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USABILITY EVALUATION OF ISLAMIC LEARNING MOBILE APPLICATIONS

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Abstract : The trend of using mobile devices for the purpose of learning is gaining momentum. Apart from traditional education, various applications are being developed for religious learning. Pakistan is inhabited by around 98% of Muslims. Hence, the informal learning of Islam is essential for Muslim child development. This research presents a usability study of different Islamic learning mobile applications available on the android platform for children. The purpose of this research is to evaluate the usability of different Islamic learning mobile applications for children of diverse age groups in order to understand what design principles must be followed that increase the usability of the application. The main focus of this research is to observe and evaluate how easily children of different age groups respond to different applications, how effectively the children understand the core features of the applications and how easily they are able to use the application by themselves.

Keywords : Mobile Application, Usability, Islamic Mobile Application, User Interface, Education, Children.

Introduction

Mobile phones have become a part of everyday lives and various applications are being developed for every domain and age group. However, the mobile application sometimes may have usability issues leading to low user acceptance. These usability issues occur because developers neglect different design principles such as the visibility of features, consistency and feedback. Also, they may use technical and difficult language that increases the obstacles in using the application instead of mapping with real concepts due to which the usability of the application is affected. Usability is the most important aspect of an application.

The best applications from the point of view of users are not those that provide all features but those that are usable and easily understandable.

This paper presents the evaluation of different Islamic learning mobile applications developed for children of different ages and different educational background. The applications that are evaluated are based on Islamic teachings that provide basic knowledge of Islam, which help children to perform prayer step by step and to learn how to perform ablution.

The purpose and objective of this research paper are to evaluate effectiveness, learnability and user satisfaction of different Islamic learning applications. The foremost emphasis of this study is to detect and appraise how effortlessly children of diverse age group reply to the divergent application, how effectively the children comprehend the essential features of the application and how effortlessly they are able to practice the application on their own. An additional goal to be achieved from the assessment of this study is to determine to what degree the learnability of children is amplified by the usage of Islamic learning mobile applications.

The usability of the application is measured by using a co-operative evaluation method. In this research, fifteen different Islamic learning applications are selected. These applications were selected on the basis of popularity on android playstore. As the research is based on measuring and comparing the effectiveness, learnability and user satisfaction of every application; therefore, these fifteen applications are categorized into three different categories. Each category consists of five applications. The categories are made on the basis of how to perform salah (the ritual prayers prescribed by Islam to be observed five times a day.), learning the 99 names of Allah, daily supplication and Kalima. The factors observed are the time taken by children to access the core features of the applications in order to find the rate of completion and how much they explored the basic features on their own. Another factor observed is to measure how easily the children are able to learn while using the application. An additional purpose of this study is also to compare applications with same features but have different interfaces and usability in order to discover which design strategies have been implemented in applications that produce hindrances to children to use the core features.

The key objectives of this study can be summarized as follows:

- a) To evaluate the usability of various Islamic applications available on android play store
- b) To assess the effectiveness, learnability and user satisfaction of these applications for children
- c) To study the impact of interfaces on user acceptance by comparing applications with similar features and different interfaces.

The structure of the paper is as follows. The introduction is followed by a related work section. Next, Experiment design is discussed, which includes the

details of participants and measurements taken into account in this study. Subsequently, results are presented and the last section concludes the paper.

Related Work

In (2013), Rachel Harrison, Derek Flood and David Duce while conducting a review, found the three attributes (effectiveness, efficiency and satisfaction) to measure usability. From the previous research, it has been concluded that an attribute which is cognitive load is missing. Although this attribute plays a very important role in the success or failure of the application, it was missing. So they introduced PACMAD (People at the Centre of Mobile Application Development) usability model. To create a more comprehensive model PACMAD emerges important attributes of various usability models. This model consists of three factors (User, Task and Context of use). The final design of the application is affected by these factors. For evaluating the usability of mobile application, some metrics are defined by the seven attributes of this model. In order to prove above mentioned concepts they conducted a literature review in which they found that each attribute was found to be important by 20% except memorability (McWhorter, 2014).

