

MEMORIALIZATION THROUGH METAVERSE: NEW TECHNOLOGIES FOR HERITAGE EDUCATION

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ABSTRACT:

The prolonged COVID-19 pandemic has restricted civic engagement with heritage sites and on-site learning. Although active participation is a prerequisite for managing cultural properties, most communities have had to cope with related activities—particularly memorialization at cemeteries—during the pandemic. This study explores the dynamism of innovative technologies that radically change pedagogical approaches through the United Nations (UN)-designated graveyard, the UN Memorial Cemetery in Korea (UNMCK). It focuses on the metaverse learning program of an international memorial ceremony named "Turn toward Busan," which is honored on Remembrance Day, 11 November, to commemorate the fallen UN veterans who died in the Korean War (1950–1953). The online activity provides students with the opportunity to engage in a silent tribute to UN veterans and to participate in the virtual UNMCK implemented on the metaverse platform called "Gather. Town." Qualitative analysis of a literature review, interviews with related stakeholders, and video participation reveals that this program of incorporating the remembrance of war veterans into the framework of the metaverse has a high educational impact in the era of Industry 4.0. The proposed solution demonstrates how virtual learning courses integrate multi-dimensional methods to encourage participants' proactive heritage involvement and awareness of peacebuilding. Given that 2023 marks the 70th anniversary of the Korean War Armistice, this study is expected to provide a stepping stone for further research investigating the correlation between the humanities and digital technologies to foster a more reconciliatory world.

1. INTRODUCTION

Since 2020, the COVID-19 pandemic has considerably restricted civic engagement with heritage sites and on-site learning. Although active participation is a prerequisite for managing cultural property, many communities have faced difficulties in related activities during the pandemic. Consequently, there has been limited social inclusion between various stakeholders with heritage sites. According to social psychologists, the term "social inclusion" is "the degree to which an individual perceives that the group provides him or her with a sense of belonging and authenticity" (Jansen et al., 2014; Bai et al., 2021). Heritage education is a salient example of social inclusion since heritage plays a vital role in manifesting a sense of belonging and authenticity. In particular, diverse educational curricula that utilize multiple senses can facilitate actors' proactive engagement with heritage sites (Lee, 2022b).

Recent studies have demonstrated the mechanisms of education using new technologies such as the metaverse (Zhang et al., 2022). Nevertheless, little research has been conducted on metaverse programs that focus on heritage, particularly regarding the bodily performance of memorialization at cemeteries. Thus, the lack of relevant analysis reveals a research gap in the new trends of heritage education, the correlation between war and society, and social inclusion via heritage. Against this background, this study explores the dynamism of emerging technologies that change pedagogical approaches through the United Nations (UN)-designated graveyard, the UN Memorial Cemetery in Korea (UNMCK). The research sheds light on the metaverse education program of an international memorial ceremony called "Turn toward Busan," held on Remembrance Day, 11 November, to pay tribute to the fallen UN veterans of the

Korean War (1950–1953). The online activity, which is based on a metaverse platform called "Gather. Town," provides students with the opportunity to pay silent tribute to UN veterans and to participate in the virtual world of the UNMCK.

Qualitative analysis revealed that this performance of integrating the remembrance of war veterans into the framework of the metaverse has a high educational effect, not only during the pandemic but also in terms of Industry 4.0. The findings are followed by a literature review, archival research, interviews with related stakeholders, video participation, and the author's interpretation. The results demonstrate how virtual-learning courses incorporate new technologies and multi-disciplinary methods to encourage active heritage engagement and awareness of peacebuilding among participants. Research implications suggest the appropriate use of photogrammetry, remote sensing, and spatial information science in changing learning environments for the digital generation. With the year 2023 marking the 70th anniversary of the Korean War Armistice, this study is expected to lay the foundation for further research to investigate the strong correlation between the humanities and digital technologies.

2. METAVERSE FOR HERITAGE EDUCATION

2.1 "Gather. Town" as a learning tool

Since 2020, the use of metaverse educational platforms has steadily increased throughout the COVID-19 pandemic. The metaverse has brought about a new global trend with high potential and opportunities for education (Zhang et al., 2022). With the rise of a metaverse environment during the pandemic, innovative platforms have become alternative education tools.

