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Using Mobile Technology for Enhancing Museum Experience: Case Studies of Museum Mobile Applications in S. Korea

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Abstract

In the case of the Chungwadae Gallery, both smartphone and tablet computer applications as a digital docent failed to achieve a seamless visit model. Visitors had no interest in interpretation and the usage of mobile applications stayed at very low levels. And technical, practical, contextual and social issues in relation to using mobile applications have been derived from the empirical analysis. More importantly, visitors thought that the applications leave visitors incapable of deep engagement with companions in terms of isolation and intrusiveness. From this point of view, the biggest challenge of managing mobile interpretative device is encouraging visitors to use the mobile experience. It is somewhat skeptical about the value of mobile applications in the research of the Chungwadae Gallery, whereas the usability and the degree of satisfaction of using the application were relatively high in the research of the Leeum. However, several problems such as intrusiveness, isolation, head-down effect and technical problems should be improved to use the mobile application. In the case of the Leeum, a short orientation session as one of marketing efforts is a key component in encouraging visitors to use a mobile experience and in solving the problem of hesitancy.

Keywords: *Museum mobile application, Hesitancy, Engagement, Usability, Satisfaction*

1. Introduction

Congratulations! Driven by the Apple devices' success, mobile communication is fast spreading all over the world [1] and chasing the tail of mobile technology was getting museums nowhere. Mobile applications as interpretative devices share 'mobile', 'digital', 'personal' features that enable a seamless visit model in which the pre-visit, during visit and post-visit intertwined together in a flow of experience [2]. In fact, orientation features such as way-finding, tour program conjoined with location-awareness and interactive map are useful for first time or low-frequency visitors [3]. Thus, the use of mobile applications within museum settings has dramatically increased within the last few years. L. Tallon (2012) explains traditional audio guide has shrunk down to 1/5 while application of mobile technology showed a sudden increase in using QR Code (800%), iPad tour (200%) and smartphone application (151%) [4].

Mobile applications are truly having meaningful effects on visitor's personalized meaning-making, interpretation, immersion, participation, learning effect related to the exhibition [5]. Very preliminary data has shown that those who make use of a mobile application find that it enhances their museum experience [6] and they have more in-

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depth experiences and longer stay time [7]. At the same time, mobile applications pose new challenges. Despite the pervasiveness of such applications in museums, recent studies have revealed that visitors are quite hesitant to use them or even not making use of them [8-10].

In the case of the Chungwadae Gallery, there exists no prior knowledge of how many visitors actually use mobile applications for the purpose of interpretation and no prior understanding of barriers to use them. On the contrary, the Leeum had a previous experience to run a PDA-based digital guide and the Leeum developed a mobile guide based on the previous research data. This research thus sheds light on the actual usage of mobile applications in order to provide an insight on the use of mobile technology in museum settings. If hesitancy is a core of the problem, it also needs to examine the visitors' mental burdens, behaviors and actual engagements in using applications. To verify these research questions, a mixed-methodology is used for empirical analysis.

2. Evaluation of Museum Mobile Applications

2.1 Evaluation of Mobile Applications in the Chungwadae Gallery

In the case of the Chungwadae Gallery, mobile technology has been the focus in actualizing seamless visit model. As a digital docent, a smartphone and a tablet computer each came with optimized exhibit contents and information (Figure. 1-1.). The mobile application used iOS and Android platform and was composed of digital guide, Chungwadae guide, AR and SNS (Figure 1-2.). With this application, visitors can explore the exhibit location, use audio guide, and use QR code below the exhibit to play videos. Tablet computers were connected to the media table located in the center of the gallery, therefore failed to achieve a seamless visit model. Tablet computers using android platform also offered the application that provided route-finding and navigation, synchronization with QR code, and Indoor Location based Services for connecting 3D virtual space and the actual exhibit location based on 'ArchiSpace' which is one of the space information visualization software. For empirical analysis on the visitors' mobile experience, observations and focus group interviews along with a survey were carried out in 2012. 70 visitors were invited to participate in the survey consisting of 20 questions, regardless of whether or not they used the mobile application. The questions covered rather heterogeneous issues ranging from viewing time, attracting power and holding power of each exhibit to using the mobile application. Following up on the survey, observations were conducted in gallery for a week, and 5 semi-structured focus group interviews were performed to get feedback and comments on utilizing the mobile application from group of visitor as well as from group of employees in the gallery. Focus group interviews particularly concentrated upon visitors who did not use the mobile application while within the exhibition.

