Expert and User Evaluations Of Persuasive Hajj Learning Procedures Courseware

Mohd Fitri Yusoff, Abdul Nasir Zulkifli, and Nur Fadziana Faisal Mohamed
School of Multimedia Technology and Communication, Universiti Utara Malaysia (UUM), Malaysia, {mfitri, nasirzul, fadziana}@uum.edu.my

ABSTRACT
Previous researches and current initial findings have found that Hajj supplementary learning materials approaches are less effective in giving clear understanding to users, particularly the pilgrims. Most of the materials are based on passive learning. Therefore, this study incorporates virtual environments (VE) and multimedia technologies to develop Virtual Hajj (V-Hajj) courseware, as an attempt to provide a better learning aid for supporting active learning and self-directed learning in Hajj learning. In view of our preliminary study revealed that elders were lack of trust to use a computer courseware for learning, this study also adapts some guidelines in persuasive technology to persuade them towards the developed prototype. This paper discussed two types of evaluations that have been conducted, namely expert and users’ evaluations by using in the multimedia and VE heuristics evaluations and technology acceptance model (TAM) questionnaires.

Keywords: hajj; multimedia; VE; persuasive; heuristic evaluation; technology acceptance model

I INTRODUCTION
In Islam, every capable and able-bodied Muslim is obliged to make the pilgrimage to Mecca (Hajj) at least once in their lifetime. The Hajj is one of the pillars in the religion. In Malaysia, Lembaga Tabung Haji (LTH) is the entrusted organization to handle Hajj matters before pilgrims leave for Mecca, such as Hajj learning courses. The courses include talks and practical sessions. The Hajj procedures are complex where a lot of information, rules, tasks, practical steps and Al-Quran verses, doa and zikr that have to be learnt and understood. However, according to Jamaan (2010), even though LTH provided comprehensive courses to the pilgrims, supplementary learning materials are still required. Currently, most of the supplementary materials are available in the form of books, cassettes, CDs/DVDs and video tapes which emphasize more on the requirements, procedures and steps in performing the Hajj. However, obtaining knowledge through these approaches seems like a rather passive activity. In a learning process, learners should be active rather than passive (Brecke and Jensen, 2007). Passive learning approaches result in the decrease of comprehension and retention among learners (Burt, 2004). Interviews and survey were used as the data gathering techniques. Interviews were deployed with two qualified Hajj instructors (content experts) from LTH. According to the Hajj instructors, most of the Hajj learners could not practically imagine the Hajj procedures. The learners were hard to successively imagine and memorize the steps in Hajj. Furthermore, they did agree that there is a large amount of information, rules and tasks that need to be understood by the learners. Surprisingly, they also suggested the Hajj learners to refer to the supplementary materials to increase their understanding and retention towards better understanding of the Hajj procedures. However, for the practical parts the learners have no choice except to involve in the practical sessions to understand the steps and to experience in a real life situation. Hence, the only practical parts (require learners to actively involve) is from the course session.

A survey was conducted as part of the preliminary study involving 60 respondents. A convenient sampling technique was applied and the age of the selected respondents was 19 years old and above. 22 respondents above the age of 40 were grouped as elder while 38 respondents between the age of 19 and 39 were grouped as youngster. The results of the preliminary study indicated that fifty two percent (52%) of the respondents experienced low understanding and retention in Hajj learning. Ninety three percent (93%) of the respondents referred to supplementary materials for learning Hajj procedures in order to better understand and increase their knowledge. Ninety seven percent (97%) of them claimed that the supplementary materials lacked in terms of practical steps.

According to (Jabar et al, 2008), VE is the best alternative to be employed during the practical training for Hajj learning based on the
supplementary material. The real time of life-like environment and self-directed learning capabilities can increase learners understanding towards the Hajj procedures. Meanwhile, the use of MM is the best way to convey information effectively, such as through the use of animation (Jusoh and Jusoff, 2009; Yusoff et al, 2010; and Yusoff et al, 2012).

Therefore, this research attempts to use VE as an alternative training for the practical steps (Tawaf, Sa’ie and throwing of the Jamarat), and MM as an alternative learning approach to convey information in this supplementary material for Hajj learning.

