



Applying Virtual Reality (VR) for Immersive Experiential Learning in Underserved Rural Schools

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Abstract. This study presented immersive experiential learning methods using virtual reality (VR) technology to students in challenging educational environments. This study investigated the effects of these methods and whether they can be used to enhance student learning in rural schools. A VR-based Antarctic exploration was conducted, and project classes linked to other subjects were taught aligned with this theme. This study assessed student motivation and academic achievement using VR devices, and found that students achieved great success in other subjects linked to project classes.

Keywords: Educational Use of Virtual Reality (VR) Media, VR Field Trip, Social Education Using Oculus.

1 Purpose of Study

The goal of this study is to explore the ways and possibilities of using immersive experiential learning in virtual reality (VR) media by planning and operating Antarctic exploration convergence classes based on social classes.

2 Background of the Study

In general, schools in underserved rural school areas have fewer opportunities than average in experiencing various educational environments. In addition, due to social distancing caused by COVID-19, students' opportunities for field trips have even become limited. In response, it was confirmed that among virtual reality (VR) media, there is content to explore Antarctica in the "National Geographic Explore VR" app provided by Oculus, and based on this, a "Antarctic Exploration Convergence Class" was planned based on social classes to discover the possibility and utilization of new class ideas.

First, the core contents related to this study in Korea's national-level curriculum and social curriculum are as follows.

Table 1. Contents related to experiential learning in the social curriculum.

Curriculum	Contents
Achievement Criteria	[6사07-03] The distribution and characteristics of the world's major climates are identified, and the relationship between the climate environment and human life is explored based on this.
Detailed objectives of social studies	Understanding the natural environment and humanities environment of the surface space to understand the diversity and dynamics of human life by region, and to be interested in geographical issues and issues at the regional, national, and global levels.

Teaching and learning methods and precautions	(사)It creates a classroom environment to utilize various digital technologies and information media, and utilizes geographic information systems, media utilization, and digital-based learning.
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Using VR in social studies classes is necessary in that students can contribute to enhancing learning motivation and social citizenship, the ultimate purpose of social studies education, by immersing and experiencing VR on historical and geographic materials, various social life issues, and issues in classroom classes [1]. Existing education using VR often uses Google Expedition and augmented reality data. Although these existing virtual reality media usage education allows students to "listen" to various contents by accessing the platform, there is a lack of "interaction with the world" that performs specific activities within virtual reality. Unlike traditional VR media, the 'National Geographic Explore VR' app provided by 'Oculus' has the advantage that students take the lead in learning through various interactions provided by devices and controllers, and that the results are suitable for convergence education of other subjects.

3 Research Process

3.1 Research Design

The researcher of this study is currently a teacher at an elementary school and is also taking a master's course at the graduate school of Gyeongin National University of Education. In addition, as a central school teacher in the underserved rural school association joint curriculum, research was conducted by sharing plans and designs with nearby schools.

First, through the Joint Curriculum Council, ten classes on convergence projects linked to other subjects were organized, focusing on social studies. It was designed in connection with learning contents such as "writing the experienced contents in appreciation" of the Korean language subject and "drawing landscapes" of the art subject, and the contents were applied to the school. Since then, in order to understand the possibility of generalization of convergence project classes, the same classes were conducted to other students at nearby schools, and feedback councils were continuously conducted on the difficulties arising in the process. The process of developing project classes using VR National Geographic Explore VR is as follows.

Table 2. The process of developing project classes using virtual reality (VR) media.

Curriculum	Contents
The subject of a class	[6사07-03] The distribution and characteristics of the world's major climates are identified, and the relationship between the climate environment and human life is explored based on this.
The objectives of the class	Understanding the natural environment and humanities environment of the surface space to understand the diversity and dynamics of human life by region, and to be interested in geographical issues and issues at the regional, national, and global levels.
The development of a class	1~2 Lesson The basic knowledge of climate environment and ecological characteristics of Antarctica is investigated through books and media.
	3~4 Lesson Learn how to operate and use VR content.
	5~6 Lesson Experiencing and recording the Antarctic region with photographs, etc.
	7~8 Lesson Based on the most impressive photos you've experienced, Record the Antarctic Experience Diary and write a review
	9~10 Lesson Drawing landscapes with impressive scenes based on the experience of the Antarctic experience.
	Investigate the current problems facing Antarctica and find out the efforts to solve environmental problems.

Prior to the progress of the class, the instrumental settings (i.e., oculus device status, Wi-Fi setting) of the classroom

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should be configured in advance. In addition, students' understanding and preferences in virtual reality (VR) media, learning ability, and adaptation to devices (e.g., motion sickness when wearing devices) should be closely investigated to supplement the learning environment according to the analysis results. This process affects actual learning time and class achievement.

3.2 Learning Activities

Students' activities according to the development of project classes are as follows.



Fig. 1. Students' perspective on actual experience.



Fig. 2. Playing VR devices.

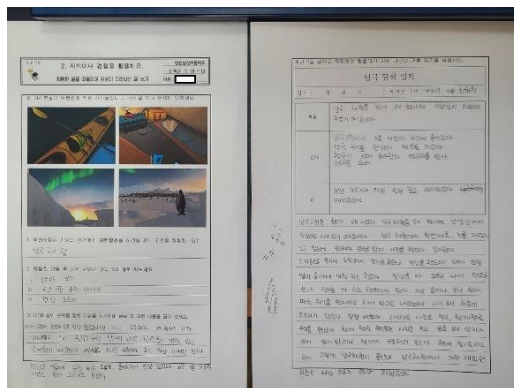


Fig. 3. A review of what you experienced.



Fig. 4. Landscape Painting with Impressive Scenes

Basically, students were curious about virtual reality (VR), so they were easily immersed in learning without preparing special activities for motivation in class. In using VR devices, it was easy to adapt, and all subsequent convergence classes were successfully performed. The effect was the same not only in this school but also in schools that conducted joint curriculum with the project. In particular, due to the characteristics of underserved rural school students who cannot receive various educational benefits, they participated actively throughout the project and achieved the learning achievement standards of various subjects without difficulty.

4 Conclusion and Suggestions

This study investigated the possibility of using immersive classes to enhance students' learning achievement, with a focus on a case of social science convergence education using VR in elementary schools. The study identified the following educational significance of the project class: First, it can create a new educational environment for students who have limited access to various educational experiences. VR technology allows students to engage in educational activities that would not be possible within the confines of the classroom. Second, convergence classes using virtual

reality have a more positive effect on motivation and learning achievement compared to classes that rely on traditional book and media materials. Third, the current generation of students, often referred to as "digital natives," quickly adapt to classes that use VR media once the physical environment is established.

References

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