

USABILITY EVALUATION OF VIRTUAL UMRAH BASED ON USER CENTERED DESIGN FROM EXPERT USER VIEW

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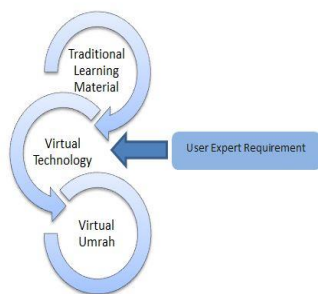
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Graphical abstract



Abstract

With the emergence of the learning materials volume, the developer has to face many challenges to develop an effective and efficient application to support the learning process. The objective of this study is to evaluate usability of Virtual Umrah application based on expert views using User-Centered Design approach. User-Centered Design is a multi-stages process that requires the designers to analyze and verify the requirement of a user by involving the user throughout the whole processes. The findings of the usability evaluations are for errors, efficiency and satisfaction level, the individual mean score is 4.00, 4.20 and 4.40. While for the memorability and learnability component, the mean score for the items are below than 4.00 which are 3.80 and 3.70 respectively. These findings demonstrate that the developed application is significantly needed by the pilgrims and individuals in order to assist them in preparation and performing Umrah.

Keywords: Virtual reality, expert user requirement, user centered design, umrah

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1.0 INTRODUCTION

The development of digital world has dramatically expanded. The expansion has changed the way of organizations such as educational entities, research institutes and medical institutions carried out their daily routines. In these last few years, the development of the applications based on Information and Communication Technologies (ICT) have increased dramatically in term of the volume of learning materials.

With the emergence of the learning materials volume, this would introduce a new challenge upon producing the learning material. Other than that, to develop an application that meet the user's expectation, the developer has to face many challenges to develop an effective and efficient application to support the learning process. The sudden surge in the amount of the learning materials has initiated to issues regarding the quality of the existed materials.

These shortcomings produce opportunity for us to produce an interactive virtual application called Virtual Umrah [1]. The proposed Virtual Umrah actually serves as unconventional method to convey learning material information because the using of Virtual Reality technique. Virtual Reality technique in this application will be able to provide the most realistic experience for the users in performing Umrah. The methodology that has been adopted to develop this application is User Centered Design model (UCD) that focuses on involvement of users in every phase.

This paper focuses on the usability evaluation to prove that the intended application is necessary to be developed to support learning processes of the users especially the pilgrims. This usability evaluation involved expert users that have experienced in conducting traditional method of explaining Umrah rituals.

This paper is organized as follows. Section 2 briefly describes virtual technology, UCD and usability study. Then, methodology is discussed in section 3.0 and

lastly, the result and discussion stated in section 4.0. Finally the conclusion is draw with the future works also stated.

2.0 RELATED WORK

2.1 Virtual Technology

According to [1], virtual reality technology has been well adopted in many areas such as in training simulators, games and also medical procedures. Yet this technology seems not has been used regularly in Hajj or Umrah environment. The implementation of virtual reality is preferred because the technology can provide realistic experience to the users. Moreover it also can deliver flexible control for the users in a user-friendly environment.

Virtual technology acquires a great potential to be employed in learning atmosphere because of its capability to construct an interactive and immersive learning platform [2]. Furthermore, virtual technology can be recognized as a technology that can support learning environments to facilitate learning through role-plays and simulations, and visualization [3].

According to [4], there are many existing Hajj or Umrah supplementary learning materials in the market but deliver less effective materials in providing clear understanding to users, particularly the pilgrims. The authors have proposed that learning materials should be changed into active learning to provide a better learning aid. They also have suggested the development of Hajj educational model that can provides a trusted and comprehensive information on the whole process of Hajj and related activities [5].

In Virtual Umrah environment it is very important to ensure that the realism of virtual environments in the application match the expectation of the users in the real world. Failure to achieve the right level of realism would lead to misunderstanding on Umrah activities and rituals and eventually lead to failure to get perfect (mabrur) Umrah.

2.2 User Centered Design (UCD)

UCD is an important approach to be adopted when creating new application that can be accepted by users. The purpose of incorporating UCD throughout the development stages is to support the entire product development process with user-centered activities in order to create applications which are easy to use and fulfill the needs of the intended user groups.

UCD was introduced by [6] and the author started with the term of User-Centered System Design, and nowadays this approach is widely accepted and used with the terms such as Human-Centered Design, User-Centered Design, Usability Engineering, Human Factors Engineering, or even Ergonomics. The authors in [7] stressed that there are three main principles of design: i) an early focus on users and

their tasks, ii) empirical measurement, and iii) iterative design. UCD can be seen as an iterative process that involve the user as the main stakeholder.

Hence, to ensure that the developed application meet the user's expectation and to support learning environments, the authors incorporate UCD processes throughout the stages of the development of this application.