Figure. 1. Smartphone Application Screenshots of the Chungwadae Gallery

2.2 Evaluation of Mobile Applications in the Leeum

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 digital guide started to use it as an interpretative device. In 2013, a new mobile guide was created by the cooperation with Samsung Electronics, using the Samsung GALAXY NOTE II. This mobile guide is highly valued for its excellence in terms of function and design. Moreover, the Highlight Tour Program provides a wealth of information of the main collection for visitors with the function of 360 degree view by putting 650 pictures in three dimensional order. In this study, a quantitative research for usability of the mobile guide was implemented in 2014. 57 participants in twenties were collected as a sample population, and the survey consisted of 30 questions about usability of the mobile application during the visit. Unlike the research of the Chungwadae Gallery, survey participants had a very short orientation session to explain as well as to encourage using the museum application as a kind of the treatment before the survey runs.

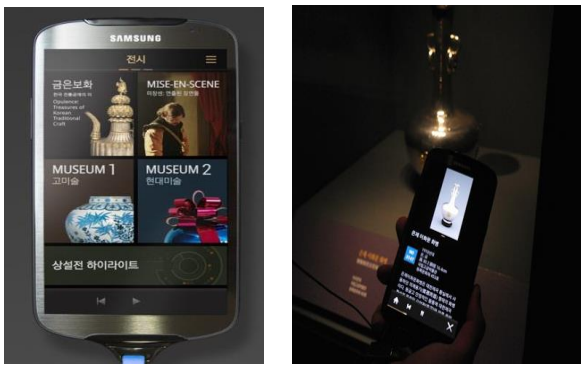

Figure. 2. The Features of Leeum Mobile Guide (http://blog.samsung.com/3550/) (http://leeum.samsungfoundation.org/html/introduction/news_view.asp?seq=1263)

3. Results and Discussion

3.1 Key Findings for Usage of Mobile Applications in the Chungwadae Gallery

The quantitative research evidence suggests that only 6% (n=4) of survey participants made use of the mobile application although many visitors possessed

a smartphone. They wanted to try it for the first time and see how it worked, and they thought it could be fun to try. Only one participant compared the application with more traditional ways of acquiring information, saying that the application was easier, more interactive and better than reading labels. Obviously, most participants did not utilize the mobile application because they were unaware that the service was offered. They also assumed that smartphone usage was prohibited in the gallery. Above all, they were unsure of what it was or how to use it. Some did not want to use the application because they wanted to interact with companions. While some of the non-users had logistical reasons for not making use of the mobile application, others simply said they are not interested in having more information about exhibits.

In the qualitative research, most visitors indifferently passed by tablet computers, according to the observation data. A couple of visitors stopped the pace and tried the application out of curiosity concerning the novelty of devices in less than 1 minute. Indeed, they had absolutely no interest in the interpretative information. There were several facts revealed through the interviews with visitors and employees. The mobile application, had only one to two downloads per day, suffering from lack of promotion. These downloads have been made after visitors arrived to the gallery and not on a pre-visit phase. From the perspective of visitors, there was a simple technical problem: the application took too long to download. Also on the application, diversity of contents and the quantity of information were not enough for interpretation, UI and UX were less intuitive and functioning errors of AR and QR code have been pointed out.

3.2 Key findings for Usage of Mobile Applications in the Leeum

Survey data shows that 50.9% of the participants had a previous experience using the museum applications and 61.4% respondents preferred using the application rather than using text-based materials such as labels and panels nearby exhibits. 92.9% participants stayed 40 minutes or longer at the museum and their staying time were almost consistent with the total viewing time. Their staying time and viewing time is higher than those of average time in other museums. Based on the data of time measurements, it was possible to estimate that their satisfaction for museum experience would be high and, in fact, their satisfaction with their visiting experience at the Leeum appeared to be very high (75.4%).

As for the usage of the mobile application at the Leeum, 50% of participants used the application in 10 minutes for viewing time, 80.3% engaged in each exhibit with the application in less than 1 minute and 59.6% used the application for less than 10 objects. More than half of participants agreed that the application was easy to understand as well as to control. More importantly, 92.7% expressed that the application was helpful and useful to understand the exhibitions and the degree of satisfaction of using the application was relatively high (87.2%). Despite of the high satisfaction degree, almost 90% of the participants were aware that the application hindered to communicate with objects as well as companions at the same time. This is a problem of isolation using mobile application. Moreover, almost 90% of participants complained about the head-down effect of the mobile device along with the several technical problems such as the length of loading time of the information and the frequent malfunction of IR sensor. On the other hand, the same percentage, 90% of the participants were satisfied with using the application and they felt the application ultimately enhanced the museum experience.

