

Presence and Situational Interest of Participants of a Virtual Art Exhibit in the Metaverse: The Case of Galeria Sinag

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Abstract: This study explores the relationship between situational interest and spatial presence, as well as the hardware or viewing platform used in observing a virtual art exhibit in the Metaverse. It employed a mixed-methods approach, utilizing correlation analysis and qualitative thematic analysis to understand participant experiences. The study found a positive correlation between situational interest and spatial presence among participants in the virtual space. However, the viewing platform used did not significantly impact spatial presence or situational interest. External environmental factors and limited usage of certain viewing platforms may have influenced the findings. Further research is recommended to comprehensively understand the nuanced effects of viewing platforms on spatial presence. The results of this study encourage designers to focus on creating immersive and realistic virtual exhibits in the Metaverse to motivate students through their heightened situational interest and presence. Insights from this study can guide the development of future virtual exhibits. The study shows how understanding virtual spaces like the Metaverse can shape art experiences. It highlights the potential of Metaverse-based exhibits in providing accessible and immersive cultural engagement, transcending physical limitations. It adds to the evolving knowledge of Metaverse applications, specifically in art displays. It introduces insights into the relationships between situational interest, spatial presence, and viewing platforms, and challenges existing assumptions that can pave the way for further exploration.

Keywords: Metaverse, virtual exhibit, spatial presence, situational interest, VR, cultural engagement

INTRODUCTION

The concept of the Metaverse is not a recent one (Mitra, 2023). It was first introduced in Neal Stephenson's novel "Snow Crash" in 1992 (Mitra, 2023; Moro-Visconti, 2022; Shen, 2022). Moro-Visconti (2022) explains that the term "metaverse" is a combination of "meta" (which means "beyond" in Greek) and "universe." According to Onu et al. (2023), the Metaverse is a shared virtual space that integrates different immersive technologies, such as Augmented Reality (AR) and Virtual Reality (VR), with the internet. It is a network of 3D virtual worlds that allows individuals to create and explore with others, regardless of their physical location (Moro-Visconti, 2022). In other words, it is a new digital platform or space for collaboration, sharing, and interaction through the use of the Internet.

The Metaverse has been studied in various fields, including education, health, communication, and business, as technology has advanced. The study presented in this article aims to add to the existing information about the Metaverse and its possible uses in various contexts, particularly in the realm of art exhibits both in physical and virtual formats.

The Metaverse as a Venue for a Virtual Exhibit

With the recent advancements in computer technology, more and more virtual environments have been created ranging from virtual tours and virtual museums to three-dimensional exhibits. The Metaverse offers another dimension of art displays and cultural engagement. It acts as a canvas from which artists, designers, and educators can share, collaborate, and interact with their target audience or participants. In this study, *Frame VR*, a metaversal platform, was used to display wood carvings usually displayed in the physical art gallery of the University of the Philippines Open University (UPOU).

Photogrammetry and the Metaverse

The ever-increasing use of computers is undeniably a great boost to photogrammetry. Digital photogrammetry is an important means for virtual spaces as 3D image acquisition is done through it (Carvajal et al., 2020). In contemporary times, the process of 3D scanning has emerged as highly significant in the preservation of artifacts and the creation of virtual displays. The issue with photogrammetry was posed early from the first stages of its debut and developers had recognized its impracticality for small to medium users as it required huge economic investments in human specialization, spaces, and dedicated equipment resources (Apollonio et al., 2021). According to Apollonio et al. (2021), the issue was then addressed, and the solution was put into action by improving crucial features and specifications in gadgets like mobile phones, tablets, and portable cameras so they could easily handle 3D scanning without the need for exorbitant expenditures. Currently, virtual modeling and 3D reconstruction are widely employed methods in the domains of art and cultural heritage with the purpose of recreating and obtaining detailed visual representations of various objects. These techniques are commonly used to recreate both large-scale items, such as archeological sites and museums, as well as smaller pieces like wooden relics (Portalés et al., 2009). Several photogrammetry-based initiatives have already been implemented, showcasing the ability of 3D graphic representations to enhance viewers' comprehension of wooden sculptures by providing a detailed insight into their original structural identity (Učakar et al., 2022).

