



Action Research on Exploring the Educational Use of VR Platform in Art Education

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Abstract. This study investigates the use of VR platforms in art education to overcome physical limitations in art activities, such as exhibition planning and hosting classes. This study was conducted for four months, and 14 hours of student classes were intervened and observed over two months. Overall, the study findings show that VR platforms can be a solution for art education. This preliminary study leaves two implications. First, this study found a technology infrastructure challenge that involves limited wireless internet and devices (e.g., tablet PCs and laptops). Second, teachers' digital literacy capacity is important, and assistant teachers to support its management is crucial. Overall, this study proposes new art and teaching methods using VR platforms.

Keywords: VR Educational Applications, Art Classes, Mozilla Hubs.

1 Introduction

1.1 Background of the Study

During the COVID-19 pandemic, social distancing measures have made educators experience challenges in conducting art education classes that involve expression and appreciation. VR platforms have been explored as a potential solution to overcome these limitations. Initially, the aim of this study was intend to seek ways to showcase students' expression online, but it was discovered that VR platforms could also be utilized for "exhibition planning" classes in art education. When examining the art education curriculum of Korea's national education curriculum, it can be observed that the following parts relate to "exhibition planning":

Table 1. The appreciation section of the art education curriculum (Focusing on exhibition planning).

Curriculum	Content
Achievement criteria	[9][03-04] Students are able to plan various types of exhibitions, taking into consideration the characteristics of art pieces, spectators, and exhibition spaces
Learning elements of the appreciation section	The history of art, background of art pieces, knowledge of art terms, content and meaning of art pieces, and exhibition planning.
teaching and learning methods and precautions	Guidance should be provided to students to help them understand various exhibition formats through research or field trips, and to plan class or school exhibitions accordingly.

The exhibition planning is not just a simple act of hanging artworks on the wall, but a complex activity that involves setting a theme, collecting materials, and considering various factors such as the scale and audience of the exhibition, the exhibition venue and timing, etc. [1]. However, in reality, art exhibition planning classes have been replaced by activities such as creating miniature exhibition halls via given materials (e.g., wood and hardboard), and opening end-of-semester exhibitions in school led by teachers. This is because there are physical limitations to the classroom environment: (1) a lack of sufficient time for art classes, (2) teachers' difficulty in assessing student performance, making it challenging to plan and execute a series of exhibition planning activities. However, despite these challenges, "exhibition planning and hosting" in art classes still holds educational value for students. Therefore, we aimed to overcome these physical limitations by utilizing VR platforms and explore new alternatives for the "exhibition planning" course. The VR platform, Mozilla Hubs, used in this study is a web-based platform that can be accessed through various devices such as smartphones, tablets, and desktop computers [2]. This study aims to explore the potential and possibilities of utilizing VR platforms in an art education setting by planning, executing, and modifying art exhibition planning classes using Mozilla Hubs.

2 Methods and Research Process

The researcher of this study is currently working as a middle school art teacher and pursuing a Ph.D. program at Korea National University of Education. This action research was conducted with the support of the S middle school art teacher, targeting a total of 10 classes (329 students) in the 2nd grade of S middle school for two months (14 hours). Throughout the entire process, the researcher worked with the S middle school art teacher through ongoing meetings to understand the school environment and design the class. The researcher observed every aspect of the class both online and offline from the beginning to the end. At the end of each session, the researcher received the art teacher's feedback on any problems or difficulties that arose during the class, and then modified the lesson plan accordingly to resolve these issues. The art and exhibition planning classes that utilized VR platform, Mozilla Hubs, were conducted as follows.

Table 2. Development process of art exhibition planning class using Mozilla Hubs.

Curriculum	Content
Purpose	The purpose of this class is to provide a direct and practical educational experience in exhibition planning by utilizing the VR platform, specifically planning, preparing, executing, and holding an art exhibition through the use of Mozilla Hubs.
Class Process	<ol style="list-style-type: none"> 1. Set roles for each group and create a cover story (museum director, external art expert, student art expert, student docent). 2. Select appropriate artworks and conduct research on the works for the exhibition theme. 3. Develop exhibition space and create artwork labels. 4. Create the exhibition space using Mozilla Hubs Spoke. 5. Produce promotional posters and leaflets for the exhibition opening. 6. Open the exhibition and provide docent explanations.



Fig. 1. The process of creating exhibition space on Mozilla Hubs using tablet PCs and laptops.

