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DESIGNING AN EXTENDED REALITY MOBILE GUIDE APPLICATION TO COMMUNICATE AND INTERPRET SERIAL WORLD HERITAGE SITES: A CASE STUDY OF KOREA'S SEOWON UNESCO WORLD HERITAGE SITE

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ABSTRACT:

Extended reality (XR) mobile guide applications offer unprecedented potential for immersive visitor experiences and in-depth knowledge retention to promote cultural learning at large-scale heritage sites, but, despite their significant development, the literature underexplores these applications for World Heritage sites, especially the serial properties that are spatially dispersed in various locations but configured as a single property. This paper describes a framework (blueprint) for the development of an XR mobile guide application focused on serial properties. By incorporating interactive XR and edutainment features, it explores a way to comprehensively reveal the interconnections between the heritage attributes of the subcomponent of the serial properties and their larger, cross-cultural context vis-à-vis the Outstanding Universal Values. To this end, at the Seowon, the UNESCO World Heritage site in Korea, we analyzed user interactions with a prototype of the XR application to identify user preferences and areas for improving the framework.

1. INTRODUCTION

Over the past decade, the serial nomination of cultural sites to the UNESCO World Heritage list has increased (UNESCO et al., 2011). These sites, so-called the serial properties, include two or more subcomponents that reflect cultural or functional links and contribute to the property's overall Outstanding Universal Value (OUV) (UNESCO, 2021). They represent the unique concept of multiple tangible and intangible components (i.e., buildings, monuments or ruins); these are spatially dispersed in different locations but configured as a single property. Given that heritage sites of this type require integrated conservation and communication strategies to ensure the maintenance and transmission of their OUV, it can be a challenge for heritage institutions to make them synthetically accessible to visitors.

Recently, extended reality (XR) technology—which refers to immersive technologies such as virtual reality (VR), augmented reality (AR) and mixed reality (MR) (Fast-Berglund et al., 2018)—has emerged as an ideal tool for improving access to heritage sites while providing an enriched heritage experience. For example, some sites lack the requisite facilities to communicate their values or artefacts due to conditions that are not conducive to making the site's offerings available in situ. For these sites, XR technologies have revolutionized visitor engagement via augmented and virtual exhibitions beyond the sites themselves, thereby extending cultural learning opportunities (Silva and Teixeira, 2022).

Cultural learning is defined as informal education with the aim of broadening the public's knowledge of cultural heritage to enhance cultural awareness and appreciation (Ibrahim and Ali, 2018). This is among the critical missions pursued by heritage institutions that seek to promote public interest in the concept of conservation (Interpret Euruope, 2020). Given the importance of non-formal learning in ensuring sustainable preservation, XR technologies have attracted attention for its potential to enhance learning for dispersed, complex environments, such as large-scale heritage sites. One element of the cultural learning facilitated by XR applications is the information retention that takes place when new layers of heritage information are added to the physical world. Another is to immerse visitors in simulated environments so that a sense of place may be communicated, thus furthering the visitors' knowledge and interest in cultural and historical contexts in situ (Pervolarakis et al., 2023). This benefit is being demonstrated by abundant location-based XR applications for heritage sites (Galatis et al., 2016; Ramtohul and Khedo, 2019; Hiramatsu et al., 2017).

Much of the current XR application research examines the three-dimensional (3D) capturing of objects and buildings at heritage sites to enable their identification and interpretation, however, there are little research on XR applications in relation to serial properties. Such studies would need to consider the ability of the XR application to communicate the overarching values of the sites holistically and to reflect the idea that each subcomponent does not necessarily represent the site's unique OUVs. Motivated by this research gap, this paper aims to explore a framework (blueprint) that covers the XR application's design and development workflow for the Seowon, the UNESCO serial World Heritage of Korea, with two primary objectives: 1) disseminate the values of serial properties and 2) enrich visitors' cultural learning.

This paper is structured as follows: Section 2 examines related works and presents the research question. Section 3 illustrates the methodological approach and the results based on visitors' experiences using the application guide. Sections 4 and 5 present our findings and discussion, respectively. The paper

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concludes with lessons learned and recommendations for future research, along with the study's limitations.