II DATA ANALYSIS AND RESULTS

Both expert and user evaluations were carried out to evaluate the effectiveness of the V-Hajj prototype. In general, the respondents were grouped into Elder and Youngster group. All the data was organized, analyzed, and interpreted systematically in an attempt to answer ‘how should VE and MM be applied in developing a persuasive Hajj learning environment’, which is the main question of the research. Various statistical techniques were used for the analysis which include descriptive statistic and independent t-test analysis. The analyses were carried out and compiled using Statistical Package for Social Science (SPSS) version 15.0. Besides evaluating the persuasive impact by using the TAM questionnaires, the results of the usability of V-Hajj prototype are also discussed based on the questionnaires. Next, the comparisons of attributes between both groups are presented. The hypotheses regarding the TAM dimensions (PEOU, PU, ITU and ATTITUDE) among both groups of users are also described in detail. In addition, the persuasive impacts for the Elder group are explained based on their acceptance towards the use of the V-Hajj prototype. Finally, a summary of the findings is presented at the end of the chapter.

A. Heuristic Evaluations

The first phase of the evaluation process involved heuristic or expert evaluation. It was conducted by presenting the V-Hajj prototype to three experts of Hajj content, MM and VE interfaces. Nielsen’s Heuristic guidelines (Nielsen, 1994) were used for the evaluation of the MM component of V-Hajj while VE Heuristic guidelines (Sutcliffe and Gault, 2004) were referred to for the VE component of V-Hajj. The expert for the Hajj content was a qualified LTH Hajj instructor who has been conducting Hajj training for more than five years. While the experts for the MM and VE interfaces were lecturers who have been teaching in these areas for more than five years. The experts were responsible to check on the content and also the design and functionality of the V-Hajj prototype interfaces. Their reviews and suggestions were required to correct and enhance the content as well as the usability of the prototype. The results of the heuristic evaluation are discussed in detail in the following sub-sections.

1) Multimedia Heuristic Evaluation

TABLE I presents the identified usability problems and suggestions provided by the experts based on the heuristic guidelines proposed by (Nielsen, 1994). In this guideline, ten heuristics were adapted.

<table>
<thead>
<tr>
<th>No</th>
<th>Heuristic</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visibility of system status: the system should not manipulate the user's attention</td>
<td>Feedback on screen, status message not functional well</td>
<td>Feedback on screen, status message functional well</td>
</tr>
<tr>
<td>2</td>
<td>Match between system and the real world: the system speaks users' language</td>
<td>System should not manipulate the user's attention</td>
<td>System should not manipulate the user's attention</td>
</tr>
<tr>
<td>3</td>
<td>User control and freedom: provide the opportunity for mistakes by users</td>
<td>System should not manipulate the user's attention</td>
<td>System should not manipulate the user's attention</td>
</tr>
<tr>
<td>4</td>
<td>Consistency and standards: use consistent and intuitive function names, actions, and terminology</td>
<td>System should not manipulate the user's attention</td>
<td>System should not manipulate the user's attention</td>
</tr>
<tr>
<td>5</td>
<td>Error prevention: system should avoid errors from the user</td>
<td>System should not manipulate the user's attention</td>
<td>System should not manipulate the user's attention</td>
</tr>
<tr>
<td>6</td>
<td>Recognition rather than recall: maintain user's memory in interactive information</td>
<td>System should not manipulate the user's attention</td>
<td>System should not manipulate the user's attention</td>
</tr>
<tr>
<td>7</td>
<td>Heuristic and efficiency of use: system should not have unnecessary interaction that cannot be avoided</td>
<td>System should not manipulate the user's attention</td>
<td>System should not manipulate the user's attention</td>
</tr>
<tr>
<td>8</td>
<td>Aesthetic and minimalist design: avoid excessive information that is not relevant or necessary</td>
<td>System should not manipulate the user's attention</td>
<td>System should not manipulate the user's attention</td>
</tr>
<tr>
<td>9</td>
<td>Recognize, diagnose, and repair errors from users' messages in a single language and suggests solutions</td>
<td>System should not manipulate the user's attention</td>
<td>System should not manipulate the user's attention</td>
</tr>
<tr>
<td>10</td>
<td>Help and documentation: provide help to the user</td>
<td>System should not manipulate the user's attention</td>
<td>System should not manipulate the user's attention</td>
</tr>
</tbody>
</table>

-The Solutions to the Amendments

(a) Visibility of system status: This part stresses that the system should always keep users informed about what is going on, gives feedback within a reasonable time.
Problem:
- Feedback is slow because some of the menus are not functioning well.

