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COGNITIVE SCIENCES AND HUMAN DEVELOPMENT

Viewing Islamic Art Museum Exhibits on the SmartPhone: Re-examining Visitors' Experiences

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ABSTRACT

Mobile Guide technologies in public spaces, particularly museum are not new and have changed the way visitors' access information during their visit. Smartphone applications (apps) are increasingly popular because it can be accessed before, during and after the museum visits. This has impacted the way exhibitions are designed and the resulting visitor experience. Therefore, it is important to measure what effect the use of smartphone technology has on visitor experience. An "in the wild" study was conducted to investigate visitor experience in Islamic Art museum, both with and without Islamic Arts Museum Malaysia (IAMM) Mobile Guide (smartphone apps). A total of 55 participants took part in the study. The Museum Experience Scale (MES) was used to measure visitor experience, whilst the Multimedia Guide Scale (MMGS) was used to measure visitors' experiences with the IAMM Mobile Guide. Results showed that scores on all components of MES suggested a positive experience at the IAMM with the component of meaningful experience being the highest score, followed by the component of knowledge and learning. Scores on the MMGS also showed a positive experience in using the mobile guide with learnability and control scored the highest, followed by general usability.

Keywords: user experience (UX); visitor experience; museum; smartphone; applications; mobile guide

ARTICLE INFO

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ISSN: 2462-1153

INTRODUCTION

Public spaces, such as, museums, art galleries, science centres, exhibitions and other similar cultural heritages sites play an important role in the discovery of knowledge, information and learning, as well as, places where visitors can indulge in art and culture. Mobile guide technologies have a long history in transforming the visitors' experience at such venues.

A recent survey of mobile guides in museums classified mobile guides into four different groups: (1) mobile guide apps, (2) web-to-mobile apps, (3) mobile phone navigational assistants, (4) mobile web-based apps (Kenteris, Gavalas, & Economou, 2011). Another survey on the use of mobile phone apps conducted in 2011 addressed various issues related to its usage, i.e., navigation, technology exploitation, interaction, usage, contents and many others (Economou & Meintani, 2011).

At Tate Modern in London, the museum provides devices with application installed into it for visitors to borrow. However, more museums and other cultural spaces are developing their respective smartphone apps which are downloadable from online apps store. The use of smartphone apps has a number of advantages for both visitors and cultural space managements (Othman, Petrie, & Power, 2011). Visitors could download and browse through the apps on their own device before the visit and plan their trip. Familiarity with their devices also reduces the learning curve of adapting to new audio or multimedia guide every time they visit different cultural spaces. Consequently, the management of such places can eliminate the cost of providing the physical devices, i.e., audio guide or other types of guide, and employing staff to manage the devices, as well as, the recurring maintenance cost. The only cost that the museums have to bear is the upfront cost of developing the apps which is significantly low.

This study explored visitors' experiences with and without mobile guide technology. The study is derived from Ansbacher's (1998, p. 36) comment about visitor's experiences who states that "Dewey's two aspects of the quality experience can be restated as follows: (1) The visitor interacts with the exhibit and has an experience, and (2) the visitor assimilates the experience so that later experiences are affected".

The use of mobile guide technologies might have different effects on the visitors, particularly exhibits that are abstract and difficult to interpret the meaning behind it. Therefore, it is important to measure what effect the use of smartphone technology has on visitor experience.

Our study explores the impact of mobile guide tour that integrates both guided tours and free-choice tours in Islamic Arts Museum Malaysia (IAMM), and how it can improve the visitors' experience of Islamic culture and heritage. To date, there are several studies that focused on the mobile guides for cultural heritage sites, such as, applications that enable interaction between visitors or group members [(for example, Cabrera et al., 2005; Grinter, Aoki, Hurst, Szymanski, Thornton & Woodruff, 2002; Papadimitriou, Komis, Tselios, & Avouris, 2007; Vavoula, Sharples, Rudman, Meek, & Lonsdale, 2009; Wakkary, Musie, Tanenbaum, Hatala, & Kornfeld, 2008; Yatani, Sugimoto, & Kusunoki, 2004)], but only one known study could be found which integrates both guided tours and free-choice tours on mobile guides, but the study was conducted at historical churches (Othman, Petrie, & Power, 2013).

