Journal of The Korea Society of Computer and Information
Vol. 20, No. 4, April 2015
www.ksci.re.kr
http://dx.doi.org/10.9708/jksci.2015.20.4.103

미술관 모바일 애플리케이션의 사용성에 대한 잠재력과 문제점

이 보 아*

Potentials and Challenges of the Usability of Art Museum Mobile Applications

Boa Rhee*

요 약

모바일 해석매체을 활용할 때의 가장 큰 문제점은 관람객이 모바일 경험을 시도하지 않는다는 것이다. 이에 리움미술관(Leeum)연구의 경우, 모바일 애플리케이션을 사용을 유도하기 위한 목적으로 하나의 처치로써 설문참여자에게 오리엔테이션을 제공했다. 오리엔테이션은 기존의 타 연구에서 제기되었던 박물관 환경에서의 스마트 폰 사용에 대한 주저함에 대한 문제를 해결했으며, 동시에 연구방법론적 측면에서 모바일 해석에 대한 기존 연구와의 차별성이다. 모바일 애플리케이션의 사용에 대한 연구결과를 살펴보면, 관람만족도와 모바일 애플리케이션 사용자에 대한 만족도는 상당히 높게 나타났다. 체류시간과 개별전시물에 대한 관람시간은 평균시간보다 길었다. 설문참여자의 과반수는 관람시간의 20~30%에 해당하는 10분간 애플리케이션을 사용했으며, 개별전시물에 대해서는 30초-1분간(80.3%) 사용했다. 모바일 애플리케이션 없이 관람할 때의 개별전시물에 대한 평균시간(10-30초)과 비교한 결과, 모바일 애플리케이션이 전시물에 대한 관람객의 참여를 증진시켰다는 결론이 도출되었다.

▸ Keywords : 모바일 애플리케이션, 사용성, 참여, 만족, 관람시간의 지속과 할당

Abstract

The biggest challenge of managing mobile interpretative device is that visitors do not have the mobile experience. Thus, in the research of the mobile application of the Leeum (Samsung Museum of Art), a short orientation session as a treatment was provided to survey participants to make them use of a mobile experience. The orientation solved the problem of hesitancy of using smartphone in other researches, it was simultaneously the uniqueness of the methodology. Based on the research data, their satisfaction with visiting experience and with using the application appeared to be relatively high. A half of participants used

•제1저자 : 이보아 •교신저자 : 이보아
•투고일 : 2015. 3. 7, 심사일 : 2015. 3. 27, 게재확정일 : 2015. 4. 21.
* 서강대학교 아트 앤 테크놀로지학과, 지식융합학부(Dept. of Art and Technology, School of Integrated Knowledge, Sogang University)

the application for 10 minutes which is accounted for 20-30% of the total viewing time. Participants (80.3%) engaged in each exhibit with the application in less than 30 sec.-1 minute. Comparing with the average time of engagement (10-30 sec.) for each exhibit without using mobile applications, it is possible to conclude that the mobile application notably contributed to make participants engage with exhibits longer.

▸ Keywords : art museum mobile application, usability, engagement, satisfaction, duration and allocation of visitor's time

I. Introduction

The use of mobile technologies has now become very common in museum settings. PDA-based multimedia guides have been replaced by mobile applications. In fact, multimedia solutions have so far failed to meet their considerable potential for supporting orientation and way-finding. Unlike PDA-based multimedia guide, mobile interpretation media shares 'mobile,' 'digital,' 'personal' features that enable the pre-visit, during visit and post-visit activities harmoniously merged together in terms of the seamless visit model. Such advantages contribute to extend the experience beyond the temporal and physical boundaries of the museum visit.

Undoubtedly, the objectives of using these technologies are to facilitate interactivity with rich resources of information between visitors and exhibits and/or among visitors during their visit, to experiment with visitor engagement, and to provide more memorable experience [1]. Such effects will inarguably keep higher growing trend of applications of smartphone and tablet computer in the near future.

The potential of mobile technologies goes far beyond providing a high performance level. It can immensely enrich visitors' enjoyment and learning in ways. For example, it can support visitors' meaning-making by framing and focusing their activities and interactions with objects and companions. They also layer multi-sensory elements within the experience, thereby enriching the quality of the physical context.