2. RELATED WORKS

Following the current trend of mobile usage, XR applications equipped with cameras, global positioning system (GPS) receivers and internal sensors are emerging in domains such as education, entertainment, gaming and tourism (Carmigniani et al., 2011). The cultural heritage sector is no exception. A promising aspect of XR applications for outdoor heritage interpretation is that they bridge real and virtual heritage environments (Carrozzino et al., 2019). Moreover, XR applications allow cultural institutions to take advantage of the devices that visitors already own, such as smartphones, instead of investing in dedicated hardware infrastructure. Most prototyped applications were tailored to indoor environments, such as museums (Hammady et al., 2018; Mohd Noor Shah and Ghazali, 2018). Currently, there is a shift towards applications developed for outdoor environments, such as archaeological sites (Bernardini et al., 2012; Galatis et al., 2016; Casella and Coelho, 2013) and heritage sites (Schaper et al., 2018; Okanovic et al., 2022). This shift is proliferating because of XR's extended ability to convey ubiquitous digital information to promote visitor engagement in historical and cultural contexts.

However, several challenges face the current literature on outdoor XR applications that would allow the dissemination of context-aware digital information (Angelopoulou et al., 2012). Considering the complexity and scale of the sites, the distribution of the socio-cultural and environmental meanings of the sites' attributes in a holistic manner would be crucial to facilitate cultural learning (Staiff, 2016). As such, XR applications need to serve as effective communication means to encourage visitors' curiosity and interest for deeper engagement, thereby further enhance their accessibility to the sites.

For heritage institutions to generate such learning opportunities among visitors, one of the central questions in developing the outdoor XR applications is how to establish an intuitive human-computer interface that integrates usability design considering user's position and orientation within the sites (Galatis et al., 2016; Matviienko et al., 2022). This is because the system must accommodate how to incorporate the environmental boundaries of the sites, their cultural and historical metaphors and contexts, and the logical arrangement of the related content, including presentation formats (Kerr et al., 2011; Litvak and Kuflik, 2020).

An early example of such an outdoor application is the Archeoguide project (Vlahakis et al., 2002), which uses visitors' mobile devices to support AR tours. The application links the user's location at the archeological site of Olympia to an online multimedia database, then uses this combined information to reconstruct a real-time image of the ancient ruins. However, this interactive platform does not fulfil certain design goals, such as robust and intuitive interfaces that increase user engagement. Another effort to develop a natural and stimulating user interface was put forth by Galatis et al. (2016). They presented an outdoor AR mobile application guide for the archeological site of Knossos. This guide uses a geolocative ray-casting method to integrate AR projections of interpretive content in a non-linear storytelling context. This approach resulted in an improved mobile interface by addressing the occlusion problems common in location-based applications. Similarly, Spierling et al. (2017) developed the SPIRIT project, a location-based AR storytelling application for the outdoor museum site of the Saalburg Roman port. This prototype creates easily understandable interactions and helps visitors to experience historical events at places of cultural significance by offering the feeling of connection to each place.

Studies have found that edutainment features using multimedia technologies, such as gamification, are useful for establishing synergy between the educational and entertainment values of heritage content (Hertzman et al., 2008) and for improving the efficacy of the learning process (Doukianou et al., 2020). These technologies create cultural learning environments through augmented or 3D information of site-specific heritage contexts that would otherwise lack conventional educational means. Several studies have examined gamification of XR applications. These features allow users to reexperience cultural heritage; as such, the technology has the potential to disseminate related social cultural meanings, thus facilitating heritage interpretation as a part of cultural learning.

For instance, Ardito et al. (2007) developed a mobile system to support history learning for young students at the archaeological site of Egnathia. The system integrates a gamification approach to motivate students to be more aware of the site's features. Similarly, Angelopoulou et al. (2012) presented a multiuser mobile-educational smartphone game about the archaeological site of Sutton Hoo. It uses a team-oriented puzzle game to connect indoor and outdoor heritage points of interest from Anglo-Saxon burial mounds. In another example, Hiramatsu et al. (2017) combined smartphone and Bluetooth low-energy beacon technology to design an application about the Nikko heritage sites. The proposed system employs a gamification approach to stimulate the younger generation's interest in their country's traditions by acquiring historical and cultural notions.

These projects all demonstrate the potential of XR applications to enrich visitor engagement and experiences with heritage sites. They also support the acquisition of knowledge and user appreciation and attitudinal changes towards cultural heritage. However, studies that support the development of XR applications for cultural learning at large-scale heritage sites, such as serial heritage properties, provide few recommendations on how to design such environments. Usability issues and how to combine XR technology features are among the top challenges that must be addressed to convey the complex and interconnected significance of the subcomponents of cultural heritage in a holistic way. To address this, we propose the following research questions:

RQ1: What are the features of a mobile application that could facilitate or/and impede the interpretation of UNESCO serial properties?