4. Conclusion and Implications

Ever since mobile technology has been introduced into museums, it is often repeated that Andre Malraux's notion of the museum without walls has met its best realization. A 'museum without walls' stands for a museum that makes its

information and knowledge available both to on-site and remote visitors [11]. Mobile applications can provide a platform for interactivity and access to an unlimited amount of information, presentation of rich media, and flexibility for customized experiences both inside the museum and beyond [12]. However, this does not bring down the conceptual walls that visitors have.

In this study, both mobile applications in the Chungwadae Gallery failed to actualize a seamless visit model. Visitors had no interest in interpretation and the usage of mobile applications stayed at very low levels. And technical, practical, contextual and social issues in relation to using mobile applications have been derived from the empirical analysis. More importantly, visitors thought that the applications leave visitors incapable of deep engagement with companions. The result is consistent with the data of 'Mobile Strategy in 2013: An analysis of the annual Museums & Mobile survey' that the biggest challenge of managing mobile interpretative device is encouraging visitors to use the mobile experience [13].

It is somewhat skeptical about the value of mobile applications in the research of the Chungwadae Gallery, whereas the usability and the degree of satisfaction of using the application were relatively high in the research of the Leeum. However, several problems such as intrusiveness, isolation, head-down effect and technical problems should be improved to use the mobile application. To sum up, a short orientation session as one of marketing efforts is a key component in encouraging visitors to use a mobile experience and in solving the problem of hesitancy in the Leeum case.

5. Acknowledgments

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6. References

6.1. Journal Article

[1] H. Tsai and K. Sung K., "Mobile applications and museum visitation," IEEE 45, vol. 4, **(2012)**.
[2] K. H. Goldman, "Cell Phones and Exhibitions 2.O: Moving beyond the Pilot Stage," Museum and the Web 2007, **(2007)**.

6.2. Book

[3] L. Tallon, "Museum & Mobile Survey 2012. Pocket-Proof & Learning Times," London **(2012)**.
[4] Luke J. and Stein J., "Walker Art Center: Summative Evaluation of Interpretive Experiences Newly Installed within the Permanent Collection," Unpublished Technical Report. Institute for Learning Innovation, MD, **(2006)**.
[5] Luke J. and Stein J., "Walker Art Center: Summative Evaluation of Interpretive Experiences Newly Installed within the Permanent. Institute for Learning Innovation," MD, **(2006)**.
[6] Templeton C. A., "Museum Visitor Engagement through Resonant, Rich and Interactive Experiences," MA thesis, the School of Design, Carnegie Mellon University, PA, **(2011)**.
[7] Tallon L., "Mobile Strategy in 2013: an analysis of the annual Museums & Mobile survey. Pocket-Proof & Learning Times," London, **(2013)**.

6.3. Chapter in a Book

[8] L. Tallon L., "Introduction: Mobile, Digital, and Personal. Digital Technologies and the Museum Experience, Altamira Press," MD, **(2008)**, pp. xiii-xxv

6.4. Conference Proceedings

[9] L. Calvi and M. Cassella, "Always On: Museums in the Mobile Communication Era," ELPUB2011, Digital Publishing and Mobile Technologies, 15th International Conference on Electronic Publishing, Istanbul, Turkey, **(2011)**.
[10] Laine T. H., Islas S. C., Vinni M. and Joy M., "Characteristics of Pervasive Learning Environments in Museum Contexts," 8th World Conference on Mobile and Contextual Learning (mlearn 2009), Orlando, FL, USA, **(2009)**.

[11] Nickerson M., "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*, Chicago, IL, USA, **(2005)**.
[12] Laursen D., "Adding to the Experience: Use of Smartphone Applications by Museum Visitors", *The Transformative Museum conference*, Roskilde University, Roskilde, Denmark, **(2012).**
[13] Arvanitis K., "Museums outside walls: mobile phones and the museum in the everyday," IADIS International Conference Mobile Learning 2005, Qawra, Maldives, **(2005)**.

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