II. Related Works

Very preliminary data has shown that those who make use of a mobile application find that it enhances their museum experience [2] and they have more in-depth experiences and longer stay time [3]. Despite their great potentials and the pervasiveness of applications, there is still a lack of understanding about how visitors interact to the use of mobile applications and simultaneously with the exhibits. Moreover, many doubts with regard to their effectiveness for enhancing museum experience with new challenges are remained.

Nowadays technology gets the blame. The rise of social networks and the smartphone have made people fatally incapable of concentration and have caused the problem of head-down effects in museums. Some researchers claim about the lure of the screen to cause isolation and intrusiveness [4]. In other words, mobile guides distract visitors and redirect their attention from the exhibit to the mobile device [5]. Thus, the information should be presented in an unobtrusive way without destroying

the visitors' feeling of wonder [6]. When the information is overloaded, most visitors easily get both museum fatigue and technology fatigue. In addition, visitors have often expressed frustration when the virtual content of the mobile application does not closely match the actual content of the exhibition, such as when there are objects not featured on the tour but that the visitors wanted information about.

Recent studies have revealed that visitors have user perception problems in terms of hesitancy for engagement. For instance, the usage of the application in the Walker Art Center was merely 17% due to user's negative perception of using smartphones [7]. The Denmark National Gallery figured out that 86.4% of iPhone users have not utilized the tour guide smartphone application [8]. In the case of Chungwadae Gallery, only 6% of survey participants made use of the tour guide smartphone application [9]. This article analyzes how the mobile application can be used to enhance visiting experiences in museum context. It also sheds light upon the issues related to the potentials and challenges of the mobile of applications from the perspective of museum interpretation.

III. Method

The Leeum (Samsung Museum of Art) in Seoul, S. Korea is a world-renowned art museum for exhibitions of both Korean traditional art and international contemporary art. In 2004 with the grand opening of the museum, the PDA-based multimedia guide as a handheld device started to provide additional information for interpretation. However, several problems such as form factor and weight of the device, usability, interaction with companions, user experience and user interface, durability of battery were found through fixed observation, shadow tracking and interview.

A new mobile guide was created in collaboration with curators, museum experts and user interface designers in 2013. In the process of the mobile project, the prototype of the mobile guide was run for several months, and during this period several tests to measure the users' satisfaction and to get opinions about the new mobile system were performed. In this way, the evaluation of the user experience was applied to improve the mobile guide under development.

This mobile guide has been rated as excellent in terms of function and design by the museum visitors.. Moreover, the 'Highlight Tour' provides a wealth of information of the masterpieces in the permanent collection for visitors with the function of 360◦ view by putting 650 photos in three dimensional order.

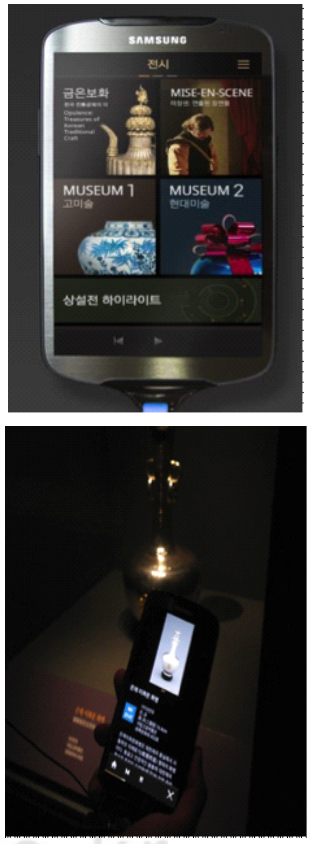

Fig. 1. The Features of Leeum Mobile Guide [10]

A quantitative research for usability of the mobile guide and the application was implemented with 57 participants in their twenties in 2014. In general, the age of the target audiences for museum mobile experience ranged from twenty to thirty who are the representatives of tech-savvy genrattion [11]. This research was designed to investigate the effects of the mobile guide on the overall visiting experiences and to identify problems using the mobile application at the Leeum. The standard questionnaire was developed to measure both visitors' experience, particularly the engagement, with the Museum Experience Scale (MES) and the usefulness and usability of the mobile guide. The 4 components such as engagement, meaningful experience, knowledge and learning, and emotional connection were included in MES [12].