Solution:
- Rechecking and debugging the non-functional menus.

Explanation for the problem: The problems derived from the Flash Actionscript, because the scripting in Flash is very case-sensitive. All the non-functional navigation has been corrected and repaired.

(b) Consistency and standards: This part is related to whether the users will confuse about the contents such as words, situations, images, actions or others.

Problem:
- Some images or pictures are blur.

Solution:
- Try to find the good image with good resolution at least 300dpi.

Explanation for the problem: There are limitations in getting the raw materials in case good quality photos. Some of the materials were obtained from the internet, books and photos.

(c) Flexibility and efficiency of use: This part is related to the ability of presenting the contents or information in a facilitating way. It benefits both experience and inexperienced users.

Problem:
- Some of the interactions are hard to be controlled such the long scrolling pages.

Solution:
- The scroll bar approach in accessing the page was changed to slide presentation approach where only a single page will appear at one time and the pages can be viewed using the forward and backward buttons.

Explanation for the problem: It was not actually a major problem if the user is familiar with the use of scroll bar approach; however, the slide presentation approach was used to make it easier for users to access the pages.

1) **VE Heuristic Evaluation**

TABLE II presents the identified usability problems and suggestions provided by experts based on the heuristic guidelines proposed by Nielsen (1994) and extended by VE principles from Sutcliffe and Kaur (2000). In these guidelines, twelve heuristics were evaluated. Below are the solutions after the amendments.

<table>
<thead>
<tr>
<th>Heuristic</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| 2 Natural engagement | More problems are some graphics rendering delay, not synchronized with the user's engagement during navigation. | Solution: Should no double-click in the graphics environment. |}

*Knowledge Management International Conference (KMICe) 2014, 12 – 15 August 2014, Malaysia*

http://www.kmice.cms.net.my/
The Solutions to the Amendments

(a) Natural engagement and sense of presence:
The problems identified by the expert involved graphics rendering delays which interfered with users’ engagement during navigation. Fig. 1 shows changes that have been made after the evaluation.

(b) Faithful viewpoints:
In order to maneuver inside the VE of the V-Hajj prototype, the hardware required is only a mouse or a keyboard. The VE component of the prototype has been configured so that the mouse is sufficient for maneuvering inside the VE. The left button is used for forward movement and 360 degrees camera view control; the right button for backward movement; and the scroll wheel for controlling user movement speed. Besides that, the keyboard can also be used for maneuvering inside the VE where the ‘up’ key is for forward movement; ‘left’ key for left movement; ‘right’ key for right movement, and lastly; ‘down’ key for backward movement. However, it is suggested that the best hardware to be used for maneuvering inside the VE is using the mouse.

(c) Natural expression of action, Clear entry and exit points, Consistent departures, and Clear turn-taking:
In facilitating users to use the V-Hajj prototype such as the case for performing the Sa’ie, the starting position has been marked by a red arrow. Since V-Hajj emphasizes on experiential learning, users need to follow the steps sequentially in learning the Sa’ie procedures. Fig. 2 shows the red arrow indicating the starting position for the Sa’ie procedures.

B. Users Evaluation

In the second phase of the evaluation process, user evaluation was conducted by using TAM questionnaires for both elder and youngster as depicted in TABLE III. The evaluation was based on the modified and improved prototype. User evaluation for V-Hajj was intended to determine users’ acceptance and perception towards the integration of VE and MM in the supplementary Hajj learning material.

Convenient sampling technique was applied in the selection of the samples. The sample consisted of 60 users. They were divided into two groups as Youngster (19 to 39 years old) and Elder (40 and above 40 years old), and the division was based on Erikson’s stages of psychosocial development. Each group contains of thirty subjects, as suggested by Coakes and Steed (2003), whereby 30 is an ideal number of subjects in order to avoid any shortage of information. The evaluations have been conducted in two places, the Information Technology Building (ITB) and the other one in the Islamic Centre, Universiti Utara Malaysia. Two laboratories were set up for that purpose. The ITB was selected as the place for evaluation as it provides the computer facilities. While the Islamic Centre was selected because the participants of a Hajj Seminar conducted at that centre became the respondents for the evaluation. Table IV shows the data related to gender, age, educational background and computer experience of all the 60 subjects involved in this study.