We have designed and deployed the first mobile guide tour for a museum in Malaysia. The fact that it is the first available mobile guide for a museum; we would evaluate the impact of using such mobile guide on visitors' experiences. In addition, this study aims to improve accessibility of digital content of Islamic artefacts, before, during, and after the visit, as well as, to engage a wider audience for Islamic artefacts.

LITERATURE REVIEW

Mobile Guide Technologies for Visitors at Museums

Mobile guides technologies that have been developed for museum and other cultural heritages sites have different purposes. Othman, Petrie and Power (2013) highlight the different technologies available at such places for different purposes, such as, (1) bringing families and friends together, (2) support natural interaction, (3) personalizing tours for different visitors, (4) technologies for all, (5) fun and entertaining, and (6) support mobile learning.

One of many reasons people visit museums is because they want to spend time with their family members, friends or companions (Dierking, Luke, Foat, & Adelman, 2001) and the majority of museum visitors consists of families and small groups (Hein, 1998). Hence, quite a few mobile guide technologies were designed to ensure that the interaction between visitors will not be disrupted with the use of mobile guide technology. There are different types of mobile guides that served this purpose, for example, a mobile guide (also known as guidebooks in the study) designed by Woodruff, Szymanski, Aoki, and Hurst (2001) allowed visitors who were getting bored with the conversation with their companion to switch their attention to other things. This mobile guide allowed the visitors to change their priorities, either to focus on the exhibit or their companions, and this was interchangeable. Another example of a mobile guide that could bring the friends and families together is known as electronic guidebooks, a prototype created at Xerox PARC by Allison Woodruff, Paul Aoki, Amy Hurst and Margaret Szymanski. The guidebooks were designed to enable different types of information to be presented as well as allowing the visitors to share information among themselves (for example, Woodruff et al., 2001). Other researchers have made visiting the museum with families and friends more enjoyable by designing a hybrid multimedia mobile-guided tour called MoMo. It was designed to enable visitors to search a large set of information about the artefacts in a museum (Jaěn, MocholÍ, Esteve, Bosch, & Canós, 2005). The highlight of this study was that it supported social interaction between visitors in the museum. *MoMo* allowed visitors to send messages to other visitors, or even form a group of visitors with similar interests. In addition, it also allowed them to send messages to other visitors or to all visitors in the same group.

In response to the difficulty that visitors had whilst using a museum mobile guides, Bay, Fasel, and Van Gool (2006) made an attempt to design an interactive mobile guide for museums that support natural interaction. Their prototype should be able to bring new light to passive and non-engaging museum exhibitions. It allowed the visitors to interact naturally with the exhibits using the mobile guide provided. The advantage of this technology was that it allowed visitors to take pictures of objects from any angle and detailed information about the object would be displayed. Additionally, it also functioned as a navigational system on the museum map and was able to provide information about the nearest specific places (for example, toilet, coffee shop, emergency exit door and so on with directions to get to and from them). Other similar studies were also conducted by Föckler, Zeidler, Brombach, Bruns, and Bimber (2005) and Bruns, Brombach, and Zeidler (2007).

Technology has changed the way visitors interact with exhibits and other visitors. Personalization becomes an important feature when designing the

mobile guides because visitors may feel overwhelmed by the amount of information provided to them. As a result, visitors might not have a meaningful experience while using a mobile guide. Personalization was believed to be first used for internet applications, especially in e-commerce applications, before it was widely used in other applications, such as, e-learning portals, tourism, finance, culture and health [(for example, Bowen & Filippini-Fantoni, 2004; Filippini-Fantoni, Bowen & Numerico, 2005; & Filippini-Fantoni, 2003)]. Several studies that employed the personalization concept have been carried out at museum, be it personalization of information or personalization of devices. For example, a study by Spasojevic and Kindberg (2001) mainly focused on the personalization of information by allowing the visitors to focus more on the exhibits that interest them more. Brelot, Cotamanac'h, and Kockelkorn (2005) developed a prototype called DANAE that allowed visitors to personalize their tours based on the contents. This was implemented at the Museon in The Hague, the Netherlands.