In the case study examined in this article, "Gather. Town" is a platform that uses new technologies and avatars. "Gather. Town" is a proximity-based video conferencing (VC) platform that combines 2D game-like features with video-based functionality (Zhao and McClure, 2022). Using an avatar on a 2D map, participants interact with each other through games, multi-media materials, and proximity-based VC, as well as by exchanging opinions in the virtual world (Zhao and McClure, 2022).

Numerous studies have demonstrated the pedagogical benefits and limitations of various implementations of virtual education in metaverse environments. For example, researchers have scrutinized aspects of language learning (Zhao and McClure, 2022; Parmaxi, 2023), pre-service teachers' perceptions of the metaverse's use as a learning tool (Cooper et al., 2019), and conducted a comparative study of teamwork on Zoom and "Gather. Town" (Lee et al., 2023). Research has also reviewed the impact of the COVID-19 pandemic on teaching and learning in a more general sense (Pokhrel and Chhetri, 2021). Focusing on heritage, scholars have noted the digitalization and metaverse nature of cultural properties (Huggett, 2020; Fan et al., 2022).

Although the existing literature provides academia with insights into innovative technologies, there have been few studies on intangible value as a common heritage of the shared memory of conflicts via the metaverse. Consequently, the application of the metaverse platform to memorialization or "remembrance" of the fallen and ongoing war has hardly been explored. Although the memory of a certain war or conflict varies across socio-political contexts, memorialization is a commonly shared value that is inextricably interconnected with both tangible aspects of heritage (e.g., war cemeteries and battlefields) and intangible facets of how societies remember the past, social inclusion, and a sense of belonging. Heritage education combined with a metaverse platform is expected to pave the way for encouraging users' social engagement with heritage and raising their awareness of peacebuilding. In the following section, I introduce how a learning program via the metaverse is applied to a war cemetery, the only UN-designated cemetery in the world.

2.2 The United Nations Memorial Cemetery in Korea (UNMCK)

The UNMCK was a by-product of the Korean War (1950–1953). During wartime, in April 1951, the UN Command established the graveyard in the Tangok area (currently Busan) as the UN Cemetery for the fallen military of UN allied nations who fought to defend the Republic of Korea's (ROK) liberal democracy (Lee, 2020). As of April 2023, 2,320 soldiers from 11 nations are now interred in the UNMCK (UNMCK, 2023). Located in the southern part of Busan, this cemetery has been a regional, national, and global hub for paying tribute to fallen soldiers from the Korean War. Noting that 2023 marks the 70th anniversary of the Korean War Armistice, the UNMCK has recently been situated in the socio-political, cultural, and educational contexts of remembrance and commemorative events.

Regarding the UN cemetery, researchers have explored diverse themes since the 1990s. The main topics include visitors' characteristics (Lee, 1992), history (Lee, 2008; Kim, 2013; Lee, 2022a), and commemoration and education (Lee, 2022b), to name a few. Contrary to its unique status as the "only UN-designated graveyard," the UNMCK has not gained global attention in academia as a heritage site, mostly due to the complexity of the stakeholders involved and the lack of relevant documents (Lee, 2023).



Figure 1. Historical photo of the first dedication ceremony at the UN Cemetery (6 April 1951, National Archives and Records Administration the Archives of Korean History, National Institute of Korean History [digital source]).

As Figure 1 illustrates, numerous memorialization performances have centered on the trajectory of the UN Cemetery over the past 70 years. Such commemorations primarily entail bodily acts such as laying wreaths, paying a moment of silence, touching a gravestone, saluting flags, or walking around monuments in the graveyard (Lee, 2020). Given that the UNMCK is a graveyard for multi-national servicemen during a global war, the politics of memory differ in the context of national narratives. By taking the example of the "Turn toward Busan" ceremony, I examine how post-war Korean society remembers the fallen soldiers of the Korean War and promotes shared cultural memory using a metaverse educational platform.

2.3 "Turn toward Busan": An international memorial ceremony held at the UNMCK

Cultural memory is related to collective memory and works in different sociocultural contexts (Drozdowski et al., 2019). The term "cultural" used here embeds memory in practices, stories, monuments, rituals, and other configurations of cultural knowledge that weave together the past and present (Erll, 2010). Elaborating on Robinson (2018), the creation of collective memory can be a dynamic process that reflects current social, economic, cultural, and political tensions.