2.3 Usability study

Usability is a concept in Human Computer Interaction (HCI) that refers to create any computer applications that easy to learn and easy to use through User-centered Design (UCD) process [8-9]. Moreover, according to [10], software usability is one of the aspect in HCI that can benefit from knowledge of the user and their tasks.

One of the main components in software usability of an application is user satisfaction. Studies have shown that satisfaction can be subdivided into five aspects [11] which are; (i)Efficiency involves the user's feeling of the software either it is enabling the taks(s) to be performed in a quick, effective and economical manner or, at the opposite extreme, that the software is getting in the way of performance, (ii)Affect defines whether the user feels mentally stimulated and pleasant or the opposite as a result of interacting with the software,(iii)Helpfulness means that the software is well interacted with the user and assisted in operational problems, (iv)Control is the degree of which the user feels in control instead of the product and lastly (v)Learnability involves the user to start and learn new features of the product easily. In this work, the authors have chosen usability criteria as learnability, efficiency, memorability, errors and satisfaction.

In order to ensure that the developed application is fulfilled the user satisfaction; usability evaluation must be carried out. Usability evaluation is a fundamental concept in creating a product that satisfies the needs and requirements of the users. Such evaluation is essential to recognize any usability deficiencies, so that the design could be improved. Failure to discover the usability deficiencies earlier, it may lead to confusion and misinterpretation, which in Virtual Umrah would lead to the misunderstanding on Umrah activities and rituals and eventually lead to failure to get perfect (mabrur) Umrah.

Usability evaluation can be conducted through usability tests, which provide the designers with detailed material on the product experience [12]. The main objective to conduct such test is to ensure that the user interaction designs are complied with an established usability design standards and guidelines. Then, based on the findings, the experts

would suggest recommendations to improve the design [13].

Research by [1] discussed about the usability standards or guidelines for experts to conduct usability evaluation tests. Table 1 shows the explanation for each standard.

Table 1 Usability criteria

Usability Criteria	
Learnability	Users must be able to learn easily even after a period of not having used it.
Efficiency	Users can carry out their tasks with a minimal number of steps.
Effectiveness	Users are able to complete the task and to achieve goals.
Errors	Users can overcome any errors by providing button for help and display suggestion through dialog box.
Satisfaction	Users must be fun to use the system to feel satisfaction

Table 2 Sections of the questionnaire

Section	Subject	Item	Number of Items
1	Demography and computer/internet background	Q1 – Q5	5
	Overall reaction to the software (satisfaction)	Q1 – Q6	6
2	Screen (memorability)	Q1– Q4	4
	Terminology and system information (errors)	Q1– Q6	6
	Learning (learnability)	Q1– Q6	6
	System capabilities (efficiency)	Q1– Q5	5
3	User experience	Q1– Q5	5

3.0 METHODOLOGY

3.1 Interview Session

A guided interview session is conducted by using a set of questionnaire and the questionnaire is distributed to expert users from the Faculty of Islamic Contemporary Studies (FKI) in University Sultan Zainal Abidin (UniSZA). The five (5) experts are selected based on their experience and qualification in Islamic studies area. They also involve in Umrah training as an instructor.

Before the interview is conducted, the experts have been given the chance to use the prototype that has been developed prior to the interview session. In essence, this interview served as a preliminary survey into getting expert requirements based on the principle of UCD approach. Microsoft Excel was used to analyze the data obtained from the interview.

3.2 Questionnaire Design

Questionnaire for the interview consists of three sections, 1) Demographic, 2) User Satisfaction and 3) User Experience.

Section 1 relates to demographic profile, computer and internet experience while Section 2 relates to user satisfactions which contain the items to measure the satisfaction level of the users, the ease of use, information messages, learnability level and the efficiency level of the application. Finally, Section 3 seeks to identify the level of user experience of this application. An outline for the types of questions (Q) in each section is provided in Table 2.

In the evaluation of experts review, Likert scale based has been chosen as evaluation approach. Range 1 to 5 scale is adapted in the questionnaire as Table 3.

Table 3 Likert Scale

Score	
1	Strongly disagree
2	Disagree
3	Fair
4	Agree
5	Strongly Agree

An expert review is one of the common methods in usability testing. The type of evaluation can be carried out by setting an experiment with at least an expert user.

4.0 RESULTS AND DISCUSSION

The result of usability study for this application is obtained through the evaluation process by the expert users review. The demographics for the expert users show that the respondents have Master or PhD degree in related field of studies. Respondents also possess more than 10 years of experience in the Islamic studies.

Prior to the evaluation process, the expert users were shown with the Virtual Umrah application. Figure 1 and Figure 2 are some of the screen shoots of Virtual Umrah application.