It is also important to design the mobile guide to accommodate different visitors' needs and preferences. Walker (2007) explored the use of mobile phone technology in museums, botanic gardens and cultural heritage sites that mainly focused on children aged 9-10 years old, as well as, adults who study horticulture. Several other studies have been carried out to design and develop mobile guides that supported different levels of 'accessibility'. For example, the mobile guide prototype called Scan and tilt had a selection of different types of tour guide to suit visitors' accessibility, including an option to navigate the exhibition using *tilt* and *voices* (Santoro, Paterno, Ricci, & Leporini, 2007). This configuration was aimed at supporting blind visitors by providing them with information about particular exhibits using voice. Other researchers, such as, Knapp, Finkelman, Kee, and Tanaka (2004) designed a mobile guide using a portable handheld computer that aimed to increase the accessibility of museum exhibits for visitors with physical, visual, hearing and cognitive disabilities.

Edutainment in museums is another innovation to attract more visitors and to compete with other popular entertainment venues, as well as, to transform museum to be more versatile in the fast-changing world of technology. Various museums have successfully installed edutainment applications. For example, the Senkenberg Museum in Germany installed DinoHunter (Feix, Gobel, & Zumack, 2004). Park and Jung (2007) highlighted several museums, such as, the British Museum, the Modern Art Museum in San Francisco, and the National Museums of Korea that have successfully adapted digital storytelling into their exhibition to actively engage their visitors.

Visitors of cultural spaces should uncover and explore, to grasp the means of inquiry and more deeply of learning itself (Naismith, Sharples, & Ting, 2005). Furthermore, the act of learning does not necessarily mean the gain of new knowledge. In fact, it should be seen as the use of knowledge that one already possesses, or half-know, in new combinations or relationships or in new situations. According to Hooper-Greenhill (2004), being able to see things from a new perspective changes the meaning of what one already know into something brand new and with even deeper significance. In addition, fruitful interventions are those that include and support multimodality. It should also consider the technology as a link between different learning contexts, linking not only physical locations but the personal and social connections between students, artefacts, his-

tory and use (Reynolds & Speight, 2009). Visitors have preferred means of spending their time in a cultural space, some might go for information discovery, education, and some would treat it as a way to pass time with family and friends.

As a conclusion, people go to a museum or other cultural space to "remind ourselves who we are ... serves the pleasure of spirit ... the curiosity" (Kimmelman, 2001, p. 1).

Visitors' Experiences at museums

Several studies have successfully measured visitors' experiences across museums using different measures. For example, Pallud and Monod (Pallud & Monod, 2010) discussed the different aspect of visitors' experiences, such as, context, self-projection, embodiment, re-enactment, historicity and possibilities of being. Previously, Pekarik et al. (1999) interviewed and collected data from surveys to identify the most satisfying experiences visitors had in museum. Four main categories were identified: object experiences, cognitive experiences, introspective experiences, and social experiences. On the other hand, Othman, Petrie and Power (2010, 2011) have successfully developed scales to measure visitors' experiences at cultural places, with or without mobile guide, namely, Museum Experience Scale (MES) and Multimedia Guide Scale (MMGS) (Othman, Petrie, & Power, 2010; Othman, Petrie, & Power, 2011). Four components were highlighted in MES: engagement, knowledge and learning, meaningful experience and emotional connection. Component of engagement measures the level of engagement of participant with the exhibition, while component of knowledge and learning measures the gain of understanding and information discoveries. For the meaningful experience component, it measures the interaction of participants with the exhibition. Lastly, component of emotional connection measures the contexts and contents of exhibition. MMGS have three distinctive components, namely, general usability, learnability and control, and interaction with the guide. General usability measures functionality and helpfulness of the mobile guide, whereas learnability and control measures the ease of learning and using, as well as, whether the user felt in control. For the last component, interaction with the guide, it measures aspects concerning interaction with and feedback from the mobile guide.

