researchers compares various Learning Management Systems solutions such as Moodle, Sakai and dotLRN. This comparison conducted by using five usability experts, who investigate the mainly three popular in open-source e-Learning platforms from the perspective of the 10 Nielsen heuristics. The result of this study was somewhat surprising, they find Moodle as the worst from three in terms of usability and its evaluation, with 263 non-compliance checkpoints out of 300 (compared with 194 and 180 for the others) [23]. Android based attendance management system can be very useful to monitor and improve class attendance [34]. Moodle mobile application can be accessible with the help of Mobile Ad Hoc Network (MANET) provided by the institution [35].

III. RESEARCH GAPS

Numerous studies have been done to test usability of Moodle web application on various grounds and context. Few of them were used to make an well-versed choice between Moodle application and other e-Learning platforms (either web based or desktop based), while others tried to assess its effectiveness in specific situations, or to live sure metrics of the platform (including usability), with the final word goal of up the training method [12,13,14]. Moodle mobile application that is used by college student were not designed for educational purpose, basically it is designed for browser based web application [22]. Very few studies have research on various usability aspects such as perceived Ease of use, perceived Attractiveness, perceived Enjoyability, perceived Efficiency. Usability has to be considered in a different way when it comes to evaluate and implement in the context of teaching learning process.

IV. OBJECTIVE OF THE STUDY

1. To study demographic profiles of users, using Moodle application for learning purpose in the context of HE in India with special reference to MBA and MCA courses.

2. To study usability issues in Moodle mobile application in learners perspectives in the context of HE in India with special reference to MBA and MCA courses.
3. To study usability issues in Moodle mobile application in learners perspectives in the context of HE in India with special reference to MBA and MCA courses.
4. To study students and teachers perceived usefulness of Moodle mobile application in the context of HE in India with special reference to MBA and MCA courses.
5. To study applicability of existing Moodle mobile application in the context of HE in India with special reference to MBA and MCA courses.

V. RESEARCH QUESTIONS

1. Is Usability is a key aspect according to M-learning application users.
2. Are there any usability issues with Moodle M-learning application?
3. What essential usability dimensions are in concerned with the Moodle mobile application?
4. Are students and teachers satisfied with the Moodle mobile application?

VI. RESEARCH HYPOTHESIS

H1₀: Usability of mobile application does not significantly impact on perceived usefulness of MBA and MCA students and teachers.

H1₁: Usability of mobile application significantly impact on perceived usefulness of MBA and MCA students and teachers.

H2₀: Usability of mobile application not significantly affect on Ease of Use of MBA and MCA students and teachers.

H2₁: Usability of mobile application significantly affect on Ease of Use of MBA and MCA students and teachers.

H3₀: Navigability does not significantly correlate with perceived memorability.

H3₁: Navigability and perceived memorability are significantly correlated.

VII. RESEARCH METHODOLOGY

This study was carried out at the Management colleges from Savitribai Phule Pune University (SPPU). Survey method was used in extracting information on the usability of the Moodle mobile version. A 20-items questionnaire was given to students and teachers to collect their responses about the usability of the application. Two hundred fifteen (215) users of Moodle mobile app were participated in the survey for the study, out of which, 73.5% were students studying at MBA and MCA courses and 26.5% were teacher teaching at MBA and MCA courses from colleges affiliated to Savitribai Phule Pune University. The age of most of the student participants ranged between 21 to 25 years 93.7%, while age

of the teacher participants ranged between 25 to 40 years 72.2%. In addition, 57.8% of participants were male and the other 42.2% were female. 95% of the participants (Students and Teachers) used smartphones in the past, while 82% participants have used Moodle mobile app at regular basis. The remaining 18% used the application sometimes. SPSS was used for analysis of data and data were presented as arithmetic means, and standard deviations. Five common Moodle mobile application's functions were used by participants, these include: 1) View or read or download subject wise notes 2) Listen audio content 3) Watch video content 4) Assignment submission 5) Read Notification.

VIII. RESEARCH ANALYSIS

The analysis and findings were divided into two sections, namely Teacher and Student. Users of Moodle mobile application are having some specific requirements; these requirements were documented in the form of detailed diagram.

IX. RESULTS AND DISCUSSION

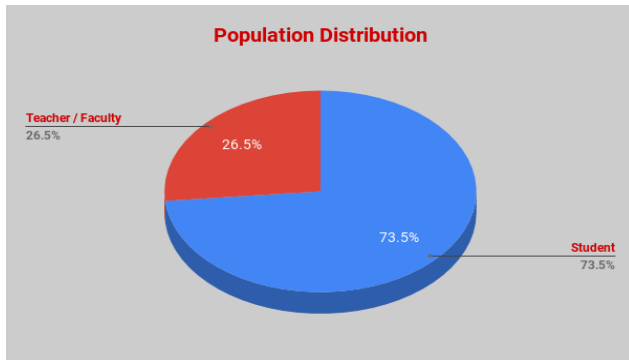


Figure 1: Population distribution

Figure 1 shows population distribution, which shows responses collected in the form of online questionnaire collected from two hundred fifteen (215) respondents out of that One hundred forty three participants were students and seventy two (72) participants were teachers.