RQ2: What aspects should be considered when designing a blueprint of the application to improve the accessibility of serial properties?

3. METHOD

This section describes our methodology which includes the research venue, a brief description of the design of our XR application prototype, the recruitment of our participants, and an experimental procedure and data collection.

3.1 Research venue

The research venue is the Seowon, consisting of nine Seowon representing a type of Neo-Confucian learning centers of the Joseon Dynasty (15th∼19th centuries AD) that was inscribed on the UNESCO World Heritage List of Korea in 2019. These serial properties' OUV, which represents exceptional cultural and educational functions including social practices associated with Neo-Confucianism in Korea were recognized by the World Heritage Committee, with the recommendation to "develop an integrated presentation of the nine components as a single property" (UNESCO, 2019). To explore a presentation strategy, Donam Seowon in Chungcheong Province, was selected from among the nine Seowon as a pilot site in consultation with the relevant Seowon authorities (Figure 1).

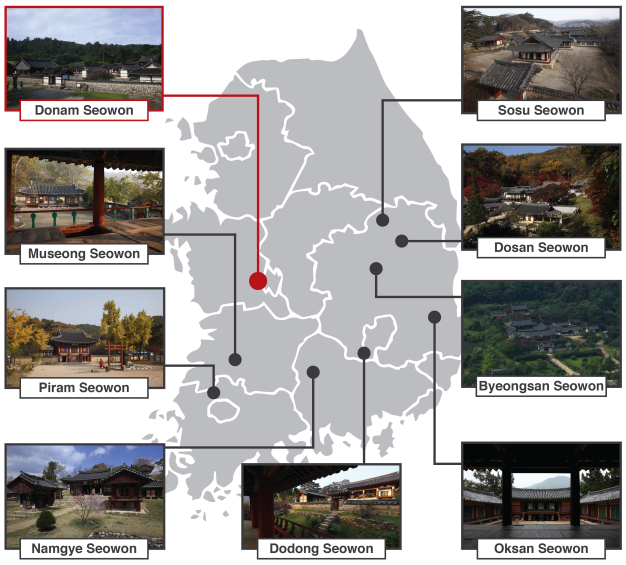

Figure 1. Nine subcomponents of the Seowon, UNESCO World Heritage Serial Property of Korea. Image source: Cultural Heritage Administration of Korea (CHA).

As a single property, the nine Seowon are characterized in common by shared spatial division and functional aspects, as seen in their architectural layout, landscape and educational services including associated rituals which reflect the underlying principles of Neo-Confucianism (Jeong, 2018). The spatial arrangement of the buildings and symbolic functional divisions highlight the Seowon's OUV, which consists of a memorial space (*Jehyang*), a lecture space (*Ganghak*), a rest space (*Yusik*), and a maintenance space (*Jiwon*). These sections are interdependent, and their orderly arrangement reflects the pious practices by the disciples of Confucius (*Yusaeng*). Simultaneously, each Seowon contains venerated scholars who contributed to promoting the Neo-Confucian classics and literacy through various socio-political activities.

3.2 Designing a prototype

We designed an XR application prototype that supports the dissemination of in-depth information on an individual Seowon, while employing interactive media to present the overarching theme of the serial properties that include other eight Seowon. This approach was designed to facilitate recommended narratives and integrated entertaining features to enhance the context-aware approaches, connecting not only Donam Seowon but also the entire Seowon holistically.

3.2.1 Strategic approach to content design: The following strategies were adopted to create the contents for our application prototype (Figure 2): (1) on-site instructions for outdoor heritage navigation, (2) gamified learning content for interactive engagement, and (3) GPS-based XR visualization for geographically remote information. The design prioritized personalized experiences through on-site heritage interpretation (Poria et al., 2006). First, our guide followed the smart and ubiquitous learning environment (FoSLE) framework proposed by Alkhafaji et al. (2020), to identify target users, content, learning methods, interaction design, and heritage context. Second, gamification adopted edutainment strategies, including award systems and information guidance (Botilias et al., 2021). Finally, XR features used users' position-based applications and location-aware information triggers (Angelopoulou et al., 2012; Galatis et al., 2016).