The Galeria Sinag Virtual Exhibit



Figure 1. The Galeria Sinag Virtual Art Exhibit (<https://framevr.io/galeria-sinag>)

The *Galeria Sinag* Virtual Art Exhibit showcases wood sculptures made by local wood carvers who participated in the UPOU Wood Competition and Exhibits held between 2013 and 2017. The majority of the artworks consisted of award-winning 3D sculptures, including both in-the-round and bas-relief pieces. Indigenous wood carvers from Ifugao and Palawan, together with local wood carvers from Pampanga and Laguna, participated in the competition. The wood-carving competition in 2015 involved a workshop for artists who created sculptures from trees that had fallen on the UPOU campus in Los Baños, Laguna, Philippines during Typhoon *Glenda*. These sculptures are now among the pieces in the UPOU Art Collection. Due to the COVID-19 pandemic and the closure of all public spaces, the physical exhibit had to be closed. The research team explored the option of transforming the physical exhibit into a virtual one to increase access and viewership.

The sculptures were digitally transformed into 3D models by capturing the actual art pieces through photogrammetry. This virtual exhibit was hosted in the Metaverse through *Frame VR* and was initially made available as part of an international conference and a local technology forum hosted by the university. Figure 1 displays the interface of the virtual exhibit hosted in the Metaverse while Figure 2a shows an “in the round” sculpture. Figure 2b shows a close-up look of the same artwork.



Figure 2a. View of One of the Exhibited Sculptures in the Galeria Sinag Virtual Art Exhibit



Figure 2b. Close-up View of an Exhibit Sculpture in Galeria Sinag Virtual Art Exhibit

Furthermore, the virtual exhibit provides viewers an opportunity to explore the virtual space unhampered. Each sculpture was properly labeled with write-ups about its creator. While most art exhibits in physical spaces prohibit viewers from “touching” the artworks, the virtual exhibit would allow participants with editing access to move, rotate, or manipulate their digital twins.

Situational Interest and Spatial Presence in Metaverse

Lee (2004 p. 32, as cited in McCreery et al., 2013, p.1636) suggested that presence is a “psychological state in which the virtuality of experience is unnoticed.” This would mean that the participants would feel that they are in the space instead of just looking at a three-dimensional image. Situational interest, on the other hand, is defined as a psychological state in which an activity gains the attention of the user. (Figueroa, 2021; Krapp et al.,1992, as cited in Cheng, 2022) These two variables are found to affect one’s participation in virtual environments (Cheng, 2022; Figueroa, 2023; Ochs & Sonderegger, 2022; McCreery et al., 2013).

Objectives of the Study

The study explored how the use of the Metaverse as a space for virtual exhibition could have an impact on the experience of visitors. Specifically, it aimed to answer the following research questions:

RQ 1: How was presence related to situational interest among visitors of the virtual exhibit?

RQ 2: How did the viewing platform affect visitors’ presence in the virtual exhibit?

RQ3: How did the viewing platform affect visitors’ situational interest in the virtual exhibit?

METHODOLOGY

This study used a mixed-methods approach to examine the impact of using the Metaverse in virtual exhibits on visitor satisfaction, presence, and viewing platform. Descriptive statistics and non-parametric tests were used to analyze quantitative data.

Participants

Volunteer sampling was used to recruit participants in the study. Specifically, they were individuals who visited the physical exhibit of the University of the Philippines Open University in an event titled *SyenSaya*. These participants tried to experience the virtual exhibit through head-mounted displays (HMDs), laptops, and tablet computers located in the physical exhibit. Among the visitors, 210 individuals volunteered to participate in the survey.

Data collection

A survey questionnaire was used to collect the quantitative data from the participants. They filled out the survey form after visiting the virtual exhibit. The questions in the survey were designed to gather information related to their satisfaction, sense of presence, situational interest, and other aspects of their experience. To measure the situational interest of the participants, we conducted a test using the instrument previously validated by Figueroa (2021). To assess the presence felt by the participants, we used a single test developed by Bouchard et al. (2004).

Analysis

To address the research questions, statistical tests were conducted. Pearson's product-moment correlation test was used to examine the relationship between the presence and situational interest of exhibit visitors (RQ 1). The Kruskal-Wallis test was employed to investigate the relationship between the viewing platform used by visitors and the presence felt (RQ 2) and the situational interest (RQ 3). All of the quantitative methodologies were done using R, which is open-source software that offers different libraries for statistical analysis.

RESULTS

This section provides the tests' results, arranged according to the research questions.

RQ 1: Relationship between Presence and Situational Interest

Table 1 displays the mean and standard deviation of items used to measure the situational interest and presence felt by the virtual exhibit participants.