It cannot be denied that designing for user experiences (UX) is a complex undertaking and the uses of different technology have changed how visitors interact with their mobile devices. For example, Kounavis et al. (2012) highlighted that the use of Augmented Reality technology has changed the way visitors interact with artefacts during their visits. The personalization of information also has a significant impact on visitors' experiences (Opperman & Specht, 1998, 1999; Sparacino 2002). Other technology, such as, mobile apps also has an impact on the visitors' experiences (see for example, Bollini et al., 2013; Damala, 2007; Keil, 2013). Andolina et al. (2012) also highlighted that different technologies available for visitors at the museum have different impact on visitors' experiences.

STUDY AT ISLAMIC ART MUSEUM MALAYSIA

Design

The study took place in the temporary art gallery (Nun wa al qalam), Islamic Art Museum Malaysia. All visitors who visited the Nun wa al qalam between December 2013 to June 2014 were approached by the museum staff and asked if they were

willing to participate in the study. A total of 55 participants agreed to participate in this study. Visitors were given a choice whether to use the IAMM Mobile Guide or visit the gallery without the IAMM Mobile Guide (smartphone apps).

Participants that chose the IAMM Mobile Guide were given a brief introduction about the smartphone apps before their visit. All participants were told that there was no time limitation for the visit. Participants were given Museum Experience Scale (MES) to be completed at the end of their visit. Additionally, participants who used the IAMM Mobile Guide were given Multimedia Guide Scale (MMGS) to be completed too.

Participants

A total of 55 participants took part in the study. 27 were in the IAMM Mobile Guide condition (MGC) and another 28 participants were in the no Guide Condition (NGC). The participants were mixed between local visitors (Malaysian) and tourists from outside Malaysia. These participants were visitors who visited the exhibition during the study.

The IAMM Mobile Guide

The IAAM Mobile Guide was developed by researchers from Universiti Malaysia Sarawak in collaboration with Islamic Art Museum Malaysia (IAMM).

The Design and its rationale

As the standard guideline of mobile application development, the mobile guide application will start up with a splash screen. Splash screens serve several functions as they could be used as a notification that the application is loading up necessary files. Furthermore, from the point of interaction, it provides feedback that a lengthy process is ongoing. Splash screens also serve to improve the overall user experience of an application, hence they are usually visually attracting. For this particular project, the researcher used the exhibition logo as well as its brief description as the splash screen. Figure 1 shows the exhibition logo as well as the splash screen design.

The menu screen will be shown right after the splash screen. In this screen, the exhibition logo will be shown on the upper part of the screen and the lower half of the screen will serve as the main navigation around the application. Tapping on these buttons will perform specific tasks, such as, starting the tour, and displaying

The logo of the Contemporary Muslim Calligraphy exhibition was inspired by the first Ayah (verse) of Surah Al Qalam (68). The Ayah, which reads: Nun wa al Qalam wama yasturun (68:1), literally means 'Nun (the 25th letter of the Arabic alphabet) and by the pen and what they inscribe. This Ayah recalls one of the mysterious letters of the Quran, which mainly appears at the beginning of the various surahs, either singly or in combinations of two, three, four or five letters.

This logo represents the beauty and creativity of Contemporary Muslim Calligraphy.divine spirituality. Written in black and red, against a light background, this logo creates an intricate form, combining the traditional with the modern, constructing a unique aesthetic composition. This logo represents the beauty and creativity of Contemporary Muslim Calligraphy.

TAP SCREEN TO CONTINUE

Figure 1: Exhibition logo used for splash screen

information about the exhibition and museum. For the menu screen, it is important that items are displayed in a meaningful, yet simplistic manner. The items arrangement is shown in Figure 2.