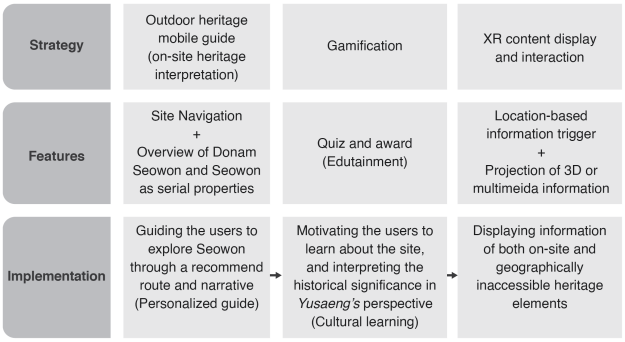

Figure 2. Conceptual model of a proposed Seowon XR application: three main strategies and their key features with corresponding implementation methods.

On-site guide. The prototype guides users to follow the recommended narratives to understand Donam Seowon and other eight Seowon under the umbrella of a single property containing OUV. Optimized for individual visitors and the ubiquitous use of mobile devices, the prototype provides position-based textual or multimedia information on built-heritage and its surroundings (Figure 3 #1). Then, the prototype offers information on the unique components of Donam Seowon (Figure 3 #2). Reflecting the functional orientation of Seowon's architectural plans, the prototype replicates *Yusaeng's* life, providing the foundation for a personalized experience.

Gamification. To motivate cultural learning and personalize experiences, the prototype flow incorporated edutainment features (Figure 3 #3), such as task and award systems, and to enrich the personalized experience of using the application, visitors are first asked to set up their profile as a *Yusaeng*. Quiz-format content was developed for learning stages, with visit-and-unlock pages appearing upon reaching certain locations. This design aimed to provoke user-driven interpretation and learning on the site.

XR visualization. XR contents were implemented to facilitate the understanding of Donam Seowon's environment by tracking users' location (Figure 3 #4) and presentation of the information about other eight Seowon despite their geographical gap. Additionally, multimedia images of intangible heritage (i.e., ritual ceremonies) and 3D models of inaccessible artifacts were provided as supplementary materials.

3.2.2 System development: The prototype of the mobile application was developed using Figma and exported in HTML

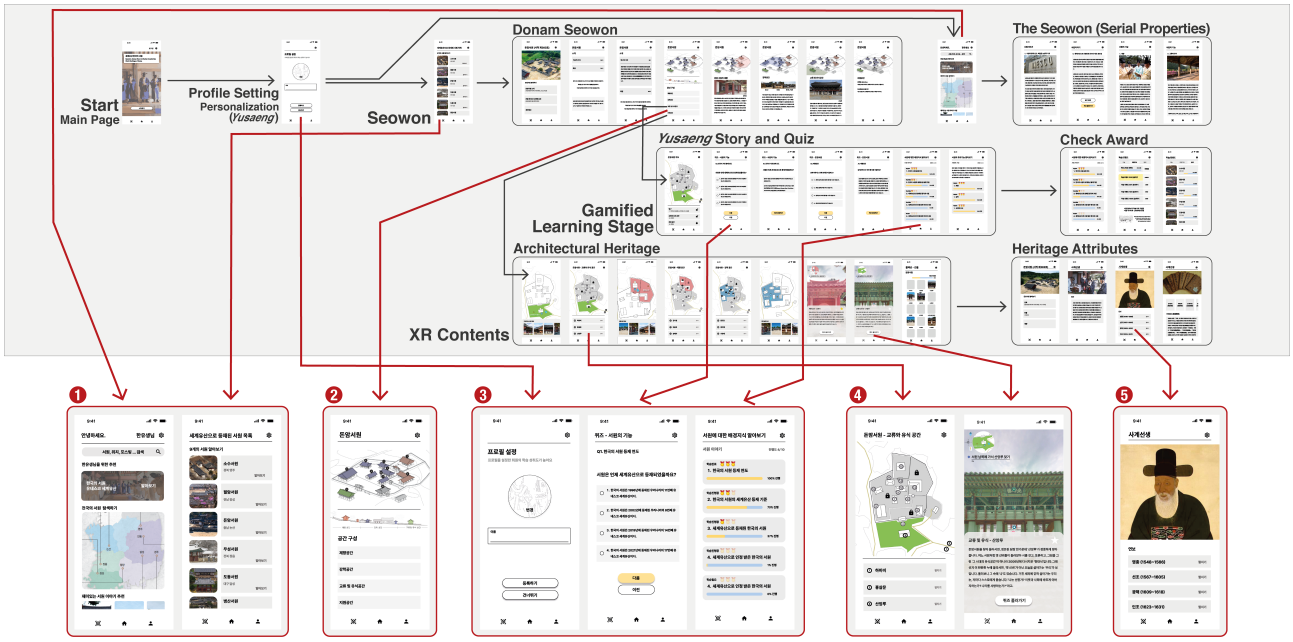

Figure 3. Content flow and system architecture of the XR mobile guide: 1. Overviews on nine Seowon, 2. Information about Seowon’s architectural layout and landscape, 3. Quiz and award content, 4. XR content showing information in response to user’s location, 5. Detailed information of heritage attributes.