It consisted of 30 questions about usability of the application, satisfaction, problems of isolation, distraction and intrusiveness, and the duration and allocation of visitors' time as a time measurement. Some items were presented in the scales as Likert items from 1 meaning "strongly disagree" to 5 meaning "strongly agree." The survey participants in twenties with tech-savvy were collected as a population. A short orientation session as a treatment was provided to the participants to make them use of a mobile experience and to solve the problem of hesitancy in advance.

IV. Key Findings

Meaningful exhibit for the visitor receives higher attracting power, holding power, attention-level, longer staying time, and better satisfaction on visiting experience. The museum setting is very complex and crowd, mostly consisting of many exhibits with high attraction power and placing high demands on visitors' cognitive resources. Despite interindividual differences, visitors commonly show signs of 'museum fatigue' after about 30 minutes. At that moment, their interest decreases, they are more selective in choosing exhibits for further exploration, and they process information less deeply [13].

According to several studies on visiting behavior, the duration of visits is a yardstick to predict or assess visitors' interest, motivation, preference and satisfaction. In fact, the visitor's span of attention is less than 20-30 minutes regardless of topic and size and average time spent on each exhibit is roughly 30 seconds to 1 minutes [14]. For example, in the case of the Louvre, the average viewing time to the Mona Lisa is 15 seconds, which makes people wonder how long they spend on other 35,000 works in the collection [15].

A survey at the Metropolitan Museum of Art found that people look at artworks for 32.5 seconds each, but they must not have counted the ones people glance at [16]. Based on several studies, the median time spent on each exhibit was only 17 seconds and average reading time for interpretative materials such as text, label and panel is less than 10 seconds.

Survey data shows that their overall satisfaction with museum experience (i.e. meaningful experience) at the Leeum appeared to be relatively high (73.2%) (Fig. 2). Almost 70.0% participants agreed that the experience was inspiring, and meaningful (61.4%), and intellectually (64.9%) and emotionally (73.2%) stimulating. In addition, 75.4% participants concentrated their efforts on meaning-making at the exhibition and wanted to make another visit to Leeum later. It means that participants were fully attracted by the exhibits and fulfilled personal interests and needs for visiting experience.