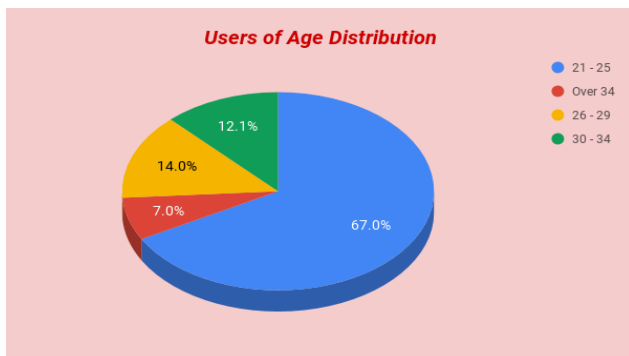


Figure 2: Population distribution on age criterion

Figure 2 shows age distribution in which 67% user falls in a age group of 21-25 followed by 14% are from age group of 26-29, 12.1% from 30-34 and 7% are falls in a age group of over 34.

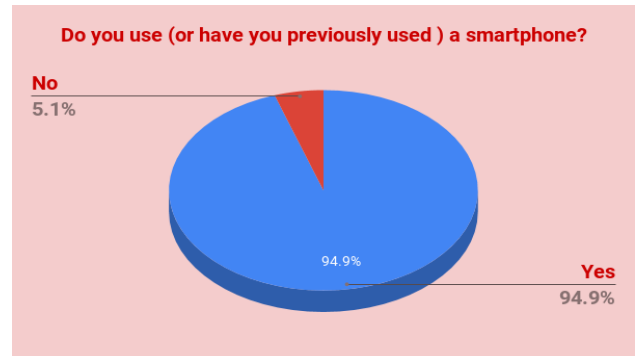


Figure 3: Smartphone used by participants

Figure 3 depicts that, 94.9% users have used or previously used smartphone for learning or teaching purpose.

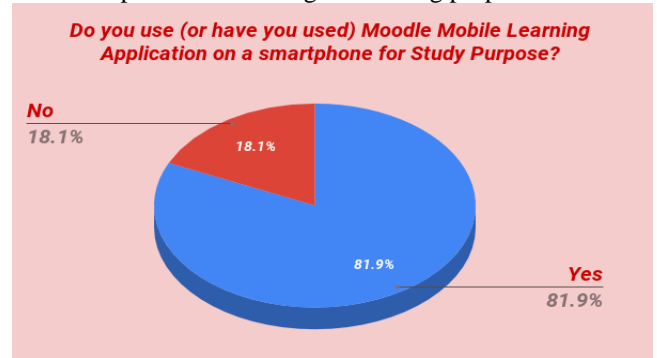


Figure 4: Moodle Mobile learning application used

Figure 4 shows responses on the question that, have you used Moodle mobile application for the study purpose. 81.9% respondents say that they used Moodle mobile application as a learning tool for their study.

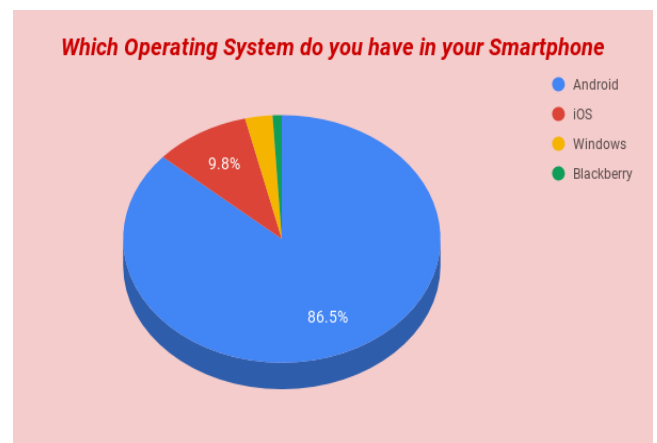


Figure 5: Mobile OS distribution

Figure 5 shows responses on the question which operating system do they have in their smartphone. 86.5% respondents said as android is their operating system followed by 9.8% as iOS and very few for Windows and blackberry.

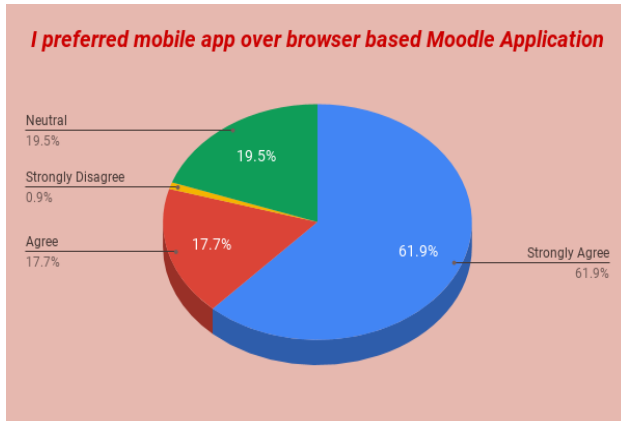


Figure 6: User preference on Moodle App

Figure 6 show the responses on the question what is their preference as learning device mobile application or desktop based browser. 79.6% respondents said they preferred mobile application over desktop based browser for their learning purpose. 19.5% cloud not said anything and 0.9% respondents said their preference was different.