In (2015), three members of (Brawijaya University) conducted research on the usability of mobile applications used in this system required several kinds of inputs from the user. Through widgets user can give input by using two dissimilar interaction methods. Usability between these two interaction methods was measured by considering the three attributes of usability (Effectiveness, Learnability and Satisfaction Performance). Through this study, they estimated the applied user interface of mobile applications in culinary recommendation system. Ultimately, according to effectiveness and satisfaction, they found no severe usability issues while obtaining user input between these interaction methods. On the basis of learnability, they found that if the user has previously experienced a similar interface then the user can perform well. The usage of common widget makes a user capable enough to use the application in a better way as compared to dissimilar user interface (Az-zahra, 2015).

In (2016), an empirical study was conducted to evaluate the usability of mobile applications running on different operating systems such as Android, IOS and Symbian (Moumane, 2016). They have developed a framework on the use of Software Quality Standard ISO 9126 in mobile environments. In this study, they used ISO 25062 and ISO 9241 standards and the mobile applications which they used were Google Apps and Google Maps. Through their study, they concluded various issues of mobile usability related to both hardware and software. Hardware issues include the size of screens along with the resolution and the capability to store data whereas, the issues related with software includes online assistance facility and guidelines for user guidance, usage of simplified methods

for entering data, and others. They prefer large-screen smartphones over a smaller one because smartphones with large screens are more easy and comfortable to use.

The research mentioned above provides a basis for conducting a usability study of mobile applications. The methodology used in these studies forms the basis on which we have designed our study. However, this study is conducted in order to examine the usability concepts (Effectiveness, Learnability and Satisfaction) in different Islamic Learning Mobile Applications for children.

Experiment Design

The main target of this research is to test different Islamic learning applications among diverse groups of children to check the usability and accessibility, whether they are able to learn and understand easily. The interface built is easy to use or not and whether it includes graphical contents to attract everyone.

The research is conducted using 15 different Islamic mobile applications with different task sets to check the visibility or accessibility of the applications. This is done by examining one application on five different children in order to observe the time taken by children to access the core features of the application and number of obstacles they faced.

The results are compared on the basis of observations obtained through different experiments. All the applications included in this research have been made to access the core features of the application and number of obstacles they faced.

All the applications included in this research have been categorized into three categories. The first category is daily supplications and Kalima, the second one is 99 Names of Allah and the third one is How to Learn Namaz.

The evaluation is done using co-operative evaluation method in which users are allowed to criticize the applications. Due to this, obstacles are found that children faced while using the applications.

The main focus of conducting this experiment is to discover the answers of following questions :

- 1) What is the rate of completion?
- 2) How much time the user took to learn the task?
- 3) How many errors were made by the user?
- 4) How much time has the user taken to operate the application?

Table 1 shows the task set to be completed by targeted users.

Table 1. Name of Application and their task sets

Category	Applications Names	Task set
Duas and Kalmas	Kids Kalma	Select first Kalma in the Urdu language
	Muslim Kids Duaa	Find Dua before sleeping
	Lil Muslim Quran and Islam for Kids	Find Dua for climbing stairs
	Lil Muslim Kids Duaa	Complete the levels till 3
How to Learn Namaz	Kids Kalma Series	Play kalma second in audio
	Learn Namaz	Find prayer time
	Learn Namaz Urdu	Find how to perform namaz-e-fajr in (women/men)
	Salah For Kids	How to perform Wudu
99 Names of Allah	Steps by steps Salat	Find rakat table
	Wudu and Salah	Find Wudu steps
	99 Names (Green)	Find 4th name of the holy prophet
	99 Names of Allah (Purple)	Find details of 2nd name of Allah
	Allah (Yellow)	Play 6th name of Allah
Meaning & Benefits of 99 Names of Allah	Find the meaning of 3rd name of Allah	
99 Allah Name (Sea Green)	Find 37th Name of Holy Prophet	

Participants

The participants of this research are children of different age groups from five to twelve ages having primary background education. Participants included in the research are those learners that possess decent awareness in English and Urdu. They have been utilizing Android Smartphone and are familiar with using different android applications in supporting their daily activities. This research targets those children who are physically and mentally capable of performing different activities.