The international memorial ceremony "Turn toward Busan," which is held at 11 a.m. on 11 November both in and outside the UNMCK, is a prominent example of collective memory-making in the post-war era. The event embeds memory in the configuration of cultural commemorations, such as practices, monuments, and rituals related to the Korean War (Lee, 2020). As the official slogan of this commemoration is literally "Turn[ing] toward Busan," the event calls for participants to remember and pay tribute to fallen UN veterans by observing one moment of silence while turning toward Busan, where the 2,320 fallen soldiers rest in peace (Ministry of Patriots and Veterans Affairs, 2021; Lee, 2020). The commemoration was proposed in 2007 by a Canadian veteran of the Korean War, Vincent Courtenay, to observe a moment of silence for Busan, where the UNMCK is located (Lee, 2023). Since 2008, the slogan "Turn toward Busan" has embodied the shared identity and the past among the UN Sending States of the Korean War. In 2020, the Korean government, the Ministry of Patriots and Veterans Affairs (MPVA), legislated 11 November as International Memorial Day for UN Veterans of the Korean War with the enactment of the Act on Remembrance of UN Veterans of the Korean War (MPVA, 2021).



Figure 2. "Turn toward Busan" international ceremony at the UNMCK (11 November 2022, Busan Metropolitan City).



Figure 3. Participants observing a moment of silence during the "Turn toward Busan" ceremony (11 November 2022, Busan Metropolitan City).

Since this ceremony is intricately linked to the collective memory-making process of peacebuilding, it has recently been incorporated into various forms of commemoration in the ROK. In Section 3, I explore the mechanism of memorialization through the metaverse by closely examining the case study of Sintangjin Middle School's virtual education.

3. MEMORIALIZATION THROUGH THE METAVERSE: A CASE STUDY OF SINTANJIN MIDDLE SCHOOL

3.1 Title Summary of the metaverse "Turn toward Busan" project

The MPVA has affiliated organizations throughout the country, and it has been fulfilling its mission "to honor and serve those who have dedicated their lives and sacrificed for our country (the ROK), and to preserve and promote their patriotic spirit" (MPVA, 2021). The MPVA's strategic goals are as follows:

1. Establish a broadly supported and well-developed compensation scheme for patriots and veterans
2. Ensure the well-being of patriots and veterans
3. Promote the spirit of patriotism and contribute to national development
4. Actively integrate veterans into the nation's human capital base

¹ This is an excerpt from the author's e-mail correspondence with the English teacher Mr. You in April 2023 (translated from Korean to English by the author).

Among the strategic goals, Sintangjin's Middle School metaverse education is closely related to Goal 3. Located in the city of Daejeon, the central part of the ROK, Sintangjin Middle School has been selected as one of "the veterans' theme schools" organized by the MPVA Daejeon Regional Office. The school curriculum is based on enhancing students' spirit of patriotism and respect for veterans, which is aligned with Goal 3 of the MPVA and is thus incorporated into major activities. For example, in 2022, a few selected students from the class visited the UN Cemetery in Busan with the support of the MPVA to understand the history and vivid lives of Korean War veterans. Geunchang You, an English teacher who oversaw relevant activities, explained the background of the learning program as follows:

November is often a time when middle school students are easily swept away by other events, but our school carries out activities in connection with the MPVA every year in memory of the UN Memorial Service (...) For students who talk about the war as if it were a matter of another country, education is considered valuable since our country [the ROK] is still in a state of truce where war has not stopped, and our current lives happen at someone else's expense.¹

Sintangjin Middle School has played a leading role in conducting innovative education based on new technologies nationwide; the school has been providing first-grade students with individual tablet PCs, and second- and third-grade students with Chromebooks.² Since Generation Z, or so-called "digital natives," are familiar with multi-use devices, various pedagogical activities are carried out using new technologies. Sintangjin Middle School recently implemented a mobile application on the theme of peacebuilding and metaverse education. The curricula boosted students' interest and enabled them to concentrate on the metaverse in the internet realm, where digital generations are confident in the technologies in which they are involved (Selwyn, 2009).

On 11 November 2021, the Daejeon Regional Office of the MPVA held a metaverse memorial ceremony called "Turn toward Busan," commemorating International Memorial Day for UN veterans of the Korean War. The MPVA Daejeon Regional Office participated in a ceremony with 170 students at Sintangjin Middle School and held a memorial facility experience event implemented in the virtual sphere.³ The event was held to remember and respect the noble sacrifices and dedication of UN veterans who fought in the Korean War. The metaverse education program provides a unique opportunity for students to participate in diverse activities with their colleagues and to promote peacebuilding in the virtual world.

