Designing the Museum Gamification System

Se-won Jeon*, Seok-Jae Moon**, Gi-Hwan Ryu***

Ph. D student, Department of Immersive Content Convergence, Graduate School of Kwangwoon University, Korea
**Professor, Institute of Information Technology, Kwangwoon University, Seoul, Korea*
***Professor, Department of Tourism and Food Industry, Graduate School of Smart Convergence, Kwangwoon University, Seoul, Korea*

E-mail: {sw2947, msj8086, allry}@kw.ac.kr

Abstract

We identified the correlation between museums, gamification, and viewers based on the results of keyword correlation analysis, designing the museum gamification system. By applying gamification to the museum through big data CONCOR analysis, it was found that viewers had fun watching it through direct experiences and experiences. In this study, we propose a system that directly selects the story desired by the viewer and serves the game suitable for the theme of the museum they visited. In addition, the system proposed in this paper organized a story algorithm so that viewers can directly select the difficulty level based on the story and play personalized games. We collected existing museum information and designed to enable games of various stories suitable for the museum's theme, and based on this, it was applied to the museum gamification app. Moreover, in order to further enhance the immersion of museum viewing. We have been designed and applied based on Virtual Reality (VR).

Keywords: Museum, Gamification, System, Museum Education, VR

1. Introduction

The museum trend is changing what keywords are related to museums, gamifications, and viewers [1]. Based on this, the relationship between museums, gamification, and viewer keywords and the museum's strategic direction using gamification were derived. In addition, basic data are presented to expand the museum market by utilizing gamification. Based on this, I would like to propose a museum system using gamification through museum keywords using social media information. In this paper collects data using social media information, performs text mining, and matrix analysis for the relationship between museums and gamification. The museum gamification system design is proposed based on the data analyzed by checking the correlation through big data CONCOR analysis, classifying groups. Combining story elements and gamification, a story algorithm is constructed to show the museum-related story topics to viewers so that they can enjoy the viewing. Taking advantage of the museum's unstructured environment and informal education, the goal is to develop it into a museum gamification system so that visitors can have fun and interest in visiting the museum and remain an impressive memory. In addition, with

the development of the information technology (IT) tourism industry, the museum gamification system is formalized as an app and applied familiarly to viewers [2]. Therefore, viewers can check the basic information of the museum through the app and expect motivation from viewers through the app game [3]. In addition, it can be a way to increase the intention to revisit the museum by applying VR and greatly affecting the audience's interest and immersion. IN this paper from the existing museum gamification and proposes a museum story gamification that combines gamification with story elements.

2. Related Work

In the past, museums were preserved, displayed, and exhibited as a space for collecting relics, but unlike in the past, education and research are now serving as spaces and social education institutions [4]. Museums are also using gamification that can be expanded into the experience of visitors, away from the general method of preserving existing materials [5]. Among the various educational programs, the application of gamification in museum education mainly focuses on related contents such as fun, immersion, and satisfaction, which are the results of the process among the various elements of the game [6].

From the original data, data containing museums, gamification, and education show that gamification technology will be used as an important role in the museum experience as one of the important skills to experience. However, it can be seen that most of the data related to research from academic information are still in the development stage. In addition, it can be seen that it is still insufficiently applied to domestic museum education. As such, it can be seen that gamification is closely related to museum education. CONCOR analysis is a method of finding a group with an appropriate level of similarity by repeatedly performing correlation analysis [7]. As a result of a comprehensive analysis, viewers prefer activities that can be experienced directly at the museum. In addition to further expanding the experience, it is also applying game elements to museum programs so that viewers can feel the fun and interest of viewing in museum education. Furthermore, we propose a museum gamification system to make it easier to understand and immerse history, culture, and relics through various contents by adding stories to the museum gamification. Coming Metaverse as a new digital trend, expectations are growing that the XR device industry, including VR and AR, will develop significantly overall. Metaverse technologies are being used in earnest in the entire cultural content industry, led by the game industry. In line with this, leading museums around the world are presenting various exhibitions using VR [8].