Each application selected is tested by five different children in order to check how efficiently each child uses the application. Every child is allowed to use the application at their own and to perform the task set given to them. Four metrics are used for every user using these applications. The first is the rate of completion of task set given to them. Secondly, how much time they take to learn by using the application. The third is the number of errors made by participants while completing the task set given to them. And last is how much time the participants take to operate the application.

Measurement

The participants of this research are children of different age groups from ages five to twelve having primary background education. Participants included in the research are those learners that possess decent awareness in English and Urdu. They have been using Android smartphones and are familiar with using different android applications in supporting their daily activities. This research targets those children who are physically and mentally capable of performing different activities.

Effectiveness is related to the correctness and perfectness of participants in attaining the stated objectives. Learnability element is part of effectiveness. For estimating satisfaction, a questionnaire was prearranged for each individual task set. The questionnaire is used to collect views and understandings of children which they faced using the mobile application.

Table 2 shows the attributes that have been measured in this evaluation in terms of usability and satisfaction. It also shows the metrics and description of the attributes that have been measured.

Table 2. Metrics And Description

Attributes	Metrics	Description
Effectiveness	Percentage of completion	The percentage of children who properly complete and accomplished the goal of each task.
	Time to learn	Time is taken to read and remember the task.
	Number of errors	Number of errors when reading scenarios and at the time of task execution.
Learnability	Time is taken to operate application	Total overall time is taken to complete one task and achieving the goal of each task.
Satisfaction	Questionnaire	Measure satisfaction from the application through QUIS-CSQU questionnaire.

Table 3. Mobile Application Names

Mobile Applications Names	
App 1	Muslim Kids Duaa
App 2	Lil Muslim Quran And Islam
App 3	99 Allah Name(Sea Green)
App 4	Salah For Kids
App 5	Allah(Yellow)
App 6	Kids Kalima
App 7	Lil Muslim Kids Duaa
App 8	Kalima Series
App 9	99 Allah Names(Purple)

Mobile Applications Names	
App 10	Step By Step Salah
App 11	99 Names Of Allah(Green)
App 12	Wudu And Salah
App 13	Learn Namaz Urdu
App 14	Learn Namaz
App 15	Meaning And Benefits Of 99 Allah Names

Table 3 shows the names that have been used in graphs. The average rate of completion for Learn Namaz is very high as compared to other applications because the prayer times were not directly visible and only three out of five children completed the task without any error. Other two children completed their task but took time in completion, whereas task completion time of application Wudu and Salah is very low because the options were very clear to the children. The interface of the application is very interactive that showed all steps with pictures. Due to these factors, children were able to memorize the steps easily.

Figure 1 shows the average time taken by children to complete the task given to them. The application Step by Step Salah has taken the highest time. Because the task set of this, the application was to find rakat (it consists of the prescribed movements and words followed by Muslims while offering prayers) table. Children were asked about the number of rakats in Namaz - e – Zuhar (It is the name of one of the ritual prayers of Muslims performed in the afternoon). They were unable to answer the numbers of rakats properly because they didn't understand the numbers of rakats in table format. Therefore, this application took the highest time as compared to other applications. The lowest time has been taken by the Wudu and Salah application since it was easy to operate the application due to the simple and easy interface.



Figure 1. Time is taken by users

Figure 2 shows the number of children that have completed the task. From Figure 2, it can be observed that in almost every application, children completed

the task set given. But in two applications, two out of five children could not complete the task because of visibility issues.