Table 3. TAM Questionnaires for the Courseware

<table>
<thead>
<tr>
<th>No</th>
<th>Measurements</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Perceived Ease of Use (PEOU)</td>
<td>i. I found V-Haj easy to use.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii. Learning to use V-Haj would be easy for me.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii. My interaction with V-Haj was clear and understandable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iv. It would be easy for me to find information at V-Haj.</td>
</tr>
<tr>
<td>2</td>
<td>Perceived Usefulness (PU)</td>
<td>i. Using V-Haj would enhance my effectiveness in learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii. Using V-Haj would improve my course performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii. Using V-Haj would increase my productivity in my course work</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iv. I found V-Haj useful.</td>
</tr>
<tr>
<td>3</td>
<td>Attitude Toward Using (ATTITUDE)</td>
<td>i. I dislike the idea of using V-Haj. (R)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii. I have a generally favourable attitude toward using V-Haj.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii. I believe it is a good idea to use this V-Haj for my course work</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iv. Using V-Haj is a foolish idea. (R)</td>
</tr>
<tr>
<td>4</td>
<td>Intention to Use (ITU)</td>
<td>i. I intend to use V-Haj during learning Haj.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii. I will return to V-Haj often.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii. I intend to visit V-Haj frequently for my course work.</td>
</tr>
</tbody>
</table>

Note: = reversed item, D = removed item
Results of comparison between the two groups of Elder and Youngster were made for every item of the measurements. The results depicted the difference in perceptions among subjects between the two groups after using the V-Hajj prototype as a supplementary Hajj learning material.

For the PEOU measurement, the mean value for the Elder group was 4.27 while for the Youngster group was 4.28 as shown in Table V. For the Elder group, the highest mean among the item was 4.37, while the lowest mean was 4.20. Meanwhile for the Youngster group, the highest mean among the item was 4.37, while the lowest mean was 4.20. Subjects from both groups agreed on the Perceived Ease of Use of the V-Hajj prototype and the mean value of the Youngster was higher than the Elder.

For the PU measurement, the mean value for the Elder group was 4.41 while for the Youngster group was 4.49 as shown in Table VI. For the Elder group, the highest mean among the item was 4.47, while the lowest mean was 4.37. Meanwhile for the Youngster group, the highest mean among the item was 4.63, while the lowest mean was 4.40. Subjects from both groups agreed on the Perceived Usefulness of the V-Hajj prototype and the mean value of the Youngster was higher than the Elder.

For the ATTITUDE measurement, the mean value for the Elder group was 4.47 while for the Youngster group was 4.52 as shown in Table VII. For the Elder group, the highest mean among the item was 4.67, while the lowest mean was 4.23. Meanwhile for the Youngster group, the highest mean among the item was 4.57, while the lowest mean was 4.43. Subjects from both groups agreed that V-Hajj influenced their attitude toward using it as a supplementary Hajj learning material and the mean value of the Youngster was higher than the Elder.

For the ITU measurement, the mean value for the Elder group was 4.22 while for the Youngster group was 4.25 as shown in Table VIII. For the Elder group, the highest mean among the item was 4.27, while the lowest mean was 4.17. Meanwhile for the Youngster group, the highest mean among the item was 4.53, while the lowest mean was 3.97. Subjects from both groups agreed that V-Hajj influenced their intention to use it as a supplementary Hajj learning material and the mean value of the Youngster was higher than the Elder.

III DISCUSSION

In order to accomplish the third objective which is the users’ acceptance toward the V-Hajj prototype as a supplementary Hajj learning material between two groups of users, youngster and elder and among the elder in terms of the persuasive effect, evaluations namely heuristic and user were deployed. The heuristic involved experts’
intervention in evaluating the developed V-Hajj prototype. The evaluation was conducted using Nielsen’s Heuristic guidelines (Nielsen, 1994) for MM component and VE Heuristic guidelines (Sutcliffe & Gault, 2004) for the VE component of the prototype. The rationales behind this evaluation were to identify usability related problems and validate the prototype before introducing it to users. The experts have provided several suggestions to further improve the prototype. Each of the suggestions was taken into consideration in improving the prototype in terms of usability.