IX. RESEARCH FINDINGS

The main contribution of this paper is to find the result on usability testing of Moodle mobile application in the context of teaching learning process, implemented for MBA and MCA courses. The research study was focused on five aspects namely effectiveness, efficiency, ease of use, memorability and enjoyability of Moodle mobile application. This research study also focused on the some usability aspects which need to be considered while designing, developing and testing M-learning application. These aspects are educational context in which students and teachers are using this application, Usability of the device, Usability of the content and Usability of mobile web interface. Definitely there is direct usability influencing factors between the four domains. For example, usability issues of mobile devices emphasize on usability issues of the user interface.

Table 1.Summary of the Results for Hypotheses Testing

No	Hypothesis	R	p-value	Decision
H1	Perceived Usefulness --> Satisfaction	0.747	.000	Supported
H2	Perceived Ease of Use --> Satisfaction	0.767	.000	Supported
H3	Navigability ---> Correlate with Memorability	0.747	.000	Supported

Multiple Regression Analysis

A standard multiple regressions are used to check the model fit. The finding shows that F value is statistically significant (F=27.701, P<0.05), which indicates that the model is statistically significant [33]. The R2 for this model turned out to be 0.748 whereby, adjusted R2 resulted to be 0.747. This asserts that independent variables explained 74.7% of variance in the dependent variable.

Table 2: Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.157	.098		21.914	.000
	Perceived Usefulness	.551	.022	.865	25.136	.000
2	(Constant)	1.884	.113		16.675	.000
	Ease of Use	.183	.042	.240	4.399	.000

a. Dependent Variable: Overall satisfaction

As shown in Table 2, the independent variables (Perceived usefulness and perceived Ease of use) contributed significantly towards explaining the dependent variable (Satisfaction). The highest contribution resulted from Perceived usefulness variable (B=0.551, t=25.136, Sig=0.000); explaining 55.1% of statistical significant influence (while holding other predictors in the model constant). Following this, Ease of use marked the major influence on user satisfaction (B=0.183, t=4.399, Sig=0.000); explaining 18.3% statistical significant influence.

Table 3: Correlation between Memorability and Navigability

		Satisfaction	Memorability	Navigability
Satisfaction	Pearson Correlation	1	.865**	.865**
	Sig. (2-tailed)		.000	.000
	N	215	215	215
Memorability	Pearson Correlation	.865**	1	1.000**

Navigability	Sig. (2-tailed)	.000		.000
	N	215	215	215
	Pearson Correlation	.865**	1.000**	1
	Sig. (2-tailed)	.000	.000	
	N	215	215	215

** . Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 3, variable satisfaction, Memorability and Navigability are strongly correlated. As shown in Table 3, Correlation is significant at the 0.01 level, research analysis shows for Memorability variable is .000 and Navigability variable is .000.

X. CONCLUSION AND FUTURE SCOPE

This study evaluated Moodle mobile application with reference to MBA and MCA students' perspective. To evaluate Moodle mobile application researchers have considered five usability dimensions namely Perceived Usefulness, Ease of Use, Navigability, Memorability and Understandability. The results have shows that the five usability dimensions proposed in the study have a significant relationship with the user satisfaction. The proposed model has resulted to be significantly fit; the independent variables explained 74.7% variance towards the dependent variable. This study has some limitations in the perspective of usability testing. This study evaluated Moodle application where as there are many M-leaning application used by MBA and MCA students such as Sololearn, Swayam, etc. In this study only MBA and MCA students and teachers have considered as a respondents which may restrict the validity of the findings. This study could be further studied to identify some more usability dimension in the perspective of MBA and MCA courses as well as for other M-learning applications.

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Authors Profile

Mr. K A Meshram pursued Bachelor of Computer Science from Amravati University Maharashtra India in 2003 and Master of Computer Application from Savitribai Phule Pune University in year 2007. He is currently pursuing Ph.D. and currently working as Assistant Professor in JSPM's Jayawant Institute of Management Studies, Pune Maharashtra India since 2009. He is a member of IEEE & IEEE computer society since 2013, also member of the ACM since 2015. He has published more than 10 research papers in reputed national and international journals including and conferences available online. His main research work focuses on Usability of mobile applications in higher education. He has 9 years of teaching experience and 4 years of Research Experience.



Dr. Manimala Puri works as Director , **JSPM Group of Institutes Pune**. Dr M.M.Puri has over 25 years of teaching as well as administrative experience in the field of technical education. She is M.Tech from N.I.T Kurukshetra and PhD (IT) from Guru Gobind Singh Indraprastha University ,Delhi. She has also completed post graduate diploma in business management from I.M.D.R ,Pune.She has had the **distinction of working at All India Council for Technical Education (A.I.C.T.E) as Director.**