3.2 Memorialization at "Gather. Town"

The virtual UNMCK was shown in "Gather. Town" and visited by students who participated in memorialization activities through the metaverse. A qualitative analysis was conducted to interpret the data and understand the phenomenon.

² The author's e-mail correspondence with Mr. You in April 2023 (translated from Korean to English by the author).

³ The author's e-mail correspondence with Mr. You in April 2023 (translated from Korean to English by the author).

Timetable		Activities
11:00~11:10	10 min.	Overall preparation for metaverse education (log in to "Gather. Town" after creating one's own avatar and tests are performed)
11:10~11:20	10 min.	1. Opening ceremony and national rituals (a salute to the national flag) 2. Watching an educational video on the UNMCK and the history of the Korean War 3. Greetings from the Commissioner of the MPVA
11:20~11:35	15 min.	1. Explanation by the host about the education 2. OX quiz guide
11:35~11:50	15 min.	Online education about four memorial facilities in Daejeon

Table 1. Detailed program of the metaverse "Turn toward Busan" ceremony (based on the Doongeunbyeol video).

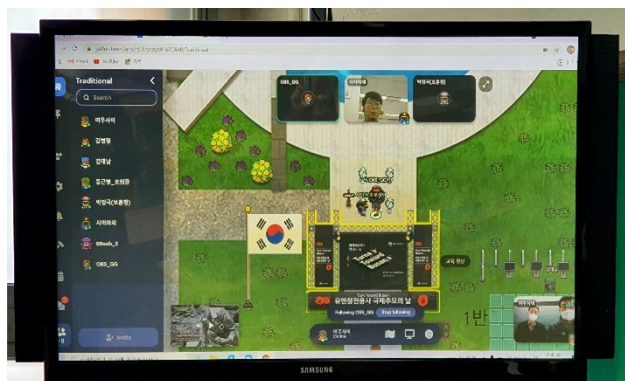


Figure 4. "Turn toward Busan" commemoration at "Gather. Town" shown on the TV screen in the classroom (11 November 2021, provided by Sintanjin Middle School).



Figure 5. Students paying tribute to fallen Korean soldiers through the metaverse "Turn toward Busan" ceremony (11 November 2021, provided by Sintanjin Middle School).

In addition to the students, teachers (including the principal of Sintanjin Middle School) and the educational host of "Gather. Town," as well as the Commissioner of the MPVA, gathered in the virtual space using their avatars and observed one minute of silence for the UN veterans. Importantly, during the national ritual, all participants stood up and saluted toward the screen of the metaverse program in the classroom. The "Turn toward Busan" memorialization through the metaverse (Figure 5) and the real commemoration at the UN Cemetery (Figure 3) make a notable contrast in terms of "bodily performances related to heritage" (Ashley, 2016). Given that "co-presence" refers to the users' sense of being present and connected with one another in a virtual environment (Savin-Baden et al., 2015), the co-presence of interacting with others in the metaverse enabled the students to create a collective identity during the rituals of remembrance.

Supplementary services were also implemented at the same time, such as educational videos on the UNMCK and the history of the Korean War. The videos included both historical photographs of the UN Cemetery in 1951 and the current status of the UNMCK.⁴ Moreover, representative students (such as the president and vice president of the class) guided their colleagues through what they had experienced during previous on-site visits to the UNMCK in Busan. Their initiatives provided the entire class and school with knowledge of the UN veterans of the Korean War and the cemetery's meaning as a heritage site.⁵ Such additional pedagogical programs have enabled learners to engage more actively in the collective memory-making of peacebuilding through the metaverse.



Figure 6. Students and the teacher interacting together during the metaverse educational program (11 November 2021, provided by Sintanjin Middle School).



Figure 7. Students communicating with each other in the virtual UNMCK (11 November 2021, provided by Sintanjin Middle School).

⁴ This is shown in the following website (<https://www.youtube.com/watch?v=Rq4ODCWS3IM>).

⁵ The author's e-mail correspondence with Mr. You in April 2023 (translated from Korean to English by the author).