3. Proposal System

Figure 1 shows When the user downloads the app on the proposed system flowchart, the system shows the game screen and selects the terms and conditions and characters. When a user requests museum information on the game screen, the museum takes museum information to the system, combines the story information in the system, and shows the story related to the museum to the user, allowing the game to proceed by selecting the story.
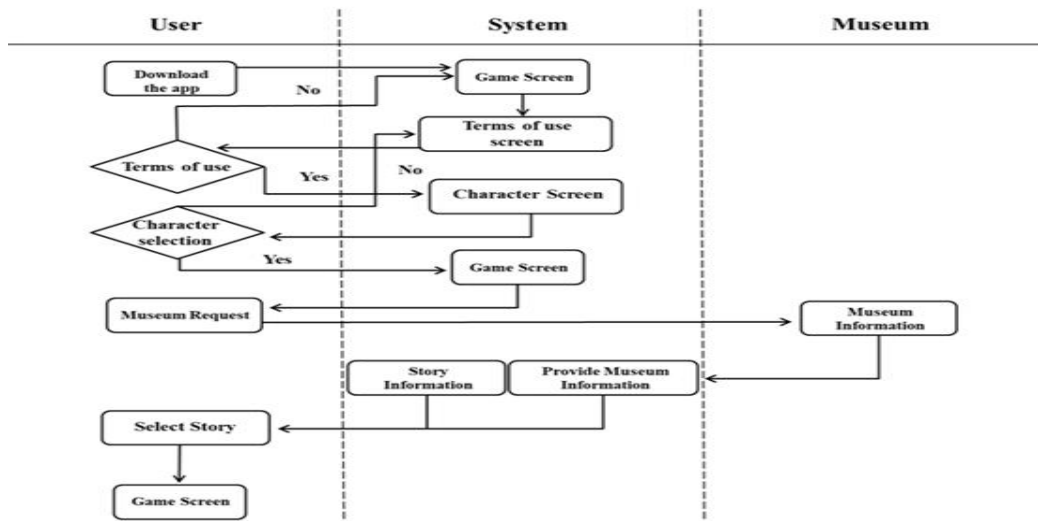
Figure 1. propose system flower

Figure 2 shows According to the system story algorithm, before starting a museum game, they agree to terms and conditions, select characters, and agree to terms and conditions for personal information and location. In character selection, name and character image are selected. Character selection helps to bond with games and reflect visitors' tendencies. Next, select and find the museum type yourself or search under the name of the museum. For example, search the National Hangeul Museum and select the desired story, such as adventure, reasoning, history, and brain, which are the story themes you want. In addition, viewer can choose the difficulty level yourself and enjoy the game according to yourself. If viewer choose to take an adventure in the story, there will be a brief plot titled "Go back to the Joseon Dynasty and find Hangul that has disappeared". Viewer can directly select the difficulty by making the difficulty appear in a star shape. Finally, the game is selected to show a graphical museum map to make it easier for visitors to find the location of the exhibits.
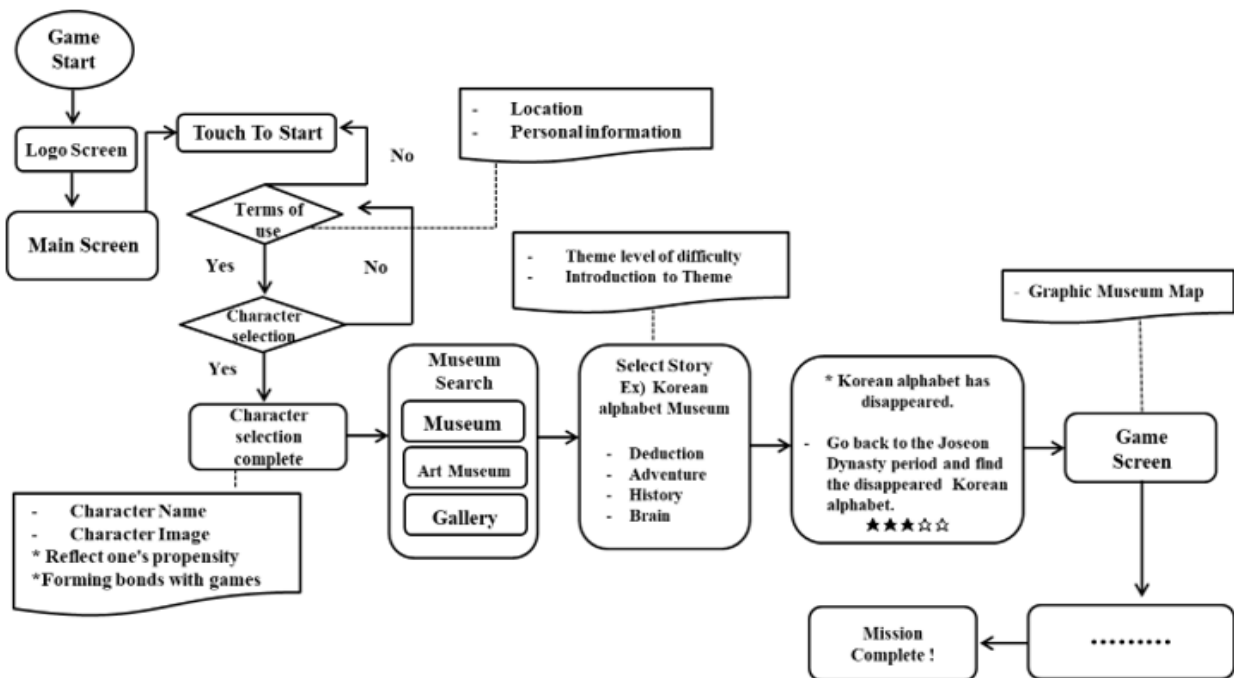