Table 1

Items Used for Measuring the Situational Interest and Presence

Item	Mean	SD
<i>Situational Interest</i>		
The exhibit was entertaining	4.324	0.923
I did not enjoy navigating the exhibit	2.633 (-) 3.367 (+)	1.485
I liked the exhibit	4.214	0.957
The topics in the exhibit were interesting	4.129	0.764
<i>Presence</i>		
How much did you feel that you were in the exhibit and not just looking at a photo?	7.467	2.22

As shown in Table 2, a Pearson correlation coefficient was computed to assess the relationship between SI and presence, revealing a significant, positive correlation, $r(208) = 0.5159$, $p < 0.001$, 95% CI [0.4091, 0.6088]. This indicates a strong relationship between situational interest and presence.

Table 2

Pearson's Correlation Test Result for Situational Interest and Presence

	r	df	p-value	95% CI
Correlation (r)	0.5159	208	<0.001	[0.4091,0.6088]

Note. df = degrees of freedom; CI = Confidence Interval.

RQ 2: Effects of Viewing Platform to Presence

During the survey, the participants were requested to indicate the platform they utilized to view the virtual exhibit. The available options were mobile devices, laptop/desktop computers, and head-mounted displays. Thereafter, the data on the viewing platforms was cross-examined with the data on the participants' sense of presence using the Kruskal-Wallis test. Figure 3 shows the distribution of the viewing platforms used by the participants.

Based on the results of the Kruskal-Wallis test, there is insufficient evidence to suggest that the viewing platform variable has a significant impact on the presence variable.

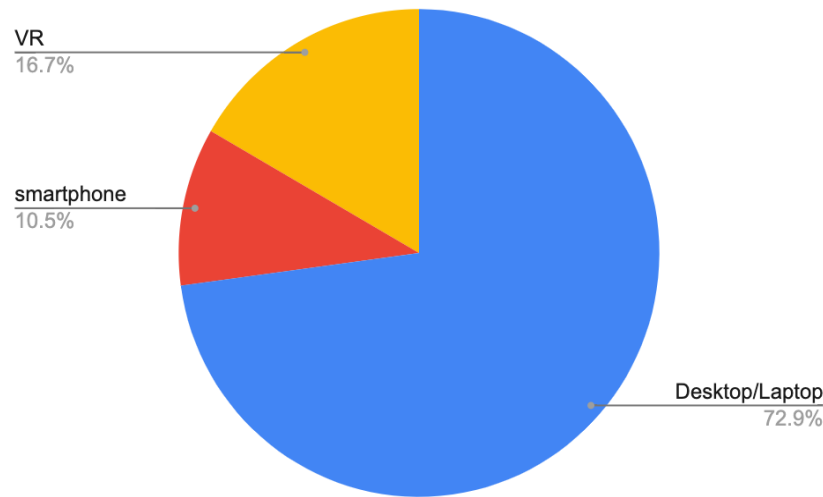


Figure 3. Distribution of the Viewing Platforms used by the Participants

Table 3

Kruskal-Wallis Test for the Effect of Viewing Platforms on Presence

	Chi-Squared	df	p-value
Kruskal-Wallis Test	1.4386	2	0.4871

Note. df = Degrees of Freedom.

RQ 3: Effects of the Viewing Platform on Situational Interest

Similar to RQ1, the data on the viewing platform was cross-examined with the data on situational interest using the Kruskal-Wallis test. According to the results of the Kruskal-Wallis test (see Table 4), there is no significant evidence to suggest that the "SI" variable is affected by the viewing platform variable. The p-value is greater than the significance level (0.05), which indicates that there are no significant differences among the groups.

Table 4

Kruskal-Wallis Test for the Effect of Viewing Platforms on Situational Interest (SI)

	Chi-Squared	df	p-value
Kruskal-Wallis Test	0.85062	2	0.6536

Note. df = Degrees of Freedom.

DISCUSSION

This study primarily focused on knowing how the use of the Metaverse as a space for virtual exhibition could have an impact on the experiences of the visitors. Situational interest and presence are both concepts that are being explored concerning virtual environments. Ochs and Sonderegger (2022), for instance, examined the relationship between presence and learning in relation to the use of VR headsets. Figueroa et al. (2022) looked at the relationship between the levels of satisfaction and presence when students use VR tours. Mccreey et al. (2013) conducted a literature review regarding the role of presence in virtual environments.