Next, under the 'Tour Options' of the section page of 'Start the Tour', both

the guided tour and free-choice tour options will be available for selection. From here, a user will select the desired tour option to proceed to the details of artists and their respective artworks. As researchers are following the design of a standard

Figure 2: Design of main menu

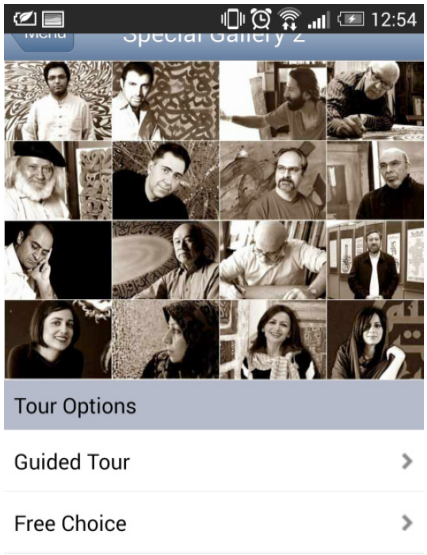

Figure 3: Design of tour option

educational application, there will be a navigation bar on top of the application. The navigation provides functionality to return to the previous page (main menu). Furthermore, to enhance user experience, selected photographs of participating artists will also be shown in this page. Figure 3 shows the layout for the Tour Option page.

Once the tour is selected, visitors will be redirected to either the screen in figure 3a (guided tour) or 3b (free-choice tour), respectively. The guided tour will guide the visitors through the exhibition from the beginning until the end of exhibition in the sequence of artwork on display. On the other hand, the free choice tour option allows visitors to choose any artwork as they roam around the exhibit.

Figure 4 shows the sequence of information available for visitors in both tour options. As the consistency of design plays a huge role in creating a good application, each successive page from the main menu will follow the standard layout of the top navigation bar. This remains the same for all tour interface pages, as well as, slide shows of artworks. By using the table widget, the design is able to account for the difference in the number of artwork across all artists. This is possible by creating a scrollable table. Similarly, to create a slideshow of artworks, the concept of scrollable items can be applied. The application will detect left right swipe motion for the transition between artworks.

MATERIALS

This study employs the Museum Experience Scales (MES) and Multimedia Guide Scales (MMGS) developed by Othman, Petrie, and Power (2010, 2011). These questionnaires use the Likert scales to indicate the visitors' experience. For each question (for instance, "The application

is easy to learn and control"), respondents state their level of agreement on the scale ranging from strongly disagree (1), disagree (2), moderate (3), agree (4), and strongly agree (5).