Kaabah image is designed in three dimension (3D) format as Figure 1. This figure also shows the hotspot for pilgrims to perform the tawaf rituals for example

Hijr Ismail and Rukun Yamani and also displays the prayer recitation for each round of tawaf.



Figure 1 Screen shot of Tawaf ritual in performing Umrah

Figure 2 shows the sai'e ritual that must be done by the pilgrims before completing their umrah. This ritual is carried out by walking to and forth from Safa until Marwah for seven (7) times. All of these rituals are represented by an animation of a male character that wearing an Umrah outfit.



Figure 2 Screen shot of a pilgrims doing sai'e ritual

After the expert users had experienced the Virtual Umrah application, they involved in the guided interview. The interview was based on the questionnaire that was adopted and adapted from [14].

Figure 3 shows the results of mean score for efficiency, learnability, errors, memorability and satisfaction level of the experts. For errors, efficiency and satisfaction level, the individual mean score is 4.00, 4.20 and 4.40. While for the memorability and learnability component, the mean score for the items are below than 4.00 which are 3.80 and 3.70

respectively. All of the items are rated above the average score.

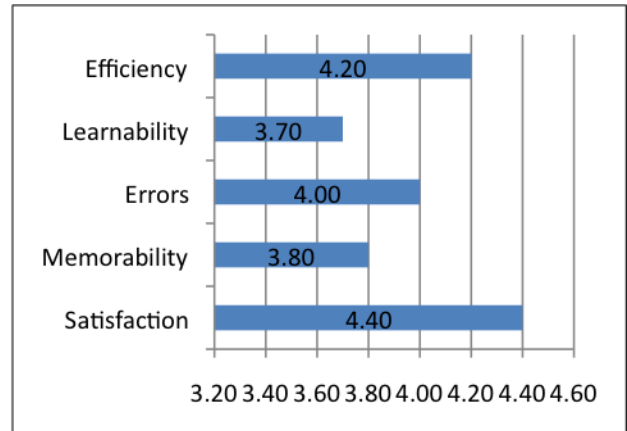


Figure 3 Mean score for efficiency, learnability, errors, memorability and satisfaction

Score 4.20 for efficiency criteria shows that the user can use this application with minimal number of steps, buttons and also clicks in order to get information. Learnability score 3.70 is the lowest which means that the function of tool in the interfaces are hard to understand and has unsmooth interaction. According to these results, some of the enhancements need to be done in order to produce more understandable function and smooth interaction in new version of Virtual Umrah application.

Errors criteria has 4.00 score indicate that the user can explore the application with help button and dialog box that can assist them to settle the errors. For the memorability criteria the score is 3.80 specify that the flow of the content or page navigation is not adequate to help the user to memorize the application. It means that the flow of the content need to rearrange in order to ensure that the user can easy remember the content.

The last criteria is satisfaction with the highest score 4.40. It proves that user can get the information quickly and accurately as well as comprises high level of interactivity.

Figure 4 shows the necessity of Virtual Umrah application. All of the expert users agreed that the development of Virtual Umrah is very crucial in order to assist the pilgrims doing the preparation since none of the learning material regarding Umrah has been developed in virtual environment.

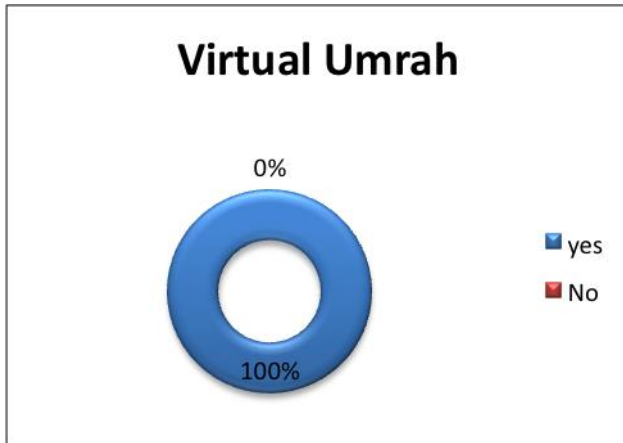


Figure 4 Necessity of Virtual Umrah

5.0 CONCLUSION

As the conclusion, it is agreed that the Virtual Umrah application is very crucial as the teaching and learning aids for the pilgrims to get information in performing Umrah. Virtual technology in Virtual Umrah has the capability to construct an interactive and immersive learning platform and also can support learning environments to facilitate learning through simulations and visualization.

The proposed Virtual Umrah actually serves as unconventional method to convey learning material information because the using of Virtual Reality technique. Virtual Reality technique in this application will be able to provide the most realistic experience for the users in performing activities and rituals of Umrah.

As the future work, this application is very necessary to assist the pilgrims in preparing for Umrah activities and rituals, but yet there exists some enhancements have to be done in order to improve this application. The result from this usability studies based on expert user review will be used as the basis for the enhancement of prototype.

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