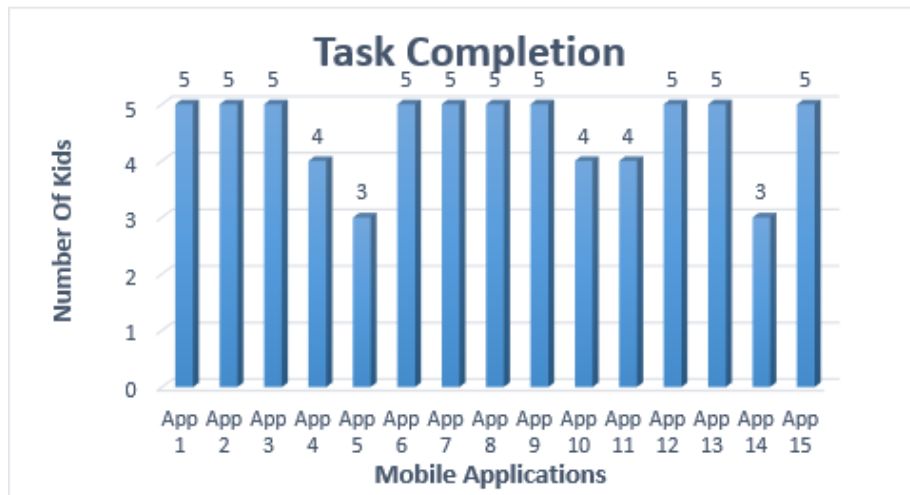


Figure 2. Task completion

Evaluation

The General Information Questionnaire was given to users so that they could explain their knowledge regarding Islamic learning mobile applications for children. Table 4 shows general information questionnaire.

Table 4. Questionnaire

General Information Questionnaire	
Name:	Age:
Gender: Boy/Girl	Class:
1	I am satisfied that the overall system is easy to use.
2	It was simple to use this system.
3	I can effectively learn Islamic knowledge using this system.
4	I am able to efficiently learn how to use the system.
5	I feel comfortable using this system.
6	I believe I have to gain more knowledge about Islam using this system.
7	The information (such as online help, on-screen messages, and other documentation) provided with this system is clear.
8	It is easy to find the information I needed.
9	The information provided for the system is easy to understand.
10	The organization of information on the system screen is clear.
11	The interface of this system is pleasant.
12	I like using the interface of this system.
13	This system has all the features I expect it to have.
14	Overall, I am satisfied with this system.

Figure 3 shows the applications that have similar interfaces took less time in operating. Therefore, their user satisfaction is good, and there are no significant problems in these applications, due to which children were comfortable in using these applications. Besides this, the applications that have simple and attractive

user interface have better usability and support in terms of user performance and comfort.

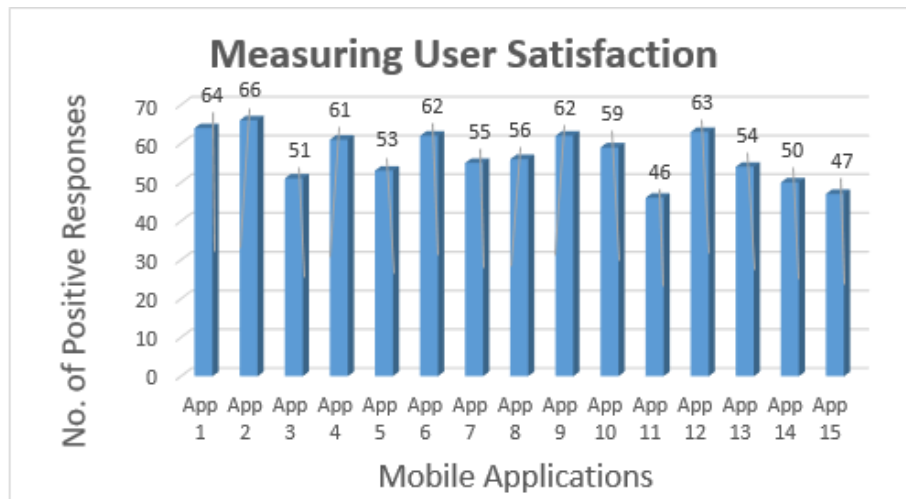


Figure 3. Measuring User Satisfaction

Figure 4 also shows the average of users that agreed to the questions of applications that were asked to measure user satisfaction. Lil Muslim Quran and Islam application have achieved the highest rate of user satisfaction from all the other fifteen Islamic learning mobile applications because its interface is attractive and children find it easy to use. Ninety-nine names of Allah (Green) has achieved the lowest rate of user satisfaction because its interface is not good and children find it difficult to use.