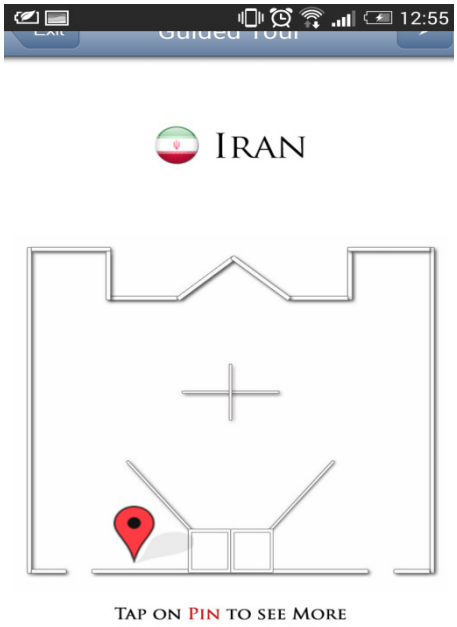

Figure 3a: Guided tour option

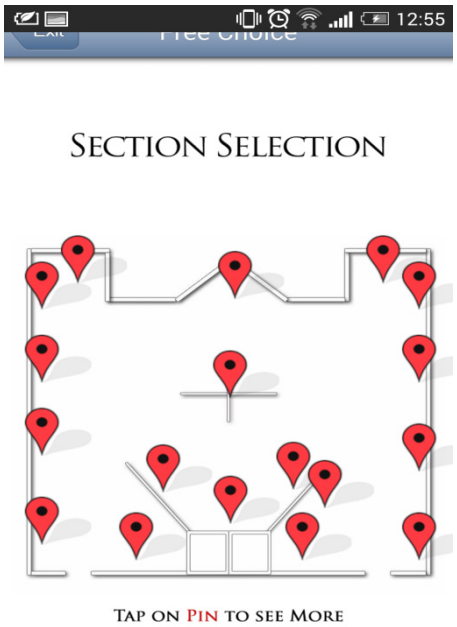

Figure 3b: Free-choice tour option

The Museum Experience Scale (MES) consists of 37 statements on museum experience, which can be categorized into four main components. These components are engagement, knowledge and learning, meaningful experience and emotional connection. The component of engagement measures the level of engagement of participant with the exhibition, while the component of knowledge and learning measures the gain of understanding and information discoveries. As for the meaningful experience component, it measures the interaction of participants with the exhibition. Lastly, the component of emotional connection measures the contexts and contents of exhibition. The Multimedia Guide Scale (MMGS), on the other hand, consists of 19 questions, which is used to measure the overall usability of the museum guide application. There are three distinctive components, namely, general usability, learnability and control, and interaction with the guide. General usability measures functionality and helpfulness of the mobile guide, whereas learnability and control measure the ease of learning and using, as well as, whether the user felt in control. For the last component, interaction with the guide, it measures aspects concerning interaction with and feedback from the mobile guide.

Procedures

Participants for this study were the visitors to the IAMM. Below is the sequential procedure of the study for each participant:

i. Briefing session: Visitors to the IAMM were approached and briefly explained about the study. Then, they were asked if they would like to participate in the study.
ii. Instructions and tour: For participants in the Mobile Guide Condition

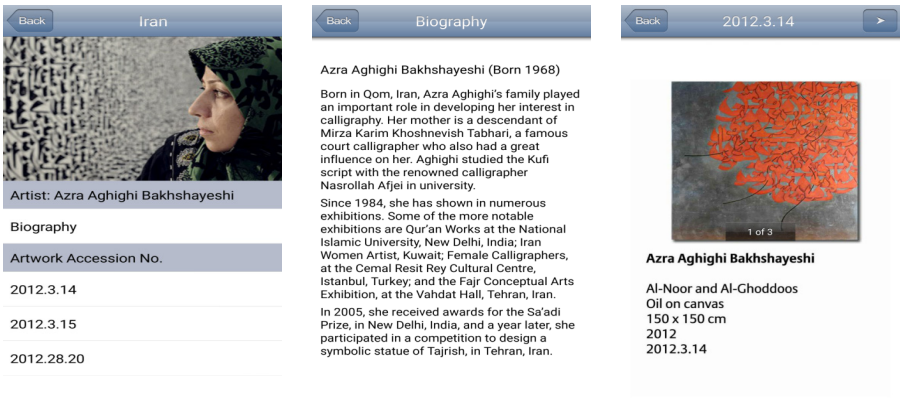

Figure 4: Sequence of information for both tour options

(MGC), a Smartphone with the app was loaned to the participants or they could install the apps to their own Smartphone. Museum staff then provided a brief explanation on how to use the app. On the other hand, participants in the No Guide Condition (NGC) were asked to explore the gallery without the Mobile Guide.

iii. Questionnaire: Participants were asked about their experiences with or without the Mobile Guide. Participants in MGC completed both MMGS and MES, whilst participants in the NGC completed only the MES.

RESULTS

Analysis of Museum Experience Scale (MES)

Figure 5 shows the mean scores on the four components for the multimedia guide. The results show that scores on all components were high, suggesting a positive experience at the IAMM. The result shows that the component of meaningful experience achieved the highest score, followed by the component of knowledge and learning. The combined components score was positive, with a mean of 3.49 (*SD*=0.39).

Using the mean score, a further analysis of the MES was conducted to compare the user experience between native and non-native English speaker respondents. The results are shown in Table 1. It can be concluded that there was no significant difference between these two groups, $t(26)=.99$, $p=.33$.

The next analysis was carried out to see whether the gender of respondents would result in a difference in museum experience. An independent t-test was used, and the results show that there was no significant difference between male and female respondents, $t(21)=1.31$, $p=.20$. Table 2 shows the result of the analysis.