Figure 2. Story algorithm propose system

   CoSpaces was used to apply VR to museum gamification apps. This shows the progress of the game by entering the museum and selecting a story when the viewer runs the app. The interface for the app to which VR is applied is shown in Figure 3. When a viewer selects a museum he or she visits, he or she can see the entrance door to the museum on the app and enters the museum. This interior was arranged to feel like a museum square so that there was no sense of distance from reality. This allowed viewers to increase their immersion. The theme consists of a total of four themes, with signs of adventure, reasoning, brain, and history written on each door. Among them, if you want a reasoning theme, choose the door with a reasoning sign. The mystery room was designated as an example of the Hangeul Museum. First, the mystery room was decorated with something related to the Hangeul Museum. It is a way to check the mission and find hints hidden throughout the room. It is a method of finding the last number and going to the password keyboard and writing the password in the order of the answer of question 1, answer of question 2, and number on the top of the dice. Finally, if you write down the password and press confirmation, the treasure box will open and the game will be finished.
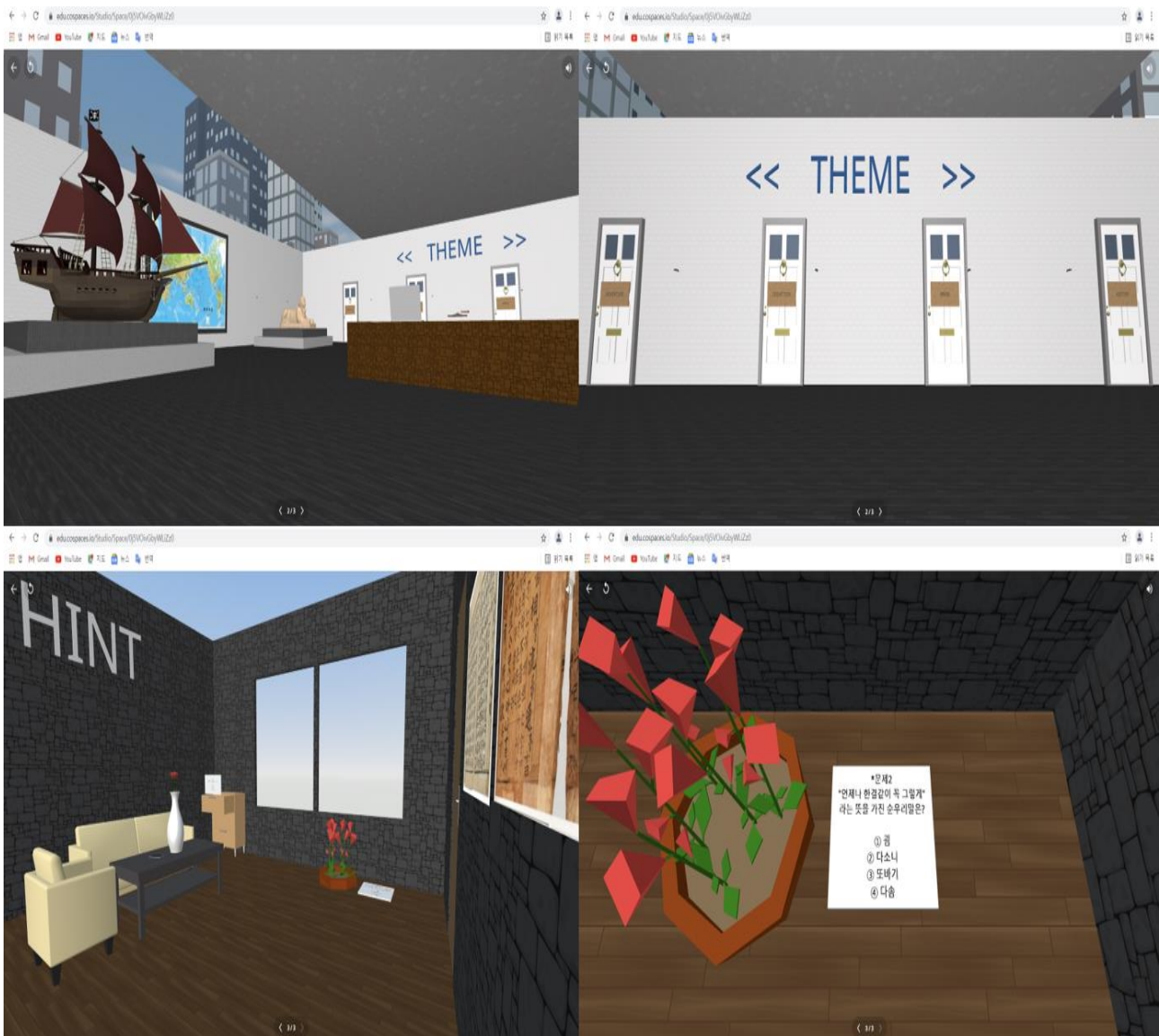

Figure 3. Museum interface adopting the VR

4. Comparison Analysis

Table 1. Comparative analysis of other museum systems and proposal system

Compare	National Museum of Korea App	Suwon Hwaseong Museum App	This paper
Purpose	• Learning information that is difficult to understand in text through an experiential process	• Augmented reality related to Suwon Hwaseong Museum • Educational purpose as an educational app	• Applying VR to immerse yourself in the museum by applying gamification to make it interesting and fun