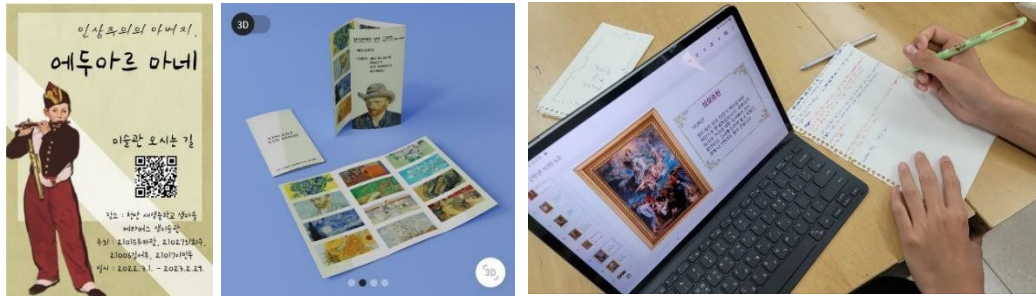


Fig. 2. Creating Exhibition Posters and Flyers: Process and Outcomes.

3 Results and Conclusion

3.1 Results

At a time when social distancing measures were being implemented due to COVID-19, VR platforms were explored as a medium that could alleviate the limitations of expression and appreciation classes in art education. Using VR platform in art class, students were able to create the following exhibition space (Fig. 3). The students created exhibition spaces consisting of at least two to four spaces per group and posted appropriate exhibition works and captions on the walls of the exhibition space. During this process, students were able to naturally consider the viewer's path, the size of the artwork, and the placement of posters.



Fig. 3. The art exhibition space created by students.

In addition, students also created a rest area by placing sofas, a swimming pool, and other amenities within the art exhibition space. They selected YouTube videos that were appropriate for the exhibition theme and created a designated space for watching the videos.



Fig. 4. Resting area and video viewing room inside the exhibition hall.

3.2 Conclusion

Through the exploration of educational uses of VR platforms in art, this study yielded the following findings: Firstly, teachers need to choose the appropriate VR platform for their class objectives, and they require digital literacy skills to utilize the platform in their lessons. If the teacher is not an expert in the platform, a specialist or assistant teacher who can help with the class is necessary. In this study, the researcher performed the role of an expert in the platform, but since there are usually no experts or assistant teachers outside of the subject teacher in schools, there is a need to explore ways to address this issue.

Secondly, to use VR platforms in educational settings, it is necessary to establish a wireless internet connection and have sufficient devices in the classroom. In this study, while 1:1 tablet PCs were available, there were only 8 laptops, so students had to use one laptop per group of four students. Therefore, one student who took the role of building the exhibition space using Mozilla Hubs Spoke had to lead the process, while other students were divided into other roles. Additionally, a budget for using VR platforms is necessary. In 2022 when this study was

conducted, Mozilla Hubs was free to use, but in 2023, partial charging is being implemented, which can create difficulties if the school's budget is not sufficient. In this case, alternative platforms need to be explored.

Third, using VR platforms for art and exhibition planning and hosting classes can be a viable alternative to overcome the physical limitations of traditional classroom spaces. Additionally, physically placing artwork in an actual exhibition space can be difficult and time-consuming when mistakes are made, requiring individual pieces to be taken down and frames to be reinstalled. However, utilizing VR platforms allows for features such as "undo" and "redo," making it relatively easy to start over even after multiple failures. Considering that students learn and grow through failure, the use of VR platforms has implications for educational value beyond overcoming physical limitations of exhibition spaces.

Acknowledgements

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References

1. Bark, W.: Exhibition, How to Make it. Jae-won Publishing, (2018).
2. Yoshimura, T., Borst, C.: Remote Virtual Reality Classes with Mozilla Hubs: A Case Study. Eurographics Proceedings, (2020).

Appendix A (optional)

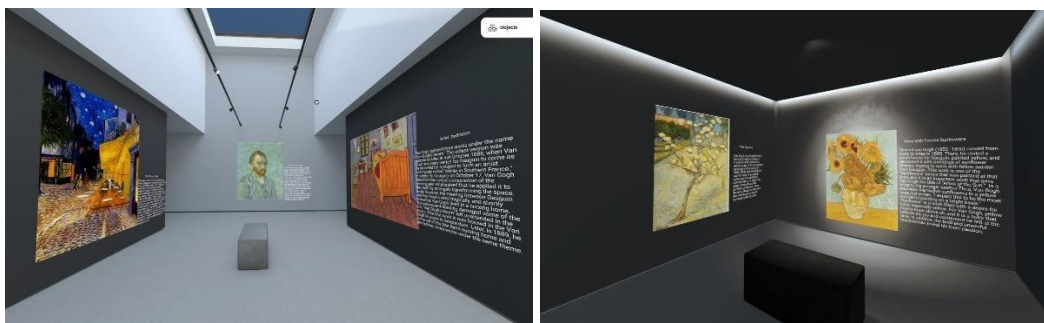


Fig. 5. The art exhibition space created by students.



Fig. 6. Students exploring exhibition space as avatars at the opening ceremony of the Sam Museum of Art on Mozilla Hubs.