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Analysis of Multimedia Guide Scale (MMGS)

To analyze the result of the MMGS, the mean rating for each of the responses to the questions of each components was calculated. It can be seen in Figure 6 that the component of learnability and control was scored the highest, followed by gen-

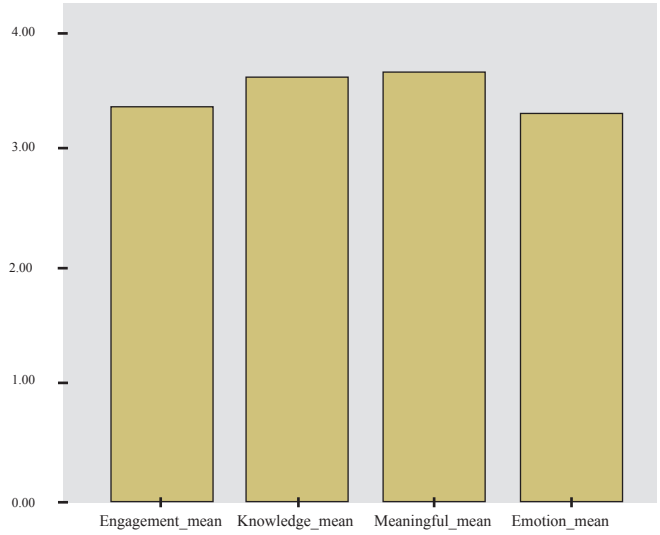

Figure 5: Mean score on the four components for MES

Table 1: Mean score between respondents of native and non-native English speakers

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Components_mean	Equal variances assumed	.99	26	.33
	Equal variances not assumed	.77	4.84	.48

Table 2: Mean score between male and female respondents

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Components_mean	Equal variances assumed	1.31	21	.20
	Equal variances not assumed	1.42	19.12	.17

eral usability. The mean score of the three components show a positive experience in using the multimedia guide (*M*=3.28, *SD*=.36).

A further analysis was then made to the data. The researchers were interested to see the differences in the results between respondents of native English speakers and non-native English speakers because the mobile guide used in the study is in English. From the results shown in Table 3, it can be concluded that there was no significant difference between these two groups, $t(25)=-.13$, $p=.90$.

Furthermore, researchers are also interested to see whether English knowledge of a respondent affects the rating of components. From the results shown in Ta-

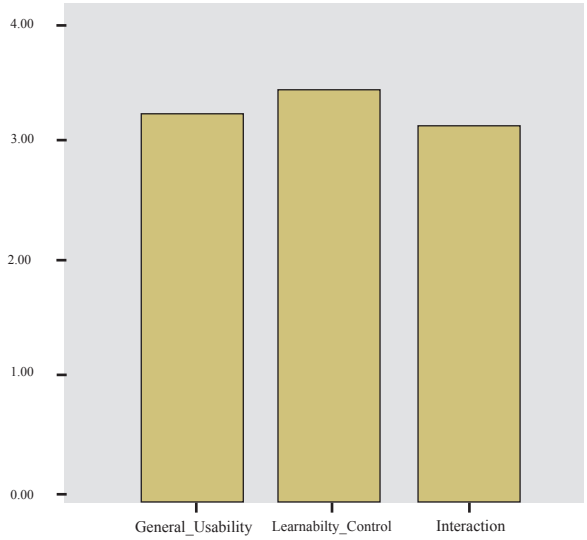

Figure 6: Mean score on the three components for MMGS

ble 4, it can be concluded that there was no significant difference between these two groups, $t(15)=.49$, $p=.63$.

Another analysis was carried out to see whether there was a difference in the mean score of components between genders. An independent t-test was used. Table 5 shows the result of the analysis. There was no significant difference between male and female respondents, $t(22)=.85$, $p=.40$.

DISCUSSION

Positive aspect of Mobile Guide Application

Most visitors found that the experience of using the Nun wa al Qalam application to be fun and engaging. The mix of media presented in the designed content was highly desirable, particularly the highlight of the details in each artwork. Though battery powered, there was no need to replace any of the batteries of the smartphone as the application is not battery consuming.

Cultural instructions have to find ways to attract more visitors to use smartphone guides during their visit. However, having to learn and re-learn to operate different types of guides for different cultural spaces has stopped visitors from using these guides. The idea of 'using your own device' could possibly reduce the usability issues faced when visitors are operating from a different platforms or devices. An application designed with universal design principles should be simple enough to accommodate different types of users, with the ultimate goal to improve user experience.