Result	• Wear artifacts directly through augmented reality • Experience the manufacturing process • Reproduced in 3D to deliver image information from various perspectives	• Visit the exhibits related to the process of building Mars through a story-based mission • How to solve the mission	• Collaborate with museums to provide information about the museum • Combined with story elements to show the story theme related to the museum, providing fun to viewing • Suggest story gamification
Application examples	• Utilize augmented reality technology • Experience museum artifacts firsthand • Provide information	• How to solve quizzes, historical stories and augmented reality games using your personal smartphone • Provide experiential learning services	• Apply gamification based on museum data • Providing various story themes related to the museum and applying VR
Difference	• Using augmented reality to provide not only visual viewing but also a direct experience service • Learning information that is difficult to understand in text as explanatory information about relics through an experience process • Through augmented reality, visitors can directly view and experience virtual artifacts	• Gives a story to the mission as a whole • Experience content in various game formats for each exhibit to solve missions like characters. • Check the progress of other friends through progress • Check the reviews of other friends through 'Like' • Consists of missions, stories, quizzes and augmented reality games	• Provides information on all museums • Select a story theme that suits the museum according to the taste of the viewer • Choose a story and difficulty level that suits you for easy understanding • Consists of museums, exhibitions and art galleries • The theme of the viewing story consists of adventure, reasoning, brain, and history. • Applying VR to provide services to make viewing more immersive
System provided	• Provide various visual image information services and experience opportunities by reproducing with augmented reality [9].	• Provide mission story [10].	• Provides various story themes depending on the museum • Providing various experience services by applying VR