Result and Discussion

From this study, the usability of Islamic learning mobile application for kids in terms of effectiveness, learnability and satisfaction is evaluated. For this purpose, all the applications are divided into three categories and a task set associated with each application. It was observed that the children belonging to different age groups had a different time, usually in seconds (less than one minute), to complete the given task set. Most of the children completed their task set easily. In terms of effectiveness, all of the applications can be considered to be effective because they are providing consistent Islamic knowledge, and users can get enough basic knowledge from these applications. The user interface of most of the applications was easy to use. However, in some applications, the navigation problem is recorded, which ultimately created learnability issues for our targeted users. Hence there is a need to make better and clear navigations and controls by considering the children. According to satisfaction, mostly all of the users agreed with questions which have been included in the general information questionnaire.

This research paper has presented an experimental assessment of the usability of Islamic learning mobile applications. For this purpose, an experiment has been directed by assigning task sets to 75 children. They have to perform

those tasks on mobile devices along with the permission of thinking aloud while using all fifteen Islamic learning mobile applications. The purpose of this experiment was to recognize and highlight the usability issues while using the application. In this experiment, usability issues are collected in terms of effectiveness and learnability that is measured by a set of metrics and as well as user's satisfaction is also measured through the QUIS -CSQU questionnaire (Moumane, 2016).

Through the experimental study and assessment with 75 children, it has been concluded that there are no critical issues occurred, related to the usability while performing the given task set between fifteen Islamic learning mobile applications as per its effectiveness point of view. Most of the children were able to finish the assigned task set easily, without any severe issues in each application. Hence, the user interfaces of mobile applications are easy to understand and simple as well. So, there should be no significant application usability issues related to its effectiveness.

According to the learnability assessment of fifteen Islamic learning mobile applications, there is an obvious association between user experiences while using mobile applications and usability issues regarding learnability. Users are able to perform better when they had earlier encountered related user interfaces, and they likewise take less time. Hence, showing better performance in terms of the usability of the mobile application.

There are no noteworthy issues met regarding user satisfaction among each of the fifteen Islamic learning mobile applications. However, there are results from more profound investigations from the survey answers, that the utilization of simple and attractive user interfaces in the application should offer enhanced usability and assistance related to user performance and relaxation.

Conclusion

This study directs a relative report between fifteen different applications of communication style in the given user interface. On the basis of the results obtained from the above research, it is found that having all the features in any application cannot increase the usability of the application. It is essential to keep an application simple, especially if target users are children. As in the above research, some applications provided the same functionality to the users but still some are expected to be used more than others. Although all the applications fulfilled user requirement, the way of using each application is different. Some applications are rated to be used more because it helps the user to use the system more effectively than others. It was observed that developers have often ignored usability while focusing more on features of the applications. It is recommended that developers must take into account the ease of use of core features with respect to the target audience. All design principles must be kept in mind while designing interfaces. The interface of an application should be in such a way that it should

not only fulfil users' requirements but must meet all the usability goals. The designers must know who are the target users and their educational background. The status of the system should be highly visible at each point. So, the users are acknowledged where they are at the current time. Designers should try to implement those concepts that match real-world things. This helps the user to better interpret the things defined in the application and to use them effectively. A user should be given full control and freedom while using the applications. By giving full control and freedom to use, the application satisfies the user that they can return back to the original state. Due to this, they can explore it more. It is also important to maintain consistency and standard in order to reduce usability issues. Help should be provided to the users. Besides this, the minimal design should be presented and no irrelevant information should be given in order to increase learnability and memorability.

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