Table 3: Mean score between respondents of native and non-native English speakers

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Mean_Score	Equal variances assumed	-.13	25	.90
	Equal variances not assumed	-.12	5.66	.91

Table 4: Mean score between respondent with Average and Good English Knowledge

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Mean_Score	Equal variances assumed	.49	15	.63
	Equal variances not assumed	.64	14.15	.53

Table 5: Mean score between male and female respondents

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Mean_Score	Equal variances assumed	.85	22	.40
	Equal variances not assumed	.88	21.53	.39

Museum Experience Scale (MES)

The MES results suggest that introducing technologies such as smartphone guides has successfully achieved its goal, which is to enhance the museum experience. This finding echoed past research which suggested that the usage of mobile guides is more attractive and interesting as compared to the traditional ways of presenting facts (Boehner, Gay, & Larkin, 2005; Othman Petrie, & Power, 2011). Moreover, Naismith and Smith (2006) suggested that visitors enjoyed and comparatively more engaged with the use of handheld devices while visiting a cultural space. Moreover, children in a previous study are also more engaged with the exhibits and at the same time learn more about the exhibits when using a multimedia phone guide (Vavoula et al., 2009). It can be concluded that technology plays a part in enhancing the level of engagement of visitors in an exhibition.

It is also important to note that the use of smartphone guide is able to stimulate creativity, learning and knowledge acquisition. Naismith et al., (2005) showed that the use of a smartphone guide indeed helped in increasing the knowledge of visitors to a cultural space. Other researchers such as Vavoula et al. (2009) and Boehner, Gay, and Larkin (2005) also agreed that visitors with mobile guide gained more knowledge after the visit. Richards and Wilson (2006) explained that when visitors themselves were involved in the creative activities, these creative experiences help in developing skills. This in turn, results in the development of creative tourism, which is defined as the act of not just looking and being around, but a two-way interaction initiative of a visitor.

Multimedia Guide Scale (MMGS)

The use of smartphone guides is one of the ways to significantly improve visitors' experience in a cultural space, as it offers visitors new ways of experiencing various aspects of the cultural space. A study by Proctor and Tellis (2003) found that older visitors experienced more difficulties in using mobile guides compared with the younger visitors. Surprisingly, in this study, respondents generally did not face major difficulties in using the mobile guide, as the mean score of the component of general usability was over 3.00 in the scale of 5.00.

The mean score for the component of learnability and control is the highest among all components, suggesting visitors are able to adapt and use the application in the desired way. It is important to understand that technologies should not become a barrier between the visitors and exhibitions, or distracting the interaction with other visitors. Previous studies have found that participants were drawn into the mobile guides resulting in them losing control of the environment and hindering them from interacting with the exhibits (Semper & Spasojevic, 2002). In this study, similar issues did not occur since visitors were allowed to use their own devices and download the application into their own devices. In addition, it is important to design a user interface with high reversibility to improve learnability and control (Proctor & Tellis, 2003).

The last component of MMGS, the quality of interaction with the mobile guide, is directly related to user experience. In the study by Semper and Spasojevic (2002), the findings showed the importance of visitor interaction with a guide at the exhibition as well as the amount of information they could learn by using a mobile guide. In this study, unnecessary information is eliminated to ensure information does not overflow and as a result, defeats the purpose of using a smartphone guide.

CONCLUSION

With rapid advancement of technology all over the world, more cultural space management ought to embrace new technology for their products, as well as, services to remain competitive in Malaysia. Their task is to constantly adapt to the latest trend by keeping up with the available technology and adding unique features to their products and services. In simple terms, a good strategy and planning is needed to keep up with the development in the museum sector. This study provides the justification needed for the implementation of mobile guide (smartphone apps) for a museum and cultural heritages site. Furthermore, it also provides an insight into visitors' experience in a museum, focusing particularly on the cognitive components, such as, engagement, knowledge and learning, meaningfulness and emotional connection.

This study clearly shows that the use of mobile guide (smartphone apps) for the Nun wa al Qalam exhibition successfully enhanced visitors' experience. In short, the (mobile guide) smartphone app assists in the learning and discovery of information, building a more immersive and engaging exhibition environment with a focus on the social experience of an exhibition visit.

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