

The Implementation of Virtual Reality as a Representation Medium of Architectural Space

Fitri Nurul Aqila

Architecture Department, Faculty of Technology and Design,
Universitas Pembangunan Jaya
fitri.nurulaqila@student.upj.ac.id

Issa Tafriidj

Architecture Department, Faculty of Technology and Design,
Universitas Pembangunan Jaya
issa.samichat@upj.ac.id

ABSTRACT

In the practice of architecture, representation is one of the fundamental things to be noted, as it acts as the medium to present the design. To establish a significant and memorable architectural space, the knowledge of spatial relationships from plans, sections, and elevations is needed. However, most of the time, those representations can not tell the designed spatial experience intended. This study incorporates the uses of virtual reality as a representation medium to investigate the effectiveness of virtual reality in conveying the architects' designed spatial narrative. This study employs qualitative methods with data collected through literature studies, virtual reality simulation, observation, and interviews. The data obtained were analyzed through a comparative study and interpreted based on existing theories. Based on data, it can be concluded that virtual reality succeeded in conveying a designed spatial narrative and establishing a similar spatial experience for several users.

Keywords: Virtual Reality, Representation Medium, Spatial Narrative, Spatial Experience

INTRODUCTION

The phenomenology of architecture is an essential study for us, architecture students, as we bear the responsibility to not only design a space, but also the experience. To establish a significant and memorable architectural space, the knowledge of spatial relationships is needed. Architecture students went through years of practice and training to understand spatial relationships through the representation of plans, sections, and elevations. However, most of the time, these representations can not specifically tell the spatial experience intended behind them.

In the practice of architecture, representation is one of the fundamental things to be noted, as it acts as the medium to present the design. Thus, architects need to fully understand the potential of their representation medium to maximize the expression of their designed architectural space. According to Aydin & Tong (2019), the intention of architectural space is primarily to create a spatial perception for its users so it could tell a spatial narrative cohesively.

Virtual Reality (VR) as a medium has the capacity to provide an indistinguishable visualization from reality as it blurs users' senses and establishes new perceptions. Cruz (2018) argued that Virtual Reality allows users to establish a sense of presence by putting the user on a human scale and providing the opportunities to experience the virtual environment through visualizations.

The main objective of this study is to investigate the effectiveness of virtual reality as a representation medium of architectural design. It is intended in the present study to discuss the potential of Virtual Reality as a tool to represent architects' designed spatial narrative and its ability to establish spatial experience in users. This study is believed to be relevant to today's society because representation medium in architecture is a key to strengthening coordination and communication between project stakeholders, hence avoiding false perceptions in the process of architectural practice.

LITERATURE REVIEW

Virtual Reality

Chen (2020) proposes that Virtual Reality (VR) is a computer-simulated environment. Hence, VR provides a non-physical and artificial environment that is able to replace the present reality. Aydin & Tong (2019) argued that VR is a representation medium based on visual and auditory elements. This correlates to the application of VR hardware which includes a head-mounted display to block out sight and earphones to block out sound, in this manner, it enables to blur the line between the artificial environment and physical environment.

VR allows users to interact with the artificial environment by providing rendered spatial sequences. According to Mihelj, et. al. (2014), VR is constructed by these elements:

- a. Virtual Environment, a non-physical and computer-simulated environment.
- b. Virtual Presence, the sense of a user's presence in the virtual environment.
- c. Sensory Feedback, the capability of users to interact and affect the virtual environment.
- d. Interactivity, responses towards user's movement.

Spatial Perception

According to Bergqvist (2015), perception is defined as the way humans interpret something based on the stimuli they receive from multisensory modalities; primarily visual and auditory. The perception of each person varies, this has to do with the subjective mind that allows people to interpret from a perspective. This argument is supported by Green and Schellenberg (2017) who considers people perceive objects as multitude spatial properties which have both constant aspect—remains unchanged through the changes in perspective, and perspectival aspect—changes depending on perspective.

Spatial Experience

Predominantly, architecture and humans are engaged in a sense that one influenced the other; and the other way around. Soltani (2019) believes that architectural

space is dependent on its surrounding environment. Hence, the essence of spatial experience is established based on the relationships between humans and the space they occupy. It is worth noting that spatial experience is capable to enhance an emotional connection within space by providing ambiance and atmosphere that will be judged based on subjective evaluations.

METHODOLOGY

This study investigates the effectiveness of virtual reality as a representation medium to convey the designed spatial narrative by adopting Chichu Art Museum VR as a case study and displaying it through a head-mounted gear. The case study was chosen as a fitting spatial experience for its varying atmosphere. A total of 7 key respondents participated in the study at different times over two weeks. This study uses a qualitative methodology which is carried out by VR simulation, observation during simulation, and interviews.