format for the experiment. The GPS location was tracked using HTML Geolocation application programming interface (API), which triggered the appropriate content while synchronizing with the Figma export. Textual information and 3D models for XR content were projected using hyperlinks that connect to WebGL, which was created using Unity. External media such as images and videos were linked to the Internet (see Figure 8 in Section 5). The application prototype was deployed to the target Samsung Galaxy S21 smartphones running on Android.

3.3 Experiment

3.3.1 Participants: We recruited a total of 30 participants (15 females and 15 males) at Donam Seowon (Figure 4). Our participants are ranged in age from 22 to 54 with the majority in the 20-29 age group (70%). Moreover, the composition of the sample’s occupation between student (73%) and non-student (27%) within our study is not far off from the trend of visitors’ participation in the Donam Seowon’s programs, which have been initiated in line with the promotion of learning programs for the younger generation in the ‘Basic Plan for the Promotion of Cultural Heritage Education for 2022-2026’ introduced by CHA (2022). Ethical approval for this experiment was obtained from the research ethics board of our university.

3.3.2 Experiment procedure and data collection: The on-site experimental session consisted of four stages, in which each participant was required to (1) fill in the pre-test questionnaire (an 11-question quiz) for five minutes before touring the Seowon using the prototype, (2) go through the application experience using the prototype at Donam Seowon for 20 minutes, (3) complete the post-test questionnaire (the same quizzes as above) for five minutes, and (4) complete a multiple-choice and open-ended survey about the application experience for 15 minutes (Figure 5).

As our study benchmarked the cognitive walk-through evaluation method to design our survey questions (Schaeffer, 2014),

Figure 4. Demographics of the participants.

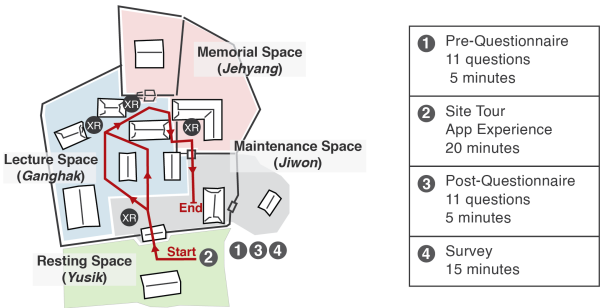

Figure 5. Experiment procedure and mobile guide pathway.

the post-experimental questionnaire in phase 4 were multiple-choice questions. Survey of the stage 4 were, therefore, set as a bipolar scale of 5-point Likert scales to measure the usability, functionality and cognitive experience using nine criteria. In addition, the open-ended questions were used to collect qualitative data about the application experience, feedback and suggestions from the participants.

4. FINDINGS

In this section, we present the findings from the data analysis derived from a series of experiments in Section 3.3.2. The subsections are divided into the evaluation of the usability and user experience, understanding of the overarching theme of the serial properties, and the feedback on our application prototype.

Firstly, the usability and user experience of using it are expected to influence how visitors perceive the overall thematic significance of the serial sites and how the effectiveness of the application in facilitating the exploration of the on-site settings is related. Using a 5-point Likert scale, nine evaluation criteria, divided into functional usability (two criteria) and cognitive experience (seven criteria), were used to measure the above, and the mean scores of the evaluation of each criterion can be found in Table 1. Figure 6 are boxplots comparing the means between the positive (3.32) and negative (2.49) ratings for usability and application experience.

Usability & Experience	Variables	Mean	SD (σ)	Color code for Fig. 6
Positive	I found the information I wanted or expcted to know about Seowon using the app	3.73	0.98	
	The app was easy to use	3.67	1.1	
	I think that I would like to use this app frquently	3.53	1.2	
	I found using this app at the site was worthwhile, my eperiencce was rewarding	3.07	1.34	
	I found it was impressive to experience various functions in this app	3	1.2	
	I found the use of this app was interesting	2.93	1.28	
Negative	I found the app was boring and difficult	2.77	1.25	
	I felt indifferent about the app experience	2.57	1.43	
	I thought that the use of this app was cumbersome	2.13	1.14	

Table 1. Nine criteria (positive and negative aspects of usability and experience).