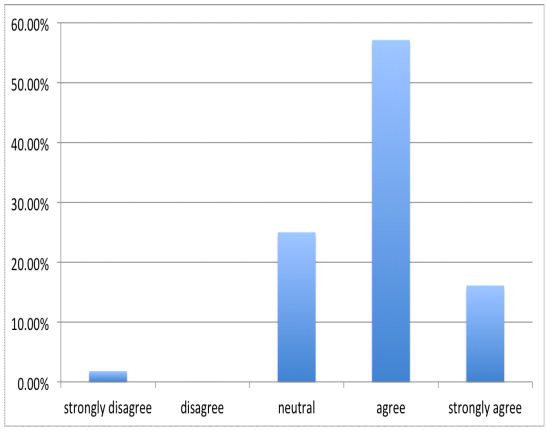

Fig. 2. The degree of satisfaction

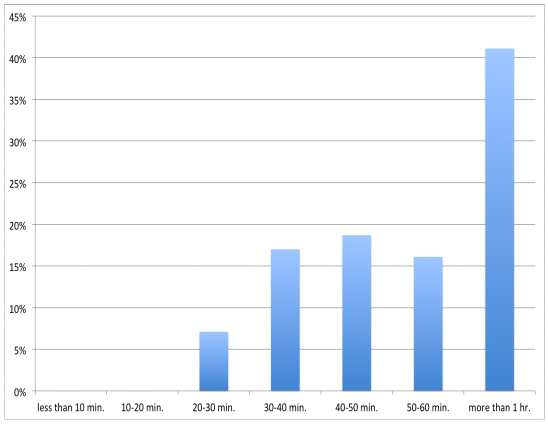

Fig. 3. Staying time at the Leeum

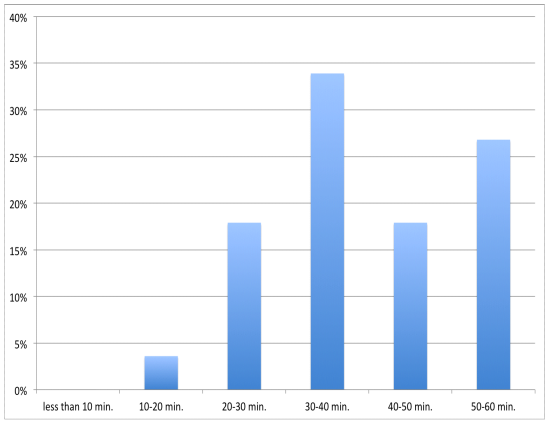

Fig. 4. Total viewing time at the Leeum

From the point of the duration and allocation of visitors' time (i.e. engagement), 93% participants stayed 30 minutes or longer at the museum (Fig. 3). 78.6% participants spent 40 minutes or more for viewing exhibits (Fig. 4). Their staying time and viewing time are longer than those of average time. Although their staying time were not consistent with the total viewing time, they used to view exhibits of more than half of the staying.

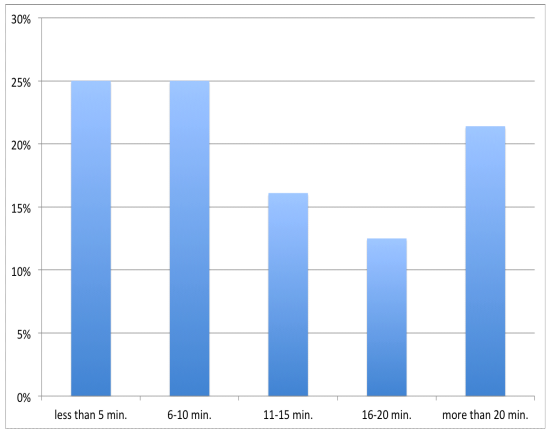

Fig. 5. Total time of engagement with the mobile application

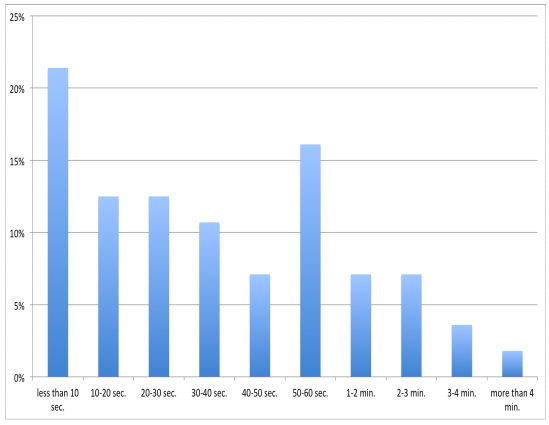

Fig. 6. Time of engagement for each exhibit with the mobile application

As for the usage of the application at the Leeum, 50% of participants used the application for 10 minutes (Fig. 5). The amount of time is accounted for 20~30% of the total viewing time. 80.3% participants engaged in each exhibit with the

application in less than 1 minute (Fig. 6).

Considering the average viewing time being 15-30 seconds for each exhibit that do not use mobile applications in other researches, it is possible to conclude that the mobile application contributed more or less to make participants engage with exhibits longer. The average time of engagement (30 sec.) for each exhibit with the mobile application came out to be higher than the average reading time (10 sec.) for information about exhibits which was shown in other studies.

59.6% participants used the application for less than 10 objects among 200 exhibits (Fig. 7). The number of objects using the mobile application is relatively small. Above all, even though the users were encouraged to have a mobile experience in the session of orientation. the rate still came out to be 22.8% nonetheless they were encouraged to have a mobile experience in the session of orientation.

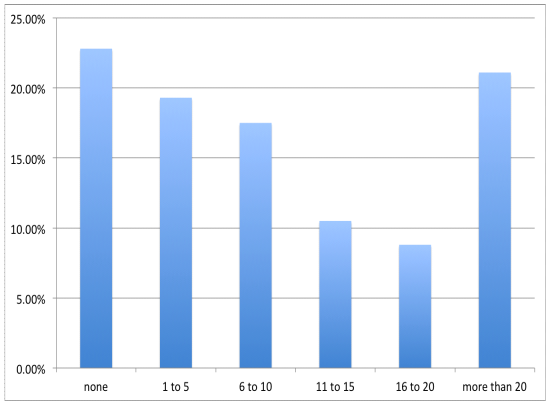

Fig. 7. Number of exhibits using the mobile application

It means that participants only used the mobile application when they needed additional information and they wanted to exercise their rights for the selection of knowledge as a subject of the museum visiting. Thus, almost half of the participants had a desire to feel free from moving around exhibits in their own way without any disturbance of the mobile application.