Situational Interest and Presence

In 2022, Cheng conducted a study that showed how spatial presence can impact situational interest, as exemplified by outcome variables such as immediate enjoyment, attention demand, the desire to explore the space, and the feeling of novelty. The qualitative data obtained from this study validates the positive correlation between spatial presence and situational interest.

The positive linear relationship between situational interest and presence suggests that as the participants feel more present within the space, without being consciously aware of its virtual nature, their situational interest tends to increase, and vice versa. This finding also aligns with the previous research by Figueroa et al. (2022). They observed a similar correlation between the satisfaction levels and presence among first-year Japanese students who use VR tours in their classes.

Practically, there are several design implications that one can explore when creating a virtual exhibit using the Metaverse. For instance, designers could focus on making the virtual exhibit more immersive and even realistic, by adding sounds, interactive elements, and graphics. The more users feel present in these spaces, the more likely they are to experience heightened situational interest.

Viewing Platform and Presence

The results of this study revealed no significant difference between the viewing platform used by the participants and the spatial presence they felt when they visited the virtual exhibit. This finding is opposite to that of the experimental study conducted by Ochs and Sonderegger (2022), in which university students who used VR headsets experienced a higher level of spatial presence.

While it may seem counterintuitive that the platform used to view virtual content does not significantly influence the sense of presence, several factors could contribute to this finding.

One possible explanation is that the spatial presence felt by the participants is influenced by the surrounding environment, as they explored the virtual exhibit within the physical exhibit mounted by the team at the mentioned event. In a literature review done by Yung et al. (2021), external environments are identified to be one of the determinants of presence. They also provided three broad categories of determinants of presence, namely, engagement, immersion, and sensory fidelity of the extent to which the senses are stimulated (Yung et al., 2021). These other determinants could also affect the result of this study.

Moreover, participants mostly experienced the virtual exhibit using the desktop/computer the team had set up in the physical venue. The low usage of VR headsets, as well as smartphones, could also affect the data and results of this study. Therefore, further research is needed to fully understand the effects of viewing platforms on spatial presence.

Viewing Platform and Situational Interest

The outcome of the Kruskal-Wallis test, indicating no significant impact of the viewing platform variable on situational interest, presents an intriguing aspect of the study. This finding suggests that, at least within the scope of this investigation, the choice of viewing platform does not play a statistically significant role in influencing situational interest in the virtual content.

Interestingly, engagement, which is a dimension of spatial presence, according to Lessiter et al. (2001) and Nash et al. (2000) was found to be correlated with situational interest and was influenced by the type of device according to Figueroa (2023).

While this result may also be affected by the sheer number of participants viewing different platforms, this contrast provides further opportunities to explore how the viewing platforms affect the situational interests of VR users or virtual exhibit visitors.

CONCLUSION

Art exhibits can now be explored in both the physical and virtual worlds. The Metaverse provides the viewers with ease of access and an immersive experience regardless of their physical location. Viewing 3D or the round and “bas relief” sculptures in the Metaverse offers viewers with an all-around view or a close-up view of each artwork and unimpeded access to all the artworks without the risk of possible physical damage from the viewers. Metadata can also be added to the Metaverse to include narratives and additional information about the artwork and the artist.

This research explored the case of the Galeria Sinag Virtual Art Exhibit which uses Metaverse as the virtual environment. The study aimed to explore the relationships between presence, situational interest, and viewing platforms among participants in the virtual exhibit.

The findings revealed a positive correlation between situational interest and presence, suggesting that as participants felt more present in the virtual space, their situational interest increased and vice versa. This aligns with prior research on the interplay between spatial presence and situational interest, emphasizing the importance of designing immersive and realistic virtual exhibits to enhance user experiences.

However, the study did not find significant differences in spatial presence based on the viewing platform used, whether desktop/laptop computers, smartphones, or VR headsets. This result, contrary to some existing literature, may be influenced by external environmental factors and the limited usage of VR headsets and smartphones in the study. Further research is recommended to comprehensively understand the impact of viewing platforms on spatial presence.

Furthermore, the absence of a significant relationship between viewing platforms and situational interest raises intriguing questions about the potential influence of device types on situational interest. This suggests the need for additional exploration into how various viewing platforms may affect the situational interests of virtual exhibit visitors.

In practical terms, the study provides insights for designing virtual exhibits within the Metaverse. Designers are encouraged to focus on creating immersive and realistic experiences to enhance spatial presence and situational interest among participants. Additionally, future research should delve deeper into the nuanced effects of viewing platforms, considering factors such as external environments, engagement, and sensory fidelity.

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