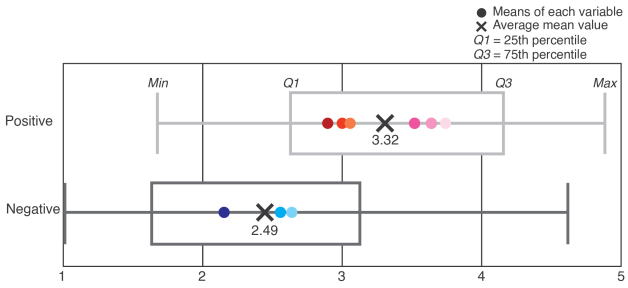

Figure 6. Boxplot comparing the means between the positive and negative ratings for usability and user experience.

Secondly, we investigated the level of participants' understanding of the concept of the serial properties' characteristics as one single property and interrelationship of Donam Seowon within the nine Seowon. Figure 7 demonstrates the improvement in users' comprehension of the above context as a result of completing 11 quizzes before and after using the prototype. This finding may suggest that the application's content and quizzes, which address the concept of the serial properties, coupled with the XR content experience, have a positive impact on users' understanding enhancement.

Lastly, we identified areas for improvement in our prototype to develop a blueprint based on the qualitative data gathered from the open-ended responses in our questionnaire. The analysis of the participants' feedback was divided into three sections: (1) application usability, (2) modes of information communication, and (3) learning motivation. By examining the responses

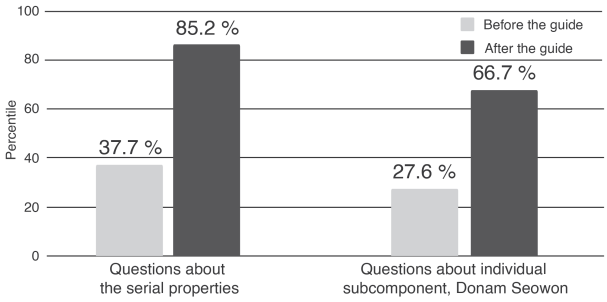

Figure 7. Accuracy rate of the quizzes about the Seowon before and after the application experience.

from each section, we conducted a content analysis to investigate users' reactions and gain insight on the relationship between the application's features and communicative heritage content.

(1) Regarding the usability of the prototype, the participants' comments focused mainly on the information retrieval functions: real-time availability of information and automated projection. For instance, several participants (P2, P3, P4, P5, P28) noted that the information search function facilitated an immersive experience during the tour by providing immediate access to relevant stories. As one participant stated, *"While walking around, a lot of questions come to mind, and I need an effective way to immediately address those questions as I explore"* (P3). Additionally, others (P4, P7, P12) stated the necessity of automated information projection, similar to beacon systems in indoor museums, *"When walking through cultural heritage sites, it would be helpful if voice explanations were automatically played based on my location"* (P4).

(2) In terms of heritage content, the participants underscored the importance of employing interactive multimedia to communicate in-depth information and personalized experiences, which in turn enhances user engagement and comprehension. Several participants (P12, P18, P29) expressed their preference for interactive features and digital media to better understand difficult information, *"Some of the contents are too difficult... if they were more interactive, I think it would be easier to understand"* (P12), and *"I tend to enjoy new media more and think more comfortably when engaging with it"* (P18). Moreover, other participants (P14, P24) emphasized digital guide's potential to level the difficulties of information for each user, suggesting that this personalized feature would facilitate users' ability to process information more effectively, *"I believe that interesting and diverse explanations are needed, as well as different levels of explanation for each person... Instead of adding more information, filtering and organizing the necessary information is essential for me"* (P24).

(3) Concerning the learning motivation, the participants noted the necessity of embracing diverse learning approaches to accommodate visitors' preferences and needs in heritage site interpretation, entailing distinct methods for individual heritage elements and the broader site context. Concentrating on individual heritage elements, the participants (P3, P11, P30) highlighted the significance of personalized and segmented information to elucidate complex concepts, *"The content is difficult to read... I only read the keywords, so definitions and additional explanations for difficult words are needed."* (P3). Conversely, when examining the broader context of the site, the participants (P12, P14, P26) advocated for alternative learning strategies,

such as storytelling or multimedia use, to enhance comprehension of the subject matter. For instance, *"Anecdotes or episodic stories [are needed]... There was only basic knowledge; storytelling is needed"* (P14). These observations emphasize the importance of tailoring educational approaches to address diverse visitors' needs in heritage site interpretation.