More than half of participants agreed that the application was easy to understand and to control. More importantly, 92.7% expressed that the application was helpful and useful to understand the exhibitions (i.e. knowledge and learning), and the degree of satisfaction (i.e. emotional connection) of using the application was high (54.5%) (Fig. 8). Based on the result of these three items, they generally felt the mobile application ultimately enhanced the museum experience.

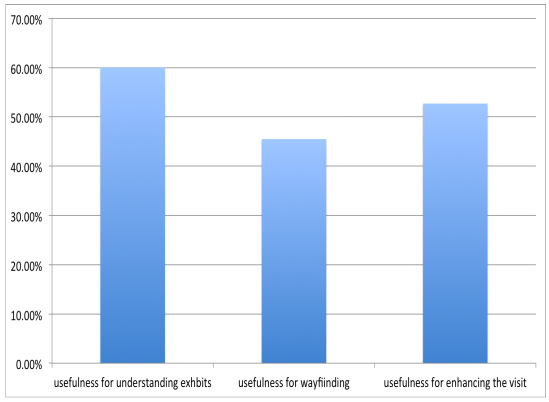

Fig. 8. The usefulness for the mobile application

Despite of the high satisfaction degree, almost 30% of the participants were aware that the application actually hindered to engage to objects and companions at the same time in terms of isolation, distraction and intrusiveness (Fig. 9). Moreover, the same percentage of participants complained about the head-down effect of the device along with the several technical problems such as the lengthy loading time of the information, the difficulty for searching information and the frequent malfunction of IR sensor. The reason why the number of objects using the mobile application is relatively small is directly due to these problems. These problems not only serve as a cause of museum fatigue and technology fatigue but also make museum professionals and visitors have a skeptical

attitude towards using mobile technology in museum settings.

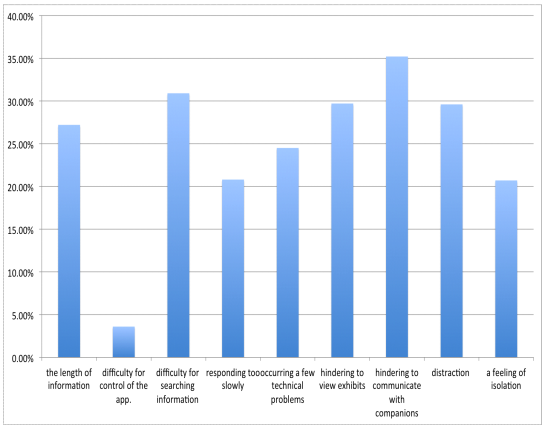

Fig. 9. The problems for using the mobile application

V. Conclusion

Mobile applications are truly having meaningful effects on visitor's personalized meaning-making, interpretation, immersion, participation and learning effect. This study analyzed how the mobile application could be used in the context of exhibition. The result unveiled the tension between potentials and challenges. Participants' satisfaction with museum experience at the Leeum appeared to be relatively high. More importantly, the usability and the degree of satisfaction of using the mobile application were also high. The participants admitted that the mobile application ultimately enhanced engagement, meaningful experience, knowledge and learning, and emotional connection. In this research, the orientation session played a crucial role not only in mitigating the participants' metal burdens including the problem of hesitancy, but also in encouraging visitors to have a mobile experience.

However, several problems such as intrusiveness and detraction to visitors' engagement with exhibits, isolation, head-down effect and technical problems are needed to be improved to have a promising future. To sum up, key to the success of using mobile applications in museum setting is a detailed understanding of visitors' needs, expectations, behaviors, satisfactions, behaviors and other issues through ongoing visitor feedbacks.

It is important for museums to embrace new technologies to engage and stimulate their visitors in exhibition spaces. Ever since mobile technology has been introduced into museums, it is often repeated that Andre Malraux's notion of the museum without walls, which stands for a museum that its information and knowledge are available both to on-site and remote visitors, has met it best realization. Mobile applications can provide a platform for interactivity and access to an unlimited amounted of information, presentation of rich multimedia, and flexibility for customized experience both inside the museum and beyond. However, this does not bring down the conceptual walls that visitors have.

