Developing Learning Activities using Mixed Reality Contents at Elementary Smart School

Suh Heejeon
Tongmyong University
428, Sinseon-ro, Nam-gu, Busan, 608-711, Republic of Korea
heejeon.suh@gmail.com

Abstract. This study aims to develop learning activities using mixed reality contents in elementary classroom. For the purpose of this study, we analyzed 10 mixed reality contents, VR experiencing classroom environment, and curriculum in C smart model school. Moreover, we applied three teaching models to experience learning activity design using mixed reality contents. Teaching models included role play model, group investigation model, and task based language teaching model. As the result of this study, we developed 10 lessons based on teaching models in Korean language, science, and English subject. In further studies, it is needed to apply experience learning activities to elementary class, and to evaluate the effectiveness of these lessons.

Keywords: Virtual Reality, Experience Learning Activity, Mixed Reality Contents, Smart School

1 Introduction

The smart and virtual technology is influencing conventional teaching methods in school education. In Singapore, through a future project such as 'Future Schools@Singapore,' Beacon future school provides a 3D virtual learning simulation environment supporting customized curriculum of elementary school. In Korea, 14 Smart model schools were appointed from 2012. C elementary school in Sejong City is providing virtual reality (VR) experiencing classroom to which mixed technologies are applied. Mixed reality (MR) is a kind of virtual reality which makes users perceive mixed (augmented) images by showing the world incorporating real world with virtual world with computer graphics. It is a computer interface technology interacting computers by manipulating virtual objects through actions of users in real time. MR makes learners’ experience more "engaging” and promotes active and interactive learning [1],[2]. Previous studies on the effects of MR experiencing learning which students received 8 weeks classes using augmented reality contents on ‘King Midas’ through the process of storytelling, quest, and role play showed significantly higher activeness in action and language [3]. When looking into the studies on children’s response in juvenile drama activities based on MR and robot technology, it was found that children did not feel difficulties in understanding roles and functions of marker and augmented reality technology and manipulating them,
and that they thought it interesting that various object images were combined with
different backgrounds and being enforced [4]. Huang, Rauch, & Liaw [5] suggested
five constructivist instructional principles: situated learning, role playing, cooperative
learning, problem-based learning, and creative learning. These principles can support
in developing and applying MR learning environment. Therefore, this study aims to
develop experience learning activities using mixed reality contents based on teaching
models (role play, group investigation, & task based language teaching) in elementary
school.

2 Research Method & Process

In this study, first, we reviewed the literature and related studies. Second, we analyzed
MR contents of C elementary school and VR experiencing classroom. Third, we
performed interviews with teachers responsible for VR experiencing classroom
Fourth, we took a video on student-content interaction processes by operating MR
contents. Fifth, we devised practical units for subjects and learning activities based on
teaching models in the class. They were modified and supplemented according to the
review by an elementary school teacher and an educational technology expert.

3 Analyzing the Mixed Reality Contents

3.1 Mixed Reality Contents

In C elementary school, 10 kinds of MR contents of Korean language, Science and
English were in place.

<table>
<thead>
<tr>
<th>No.</th>
<th>Content Title</th>
<th>MR Contents</th>
<th>Learning Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Three Piglet Brothers</td>
<td>above</td>
<td>average</td>
</tr>
<tr>
<td>2</td>
<td>The Wizard of OZ</td>
<td>above</td>
<td>average</td>
</tr>
<tr>
<td>3</td>
<td>Old Man with a Lump</td>
<td>above</td>
<td>average</td>
</tr>
<tr>
<td>4</td>
<td>The Ants</td>
<td>average</td>
<td>average</td>
</tr>
<tr>
<td>5</td>
<td>Space &amp; Science1: The Earth and the Moon</td>
<td>above</td>
<td>average</td>
</tr>
<tr>
<td>6</td>
<td>Space &amp; Science2: Solar System</td>
<td>above</td>
<td>average</td>
</tr>
<tr>
<td>7</td>
<td>Boston Subway</td>
<td>above</td>
<td>average</td>
</tr>
<tr>
<td>8</td>
<td>Museum1: Egypt</td>
<td>above</td>
<td>average</td>
</tr>
</tbody>
</table>

Table 1. Results of MR Contents Analysis
3.2 VR Experiencing Classroom Environment

The VR experiencing classroom established in C elementary school provided MR contents and systems. As a Kinect camera was implemented on the large MR contents screen and it perceived a student in the Action Zone, it synthesized the contents and the student and projected on the synthesized image on the screen. Students can interact by selecting virtual contents using their hands. As there is an electronic blackboard on the opposite side of MR contents screen, teachers can integrate the VR experiencing lessons to ordinary lessons.

Fig. 1. VR experiencing Classroom

4 Developing Experience Learning Activities using MR contents

4.1 Korean Language Learning based on Role Play Model

Role play is an effective teaching method for affecting individual attitudes and developing interpersonal skills through dramatizations [6]. Through role play using MR contents, students can understand the given problems and to solve the problems by experiencing situations indirectly through the process of setting virtual situations and performing roles.
4.2 Science Learning based on the Group Investigation (GI) Model

Group Investigation (GI) is one type of Cooperative Learning. In GI, students can select an interest topic, organize groups, plan and implement an investigation, and put together the results and findings into a group presentation for other students in the class [7].

4.3 English Learning based on Task Based Language Teaching (TBLT) Model

Task Based Language Teaching (TBLT) is placed on asking students to perform meaningful tasks using the target language in real situation. Tasks can include visiting museum and riding Boston subway [8].

5 Conclusion

Experience learning activities using MR contents were proposed as the results of this study. To expand lesson utilizing MR contents, first it is needed to develop MR...
contents highly related to elementary standard curriculum. Second, VR experiencing system should be easy to use so that a teacher can lead the class while operating VR experiencing system. Lastly, it is needed to evaluate the effectiveness of these learning activities using MR contents in further studies.

References