5. DISCUSSION

On the basis of the findings, this section discusses the design recommendations for developing the XR application.

5.1 Heritage information accessibility

The findings indicate that the way of presenting detailed information about Donam Seowon as one layer of information access, in parallel with the overarching cultural significance of the other eight Seowon as another layer of information access, increased participants' understanding of individual heritage attributes within the World Heritage contexts. This was probably because the prototype is designed so that no matter which way the participants start to explore, they can understand each Seowon's independent cultural values and the historical linkages among the other Seowon that contribute to comprehension of the OUVs. Our prototype system integrated relational interaction (i.e., tracking user location), 3D architectural models, and textual or multimedia information. Such an information arrangement through path recommendations and location-specific XR content enables the immediate display of previously unavailable information in situ, which may help the participants materialize abstract ideas (i.e., a sense of place) related to the heritage attributes. Considering the effect on enhancing users' understanding of cultural contexts of each space and interrelationships within the serial properties, it would be desirable to design future iterations of the application that could allocate information in divided layers and spaces by automatically tracking users' locations and projecting information as they navigate the premises of the heritage sites.

Furthermore, given the users' expressed desire to access more detailed information about the heritage attributes and explanation of their complex meanings, we could consider organizing the application's contents based on keywords and their semantic connections between textual and multimedia components within the application's architecture. This highlights the need for an informational navigation function capable of providing in-depth information about individual elements. A search function that enables access to external databases, such as the Seowon management website, could be integrated into the application system along with an archive of documents searchable using keywords. Additionally, some users encountered challenges when interacting with their mobile devices while navigating the outdoor environment. This suggests the need for a more user-friendly user interface system that potentially incorporates efficient search tools, such as voice-to-text search functions, to simplify the process of addressing users' informational needs while minimizing the necessary interaction steps.

5.2 Learning motivation

Our findings indicate that integrating gamified learning content into a heritage mobile guide can potentially enhance user engagement and understanding of heritage contexts. It shows that the users were more receptive to interactive materials for knowledge acquisition. For instance, edutainment components, such as incentivizing users to complete quizzes or explore specific spaces, align with proactive learning methodologies employed for motivational learning (Paliokas, 2019). In the case of the Seowon, where the site's value derives from architectural buildings and spatial configuration, designating the four symbolic spatial structures as game levels and incorporating quizzes between each area could encourage users to visit specific locations that might otherwise be overlooked. This approach not only fosters exploration but also enables users to navigate the site with sustained motivation, retain essential knowledge, and understand the OUVs.

While the prototype utilized a single narrative guide, the user's feedback on gamified features as motivational stimuli shows the potentials of multiple narratives for more personalized guide. By incorporating multiple storylines or varying levels of difficulty tailored to user preferences or prior knowledge, it can diversify user's viewpoint, which can motivate a multifaceted understanding of the site. The current application presents interpreted content from the perspective of a *Yusaeng*, as they were the main figures of the site; however, expanding this story to feature other historical figures with their unique roles could offer alternative perspectives. For the future iteration, segmenting the heritage information based on each figure's roles and differentiation of application pathways is recommended to establish a cohesive and engaging narrative.

5.3 Blueprint design

Based on the Sections 5.1 and 5.2, several recommendations are identified for the development of a blueprint for a XR mobile application. As depicted in Figure 8, the users' feedback is integrated into the Problem and Needs section (A), and the corresponding adjustments to the application are presented in the Suggestion for Improvement section (B). The feedback can be classified into two aspects: systematic modifications addressing usability and function (highlighted in green), and content-related adjustments concerning heritage learning (red). Details of proposal are presented below:

1. Incorporate a keyword-based search function within the information manager, allowing users to locate pertinent information rapidly.
2. Establish a server to retrieve information from an external database, ensuring access to current and accurate data.
3. Connect a prompt search API (text-to-audio) to both the internal information manager and external database, offering an alternative access to information.
4. Introduce game level and mode selection pages, with content inspired by historical figures, to create an engaging learning experience.
5. Provide a recommendation route page based on mode selection, guiding users through a personalized learning.
6. Incorporate quiz and award sections to encourage users to assess their knowledge and foster a sense of achievement within the heritage learning experience.