The use of mobile technologies should not be regarded as replacement of docent programs or more traditional means to disseminate information, but instead as further ways to connect and engage visitors with exhibits. It is more than an information-distribution platform, and that it should instead connect visitors with each other, with the institution playing an important role of bringing people together through shared experience [17].

REFERENCES

[1] L. Tallon, "Mobile Strategy in 2013: an analysis of the annual Museums & Mobile Survey," Pocket-Proof, March 2013(http://www.museumsmobile.com/wp-content/uploads/2013/07/MMSurvey-2013-report-V2.pdf).

[2] J. Luke, and J. Stein, "Walker Art Center: Summative Evaluation of Interpretive

Experiences Newly Installed within the Permanent Collection," Institute for Learning Innovation, Sep. 2006.
〔3〕 M. Nickerson, "1-800-FOR-TOUR: Delivering Automated Audio Information through Patron's Cell Phones," J. Trant and D. Bearman (eds). Museums and the Web 2005: Proceedings. Archives &Museum Informatics, March 2005 (http://www.archimuse.com/mw2005/papers/nickerson/nickerson.html).
〔4〕 S. Filippini-Fantoni and J.P. Bowen, "Mobile Multimedia: Reflections from Ten Years of Practice," Digital Technologies and the Museum Experience, Altamira Press, p.79-96, 2008.
〔5〕 T. Walter, From museum to morgue? Electronic guides in Roman Bath, Tourism Management, 17(4), pp. 241-245, June, 1996.
〔6〕 A.G. Valdecasas, C. Correia, and A.M. Corres, Contributing to dialogue, curiosity and wonder in natural history museums, Museum Management and Curatorship, 21(1), pp. 32-43, June, 2006.
〔7〕 K.H. Goldman, Cell Phones and Exhibitions 2.O: Moving beyond the Pilot Stage, J. Trant and D. Bearman (eds). Museums and the Web 2007: Proceedings. Archives &Museum Informatics, March 2007 (http://www.archimuse.com/mw2007/papers/haleyGoldman/haleyGoldman.html).
〔8〕 M.H. Rung and D. Laursen, "Adding to the experience: Use of smartphone applications by museum visitors." Proceedings of the Transformative Museum Conference, Roskilde University, pp. 314-324, May 2012.
〔9〕 B. Rhee and Y. Choi, Using mobile technology for enhancing visitor experience in museum contexts, Asia Workshop on Convergence Information Technology of KSCI 2014, Seoul: KSCI, pp.151-154, Dec. 2014.
〔10〕 http://leeum.samsungfoundation.org/html/introduction/news_view.asp?seq=1263
〔11〕 L. Tallon, Museums & Mobile Survey 2013. Pocket-Proof, March, 2013.
〔12〕 N.K. Othman, H. Petrie and C. Power, Engaging visitors in museums with technology: scales for the measurement for visitor and multimedia guide experience. Human-Computer Interaction-INTERACT, 6949, pp.92-99, 2001.
〔13〕 G. Davey, What is museum fatigue?, Visitor Studies Today, 8(3), pp. 17-21, 2005.
〔14〕 B. Serrell, Paying attention: The duration and allocation of visitors' time in museum exhibitions, 40(2), pp. 108-125, June 1997.
〔15〕 A. Ursyn, Computational solutions for knowledge, art, and entertainment: Information exchange beyond text. IGI Global, Oct., 2013.
〔16〕 E. James, How long does it take to look at a painting?, Huffpost Art & Culture, March 3, 2015. http://www.huffingtonpost.com/james-elkins/how-long-does-it-take-to_b_779946.html.
〔17〕 S. Wasserman, Beyond information: Ritual, relationship and reencounter through mobile connectivity. Curator: The Museum Journal, 54(1), pp. 11-24, Jan. 2011.

저 자 소 개

이 보 아
1987: 성균관대학교 문헌정보학과 문학사.
1990: 성균관대학교 미술학 석사.
1997: Florida State University 박물관경영학 박사.
현 재: 서강대학교 아트 앤 테크놀로지학과 교수
관심분야: UX/UI, 인터랙티브 미디어.
Email : boateresa@sogang.ac.kr