The simulation setup consisted of Virtual Reality Glasses (VR BOX) which displayed a sequence of artificial architectural spaces. Next, 3 key spatial scenes with certain narratives were demonstrated, as follows:

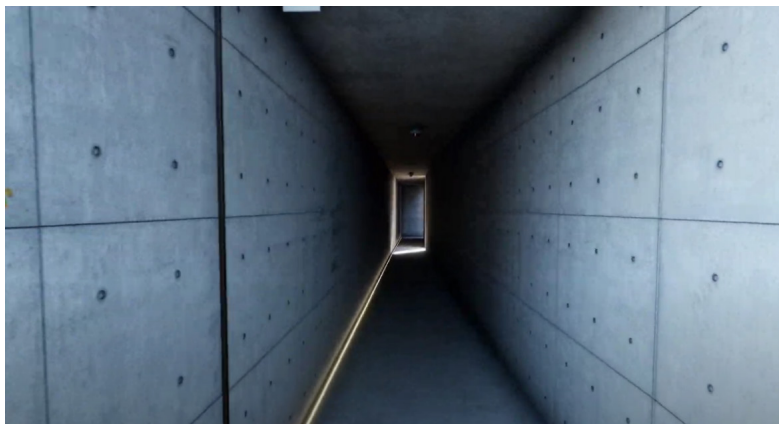


Image 1 Key Scene 1: Uncomfortable & Narrow Narrative (Source: Chichu Art VR, 2020)

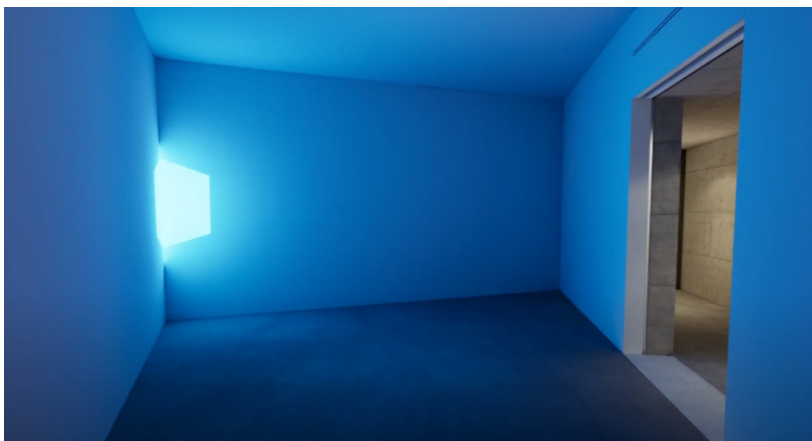


Image 2 Key Scene 2: Cold & Chills Narrative (Source: Chichu Art VR, 2020)



Image 3 Key Scene 3: Spacious but User Feel Small Narrative (Source: Chichu Art VR, 2020)

During the simulation, the responses of 7 key respondents are observed through vocal and body expressions. Afterward, the respondents were interviewed about the atmosphere and ambiance they received during the simulation.

The data collected in this study includes primary data and secondary data. The data collection results were processed through a comparative study by comparing the result of one respondent with another. The analyzed data will then be interpreted based on existing theories before the conclusion is drawn. The conclusions generated will be related to whether virtual reality could act as a good representation medium to convey a designed spatial narrative and establish a spatial experience or not.