Notably, as the participants freely moved around using their avatars, they tended to interact with one another in the classroom. Based on the author's video participation, students showed great interest in expressing their emotions out loud, answering the OX quiz audibly, discussing their opinions with their peers, exchanging monitors, and making big bodily movements in the classroom. This phenomenon can be defined as an "expression of immersion," considering that "immersion" is strongly linked to participants' 'being' in a virtual world and their engagement with issues of embodiment (Savin-Baden et., 2015). The following assertion supports the author's analysis:

One of the effects of metaverse education is that students who doze off in class participate in virtual education so actively that *no one dozes off while engaging with multi-use devices*. In addition, unlike students with varying levels of participation depending on differences in their basic learning skills, metaverse education has a significant impact in that the relevant activities create an atmosphere in which students cooperate with each other.⁶

Although the participants engaged in the virtual activities behind "masked-identity" avatars, it was through their "real selves" that they closely interacted with one another in the classroom. By taking part proactively in their bodily performances of memorialization at the UN Cemetery through the metaverse, many students responded that "[they] came to realize that 11 November was the day to commemorate the sacrifice of the UN forces."⁷ In this sense, digital learning platforms not only raise participants' awareness of the "Turn toward Busan" commemoration and the history of Remembrance Day in relation to a heritage site; it is also relevant to note that the expression of immersion through metaverse programs creates a mood of social inclusion through cooperation and interactions with one's classmates.

As a result, Sintanjin Middle School's pioneering metaverse education program was introduced in several local newspapers, and its pedagogical effects have received considerable attention in the ROK (CCNNEWS, 2021; Chungnamilbo, 2021). Moreover, Geunchang You, the supervisor who took charge of the relevant activities, was awarded the "2021 Veterans Organization Promotion Merit Award" by the MPVA Daejeon Regional Office. His contribution was officially recognized for promoting the students' awareness of peacebuilding through continuous related educational activities using the metaverse "Turn toward Busan" commemoration (Daily Hankook, 2021). Given that awarding the prize by the MPVA for teaching programs is not common, it is plausible that this memorialization through the metaverse platform has gained a good reputation for combining intangible value with new technologies in heritage education.

On the other hand, considering that "Turn toward Busan" is an event commemorating the Korean War Veterans, it is necessary to put more weight on the war veterans. Since the current program of Sintanjin Middle School is an introductory course in social inclusion with the UNMCK, detailed programs on the students' interactions with veterans shall be developed to increase understanding and appreciation of humanistic values.

⁶ The author's e-mail correspondence with Mr. You in April 2023 (translated from Korean to English by the author).

⁷ The author's e-mail correspondence with Mr. You in April 2023 (translated from Korean to English by the author).

4. RESEARCH FINDINGS

Based on the analysis of the "Turn toward Busan" commemoration case, practical findings include the following:

1. The "right devices" with the "right technologies"

Selecting the right technologies to match learning program outcomes provides educators with multiple instructional tasks and challenges (Blankenship, 2021). Sintanjin Middle School's case implies that innovative education could be challenging for general schools to initiate in the metaverse, unless the learning environment is equipped with multi-use devices and the students and staff are familiar with using high-tech machinery. Moreover, programs based on new technologies should be conducted continuously in academic institutions so that activities can be further linked to metaverse education. As the supervisor, Mr. You, explained, the research illustrates that tablet PCs are more applicable than laptops.⁸ It shall thus be taken into account that the "right devices" with the "right technologies" are a prerequisite to maximize the pedagogical benefits of heritage education.

2. Collective memory-making through memorialization

Memorialization through the metaverse based on "Gather. Town" can lead to students' collective memory-making, such as honoring war veterans who have sacrificed themselves for the country, promoting their national identity, and upholding a patriotic spirit in the socio-cultural context. Since memorialization is an important intangible value as a common heritage of the shared memory of conflicts, memorialization through the metaverse contributes to students' sense of belonging in a virtual space. However, as material aspects of memorial and monument designs enable visitors' engagement (Wagoner and Brescó, 2022), authentic experiences shall also be conducted to stimulate and promote "genuine emotions" through social inclusion with heritage.

3. Strategic use of hybrid platforms

While innovative learning tools can increase learners' sense of social inclusion with heritage, teachers should bear in mind that virtual platforms of new technologies are not fundamental solutions to heritage education. In the case of "Turn toward Busan," "Gather. Town" provided a unique atmosphere for participants to pay tribute to fallen soldiers at the virtual UNMCK. In addition, this case demonstrates the necessity of supplementary services, such as playing educational videos and representative students' pre-visits to the graveyard. Consequently, learners can improve their sense of reality and acquire multi-faceted knowledge in a well-balanced manner using online and on-site heritage learning programs. Thus, the author highlights the strategic and pre-planned combined use of hybrid platforms in heritage education.