5. Conclusion

Through keyword analysis, it can be seen from the original text data that viewers prefer to experience and experience in museums. In addition, it can be seen that applying game elements helps viewers feel fun and interested and have more diverse experiences. Through these research results, useful information was provided by suggesting that museums and gamification are highly related. It was concluded that the introduction of museum education using gamification, which can lead to changes in museums, was effective in terms of viewer immersion. In this study, We proposed a museum gamification system using story elements. The proposed system was combined with story elements based on existing gamification. The museum gamification proposed in this paper provides fun elements to visitors and helps them remain impressively memorable. Among them, story elements are added to gamification to provide personalized game services so that you can play games with what you want. As such, existing apps have limitations in immersing viewers, so they can experience various experiences while feeling fun and interest through VR. While interacting with viewers so that they can actively watch, we intend to actively engage viewers and deliver them so that they can experience while enjoying exhibition content and information. It also induces fun and interest so that viewers can actively immerse themselves in watching by providing them with experiences they actually experience. Rather than being bound by showing the time when the museum's space, relics, and relics existed, VR applications can be applied to endless content planning by applying game elements, such as talking or experiencing characters from that era, such as prehistoric and Joseon. Accordingly, it is believed that the introduction of a museum system using gamification can have a positive effect on viewers.

Acknowledgement

References

[1] Se-won Jeon, YounHee Choi, Seok-Jae Moon, Kyoungmi-Yoo and Gi-hwan Ryu, "A Study on the Analysis of Museum Gamification Keywords Using Social Media Big Data," The International Journal of Internet, Broadcasting and Communication, 13(4), pp. 66-71, 2021.

[2] Gi-hwan Ryu, Su-Hyun Youn and Seok-Jae Moon, "A Study on the Recommendation of Tourism using Topic Map According to Personality Types based on MBTI and Big Five Models," The Society of Convergence Knowledge, 8(2), pp. 21-32, 2020.

[3] Se-won Jeon, Gi-hwan Ryu and Seok-Jae Moon, "Museum Gamification Design using Story Elements," The International Journal of Advanced Culture Technology, 8(4), pp. 25-32, 2020.

[4] Minjo Son, "A Study on art Educational Program Development to Revitalize the Museum," Graduate School, Daegu Catholic University, 2020.

[5] So-Hee Son, Seo-Yun Min and Dong-Eun Lee "A Case Study of Museum Gamification in Korea and abroad," Journal of Korea Game Society 18(2), pp. 109-120, 2018.

[6] Jeeyoung YOON and Hongkyu KOH, "A Study on the Development of a Digital Art Museum Education Program through the Use of Gamification," Society for Art Education of Korea, Art Education Review, No. 74, pp. 229-249, 2020.
DOI: https://doi.org/10.25297/AER.2020.74.229

[7] Ick-Keun Oh, Tae-Sook Lee, and Chae-Nam Jeon, "A Study on Awareness of Korea Tourism through Big Data Analysis," Journal of Tourism Sciences, Vol. 39, No. 10, pp. 107-126, 2015.
DOI: https://doi.org/10.17086/JTS.2015.39.10.107.126

[8] Jiyoung Shim, "A study on how to use virtual reality (VR) in museums," Academic Association of Global Cultural Contents, 43, pp. 85-102, 2020.

[9] Myungheon Gwak, "A Study on the Characteristics of Scaffolding according to the Type of Experience Exhibition in Children's Museum," Kookmin Graduate School of Design, 2021.

[10] SoYoung Jung, "Analysis of Augmented Reality-Based Museum APP Contents Types," Bulletin of Korean Society of Basic Design & Art, 20(2), pp. 385-396, 2019.