RESULTS & DISCUSSION

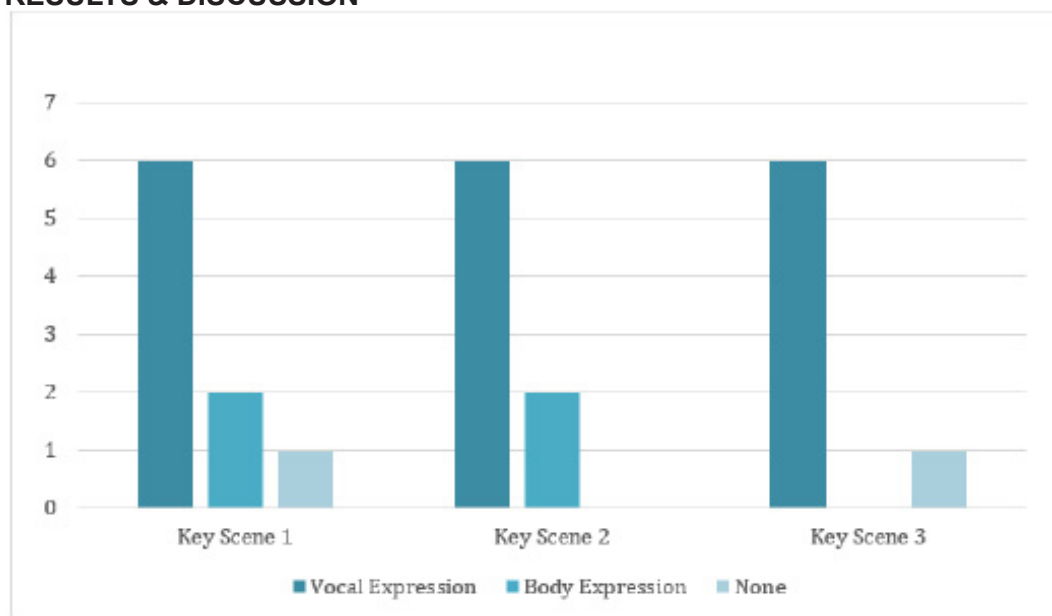


Image 4 Expression Towards Spatial Narrative (Source: Fitri Nurul Aqila)

The observation results of all respondents in terms of vocal and body expressions during the simulation are summarized in Table 1. Overall, the respondents tend to

express their spatial experiences through vocal expressions or verbally. On the other hand, some respondents reacted through body expression, for example in Key Scene 1—two people actively move their heads left and right; in Key Scene 2—two people hunched their shoulders.

Table 1 Key Scene 1: Uncomfortable & Narrow Narrative (Source: Fitri Nurul Aqila)

Respondents	Impression / Spatial Perception
01	The alley is dark and scary, it feels like there is no end in sight
02	It feels narrow and moisty
03	It feels like I can't move my body freely and it is so quiet, that it makes me cautious
04	It's dark and quiet
05	I feel isolated
06	It's dark and uncomfortable
07	I don't feel anything

From the interviews, it showed that (Table 1) most of the respondents feel some kind of uncomfortable feelings during the simulation; whether it's dark, quiet, narrow, moisty, or cautious. This indicates that Key Scene 1 successfully establishes a spatial experience in users with the designed spatial narrative by designing the space in a narrow dark alley with concrete as its material.

Table 2 Key Scene 2: Cold & Chills Narrative (Source: Fitri Nurul Aqila)

Respondents	Impression / Spatial Perception
01	The deep blue color blurs my vision
02	It feels cold
03	The lighter blue in the corner of the room makes me feel there is hope
04	It's cold and quiet
05	I feel empty
06	It kind of resembles the sea
07	It's cold and dim

Overall, based on the interview results (Table 2) of Key Scene 2, all of the respondents feel a spatial experience through their perceptions. The impressions or spatial perceptions they experience indicate the achieved cold narrative by designing the space in deep blue. Other narratives include the similarity between the room and the sea or the emptiness it conveys.

Table 3 Key Scene 3: Spacious but User Feel Small Narrative (Source: Fitri Nurul Aqila)

Respondents	Impression / Spatial Perception
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01	I feel free
02	I feel calm and free
03	It feels like I could move anywhere but then I realized I can't escape this closed space
04	It's huge and wide
05	I feel alone
06	I don't feel anything special
07	The room is wide

From Table 3, it can be concluded that most of the respondents feel the freedom and the wideness of the room. However, some respondents felt alone or trapped in a space. This result showed that Key Scene 3 has succeeded in establishing a spacious spatial experience for users but fails to achieve the "User Feel Small" narrative.

Based on the results of the data that has been presented, it can be seen that virtual reality provides a good representation medium to convey a designed spatial narrative, it also establishes similar spatial experience in users. In this study, there is not much body expression during the simulation. This could be caused by the limited gear that only provides visual and auditory feedback, there is a possibility that it would achieve different results if the simulation was demonstrated in full-gear equipment, such as remotes for users' hand movement.

CONCLUSION

Based on the simulation, observation, and interview that is demonstrated through the Virtual Reality Glasses (VR BOX), the conclusion that can be drawn from this study is that virtual reality is effective to use as a representation medium of architectural design as it successfully conveys the designed spatial narrative. Moreover, the results of the analysis argue that virtual reality achieved to plant or establish a similar spatial experience for its users. These findings indicate that the implementation of Virtual Reality as a Representation Medium of Architectural Design could improve the users' understanding of spatial narrative cohesively and minimize the presence of false perceptions.

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