4. The role of the educational host

Video analysis reveals that the co-presence and leading role of the educational host in the metaverse are of utmost importance. This is construed as a practical issue, given that teachers' ability to manage high-tech devices can directly affect educational quality. The case of Sintanjin Middle School illustrates that the actual host (who provides the narrative of the metaverse program), student representatives who guided the class, and the original classroom teacher generated a synergistic effect in facilitating the virtual learning program. Therefore, how teachers (and teaching assistants) play their proactive management role as

⁸ The author's e-mail correspondence with Mr. You in April 2023 (translated from Korean to English by the author).

actual hosts can result in different outcomes in education developed through new technologies.

5. Implications for photogrammetry, remote sensing, and spatial information science

Metaverse learning adopted in Sintanjin Middle School has numerous implications on technologies changing education in terms of photogrammetry, remote sensing, and spatial information science. Considering the current gap between "the metaverse-based UNMCK (virtual)" and "the real UNMCK", more precise documentation and digital photogrammetry techniques are a prerequisite in changing learning environments. For example, feasible methods such as creating 3D data from collected 2D photographic images including terrestrial photos taken at the UNMCK's ground level, aerial-based remote sensing, satellite imagery, and unmanned aerial vehicle (UAV) mounted sensors would be appropriate to incorporate into the metaverse platform. In cases where students are skilled at utilizing high-tech devices, they can take part in the beginning phase of establishing the platform by collecting photographic data and generating digital representations in photogrammetry or multispectral imaging (MSI). To achieve this, educators shall facilitate learning programs in cooperation with scientific networking across borders based on an interdisciplinary approach. Moreover, as most cutting-edge learning programs involve trial and error, sharing their lessons from failures and best practices with other educators will be necessary.

6. The benefits and challenges of sustainability

The findings reveal two aspects of sustainability in virtual heritage education. One is a benefit of repetitive uses and re-visits, citing the teacher's statement, "[one] strength of metaverse education is that students can visit again at any time in virtual space, regardless of 'actually being there.'" ⁹ The second challenge is creating and uploading multi-faceted content. Considering the lessons from memorialization, more versatile, multi-dimensional, and long-lasting programs with numerous themes should be devised and incorporated in terms of sustainability. To specify, the author proposes incorporating other technologies such as "DeepFake", or "Deep Nostalgia" to animate the war veterans' faces of still photos for more educational effect. Yet a scientific literature review examining the societal implications of deep fakes identified less than 30 studies that used practical experiments to investigate the genuine impact of deep fakes on the users (Gamage, et.al., 2021; Helmus, 2022). Since empirical research on the educational effect of multi-use technologies based on metaverse and deep fakes remains in its nascent phase, additional analysis identifying opportunities and challenges in education and memorialization through metaverse will be critical.

Based on the abovementioned findings, new technologies in education will ultimately contribute to the balance between the humanities and the digital world. In the case of heritage education, the author highlights its role as "bridging online and on-site" experiences by combining scientific skills, humanistic perspectives, and authentic interactions with historic sites.



Figure 8. Heritage education: Bridging online and on-site experiences

5. CONCLUSION

The findings demonstrate that incorporating the memorialization of war veterans into a metaverse platform has a strong educational impact in Industry 4.0, particularly for digital natives. However, the virtual "Turn toward Busan" commemoration conducted at Sintanjin Middle School implies that it is necessary to develop pre-planned and sustainable models of hybrid education to maximize students' participation. The qualitative analysis showed the following key lessons: (1) "right devices" with the "right technologies," (2) collective memory-making through memorialization, (3) strategic use of hybrid platforms, (4) the role of the educational host, (5) implications for photogrammetry, remote sensing, and spatial information science, and (6) the benefits and challenges of sustainability. Overall, the issues to be further addressed include more in-depth studies to examine the concrete impacts of metaverse education on human consciousness and intangible values related to heritage, the duration of the pedagogical effects, merits and demerits of immersion, and the variances of other high-tech devices and learning tools.

In conclusion, this study indicates that virtual learning programs promote participants' social engagement with heritage sites and awareness of peacebuilding through memorialization. Although there are challenges, it is likely that strategic convergence of the state-of-the-art platforms and intangible values of heritage contribute to innovative education. Marking the 70th anniversary of the Korean War Armistice, this study is expected to lay the groundwork for further research exploring the correlation between the humanities and digital technologies.

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⁹ The author's e-mail correspondence with Mr. You in April 2023 (translated from Korean to English by the author).

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