6. CONCLUSION AND FUTURE WORK

This study presents the blueprint for developing an XR mobile guide application for Donam Seowon, the World Heritage serial properties. It addresses design challenges and strategies, including on-site instructions, gamified learning content, and

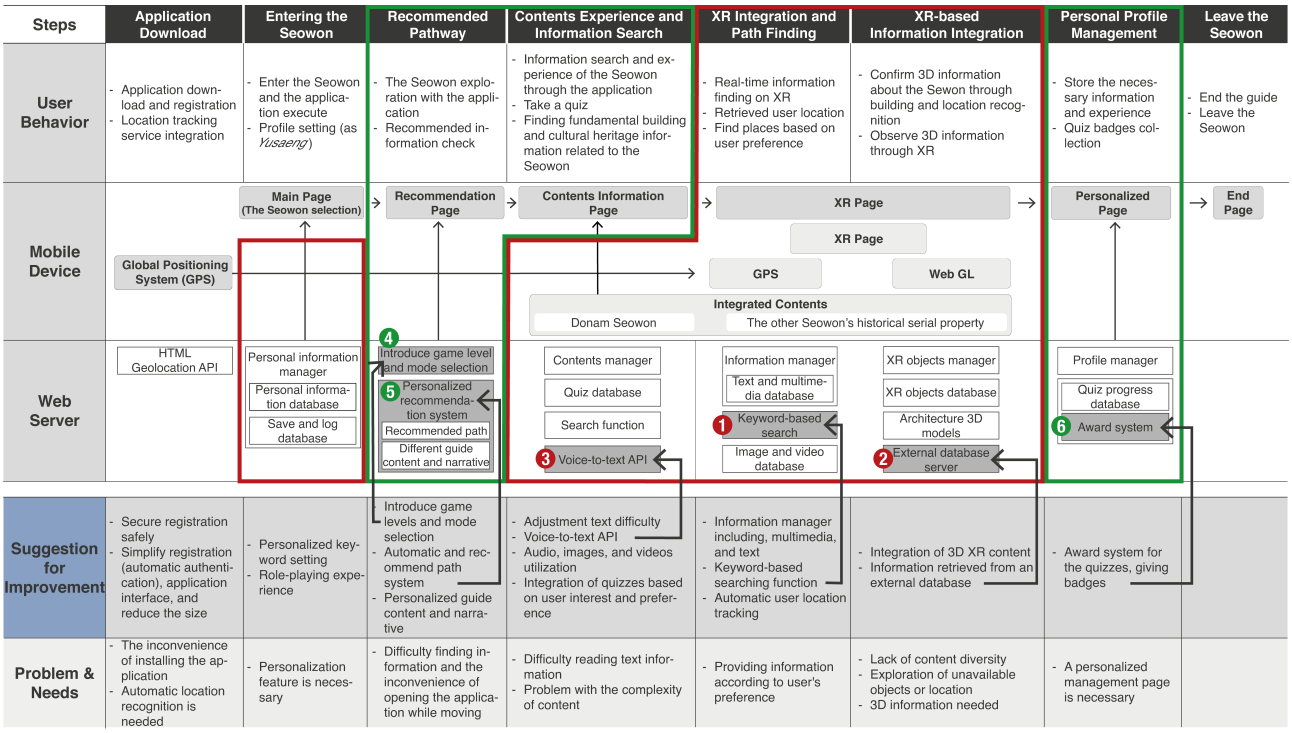

Figure 8. Final blueprint of XR guide application.

location-based content visualization. Based on the user feedback from the prototype, the initial design demonstrated potential for enhancing usability, user experience, and understanding of OUVs, while providing valuable insights for refining the application’s functions and narrative materials. The design recommendations emphasize improving information accessibility, learning motivation, and content features. Despite the useful insights, the study possesses limitations. First, the proposed blueprint incorporates adjustments to the application’s usability and functionality based on the prototype use; future research could evaluate these revised features to assess their effectiveness compared to preexisting guides. Second, while the blueprint can be replicated in other properties with the same modality, this study could potentially investigate each site’s unique characteristics and adapt the framework accordingly. Lastly, this study primarily focused on the spatial and architectural significance of the site’s inner area. To encompass other values that Seowon possesses, such as topography and cultural landscape that speak to the environmental contexts of the built-heritage, the study could be broadened to foster a more comprehensive understanding of the property’s overall values.

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