Meanwhile, for the user evaluation, TAM questionnaires have been used as the instrument. Four measurements namely; PEOU, PU, ATTITUDE and ITU were used in the evaluation. Altogether 60 subjects were involved in the evaluation. The analysis on the collected data indicated that overall the subjects agreed toward the use of V-Hajj prototype for Hajj learning. In detail, the mean values for PEOU was 4.27, PU was 4.45; ATTITUDE was 4.49 and ITU was 4.23 for the usability evaluation. For PEOU, the mean value was above 4.00 which indicate that it is in the agreeable level. From the mean value, it can be concluded that both groups of subjects agreed that V-Hajj is easy to use, easy to learn, the interaction between the subjects and prototype was clear and understandable and it is easy for them to search information in the V-Hajj prototype. For PU, the mean value also indicates that it is in the agreeable level. The subjects agreed that V-Hajj has enhanced their effectiveness in Hajj learning, improved their Hajj performance and V-Hajj is very useful. Meanwhile, the ATTITUDE also indicates that it is in the agreeable level as its mean is above 4.00. It shows that the subjects like the idea of using V-Hajj, have favorable attitude towards using V-Hajj and using the V-Hajj is a good idea. The ITU mean is also above 4.00 and rated in the acceptable level. The subjects intend to use V-Hajj for learning Hajj procedures and always use the V-Hajj in their learning.

In the same vein, comparison in acceptance between the two groups; Youngster and Elder indicated that the Youngster’s mean values are slightly higher than the Elder for PEOU (Youngster - 4.2750, Elder - 4.2667), PU (Youngster - 4.4887, Elder - 4.4113), ATTITUDE (Youngster - 4.5223, Elder - 4.4667), and ITU (Youngster - 4.2500, Elder - 4.2167). As mentioned above, the agreeable mean values are above 4.00. The mean value of 4.00 depicts that the subjects agreed to the questions asked in the TAM questionnaires. It also clearly depicts that for all TAM attributes measurement; PEOU, PU, ATTITUDE and ITU, the Youngster group mean value is higher than the Elder group, approximately; 4.2750, 4.4887, 4.5223 and 4.2500. This might be due to Youngster having more exposure and experience with computers and they were more excited with new technologies or computer application compared to the Elder group. However, even though the mean values for all measurements were lower than the Youngster, the Elder still agreed that the V-Hajj prototype was a good supplementary Hajj learning material.

Besides that, the results from our preliminary study indicated that the Elder users were reluctant to use computer based learning as supplementary Hajj learning material as seen in Fig. 3. In investigating the persuasive effect of V-Hajj prototype among the elder, the results indicated that in term of PEOU, 80.1% agreed on the use of the V-Hajj prototype, for ITU, 93.3% agreed on the use of the V-Hajj prototype, for PU, 93.4% agreed on the use of the V-Hajj prototype and finally for ATTITUDE, 96.7% agreed on the use of the V-Hajj prototype as a supplementary Hajj learning material (see Fig. 4). Comparing between the results from the preliminary study and user evaluation, it has been proven that the elder users were persuaded in using the V-Hajj prototype as supplementary Hajj learning material which actually fulfilled the intention of this research. This proves that the V-Hajj prototype is able to persuade older people (above 40 years) to use computer based learning as a supplementary Hajj learning material. The elder users were persuaded to use the V-Hajj prototype because of the ease of understanding the information which integrates all the multimedia elements, text, audio, video, animation and graphic. Besides that, the V-Hajj prototype provides the experiential learning to users while using the virtual environments such as for Tawaf, Sa‘ie and throwing of the Jamarat. These eventually increase users’ understanding of the practical rituals to be performed during Hajj. V-Hajj was also developed with minimum hardware requirements and intervention so as to allow the elder to operate it easily. Taking into account all the features that have been incorporated into the V-Hajj prototype, it was not surprising that the elder users were persuaded to use V-Hajj where more than 80% of them agreed on the use of the V-Hajj prototype as a supplementary Hajj learning material.
IV CONCLUSION

The analysis on the collected data indicated that overall the subjects agreed toward the use of V-Hajj prototype for Hajj learning. In detail, the mean values for PEOU was 4.27, PU was 4.45, ATTITUDE was 4.49 and ITU was 4.23. These results clearly indicated that the V-Hajj prototype is usable to be used as a supplementary Hajj learning material whereby only usable products grab users’ acceptance.

Figure 3. Preliminary Study Results

Figure 4. Percentage of Elder Users After Using V-Hajj

REFERENCES


