Designing Role Playing Lessons in VR Experiencing Classroom

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Abstract: The ubiquitous and virtual technology is influencing conventional teaching methods in school education. Mixed Reality is one of new technology in school and makes learners' experience more "engaging" and promotes active and interactive learning. Role play is an effective teaching method for affecting individual attitudes and developing interpersonal skills through dramatizations. This study aims to design the role playing lesson for children in a mixed reality classroom. For the purpose of this study, we analyzed the mixed reality contents and VR experiencing classroom environment in a smart model school in Sejong City, Korea, and planned the role playing lessons for children using mixed reality contents. The result of this study, four mixed reality lessons for Korean and English of elementary school were developed. It is needed to apply the role play lessons to elementary school students and to evaluate the effectiveness of these lessons in further studies.

Keywords: Role Playing Lesson, Mixed Reality Contents, VR Experiencing Classroom

Introduction

The ubiquitous and virtual technology is influencing conventional teaching methods in school education. Mixed Reality is one of new technology in school and makes learners' experience more "engaging" and promotes active and interactive learning.

Mixed reality is a kind of virtual reality which makes users perceive mixed 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. In mixed reality based learning environments, learners can experience problems in concrete contexts and can experience feedbacks and concrete results through interactions by actual manipulations. As learning processes are worked by learning behaviors, behaviors trigger explorative activities and lead to meaningful learning(Kim, et al, 2011; Jo ,et al., 2011; Hyun, et al., 2011).

Mixed reality technology has been applied to education in Korea since it was pilot applied to Elementary School classes through science, English and mathematic contents which were developed by adding virtual objects on existing textbooks (Kim, et al., 2008), and currently enforced reality books are developed, commercialized and supplied (Fig. 1). Marker based MR technology is being developed to OASIS (Object-Aware Situated Interactive System) system which projects objects placed on the desktop using interface technology increasing absorption of users, projector and Kinect syle camera and interacts using user's fingers by enforcing additional digital contents using a projector on the printed educational books such as Live Book (Fig. 2).

Fig 1. digilog book (www.digilogbook.co.kr)
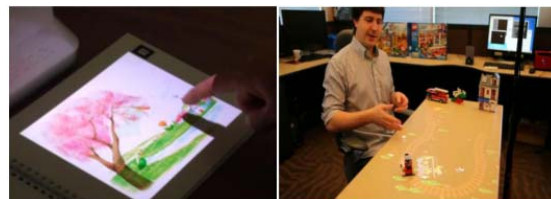
LIVE book   OASIS
Fig 2. LIVE book & OASIS (Heo et al., 2011)

In Korea, 14 SMART education model schools were appointed from 2012 and S Elementary School in Daejeon City and C Elementary School in Sejong City are providing experiential learning environments through VR classroom to which mixed technologies are applied. In Singapore, through a future project such as 'FutureSchools@ Singapore,' six model future schools are appointed and being operated. Among them, Beacon Elementary School provides Beacon World, which is a 3D virtual learning simulation environment supporting customized curriculum of Elementary Schools.

On the other hand, 'Role Play' is an effective teaching method for affecting individual attitudes and developing interpersonal skills through dramatizations (Shaftel, 1982). Role play Learning Model is performing classes by using role-plays (a kind of Lehrstuck) in teaching-learning process. Role play Learning Model is the method to understand the given problems and to solve the problems by experiencing situations indirectly through the process of setting virtual situations and performing roles. Classes are performed through setting situations, preparation and practice, performance and evaluation. This model can develop sensitive values or emotions, problem solving capabilities, communication capabilities and expression capabilities by making them explore problem situations and discussing

their roles (Cabral, 1987; MOE, 2009). In previous studies on the effects of traditional fairy tale learning and experiential fairy tale learning using enforced reality, enforced reality experiencing group which 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, although they did not show higher learning effects or higher concentration on learning. Additionally, experimental group showed relatively higher learner-driven activities and interactions (Kim & Kim, 2011). When looking into the studies on children's response in juvenile drama activities based on augmented reality 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 (Hyun, Choi, & Yeon, 2012).

This study aims to design the role play lesson for children in a mixed reality classroom. For the purpose of this study, we analyzed the mixed reality contents and a classroom environment in a smart model school in Sejong City, Korea, and planned the role play lessons for children using mixed reality contents.

Research Method

In this study, it was tried to analyze problems in virtual reality classes of C Elementary School in Sejong City, one of pilot SMART schools in Korea, and to propose teaching-learning activities and VR classroom operation guidelines using mixed reality contents. For this, we performed interviews with teachers responsible for virtual reality experiencing classroom to understand the classroom environments and classroom operational status. Second, we took a video on interaction processes by operating mixed reality contents and analyzed characteristics to analyze problems of classes in the virtual reality classroom. Third, we devised practical units for subjects and teaching-learning activities and developed role play lesson plans considering mixed reality contents characteristics, virtual reality classroom infra and subject goals of the school. They were modified and supplemented according to the results of the review by an Elementary School teacher and an educational technology expert.

Analyzing a Mixed Reality Classroom Environment & Instruction

Mixed Reality Contents and Virtual Reality Experiencing Classroom Environments

Mixed reality contents means the contents that learners participate in 3D virtual contents based on mixed reality technology and experience learning through interactions with learning contents (Lee, et al., 2012). In C Elementary School 15 kinds of virtual contents of Korean language, Science and English were in place.

The virtual reality experiencing classroom established in C Elementary School provided a mixed reality experiencing contents system and an operational program for teachers. As a Kinect camera was implemented on the large mixed reality contents screen and it perceived a students 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 icons using their hands. As there is an electronic blackboard on the opposite side of mixed reality contents screen, teachers can connect the virtual reality experiencing classes to ordinary general classes.
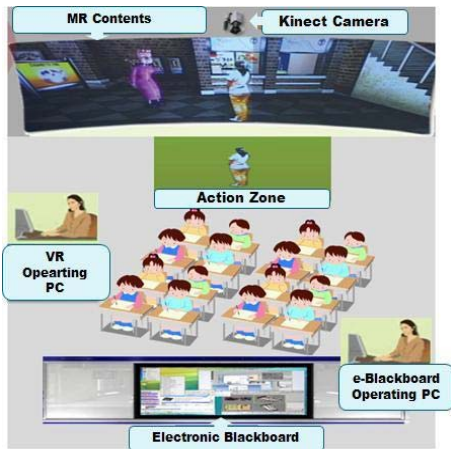
Fig 3. VR Experiencing Classroom

Fig 4. MR Contents Screen

Fig 5. MR Contents

Status and Problems of Classes in Virtual Reality Experiencing Classroom

The Status and Problems of classes in virtual reality experiencing room in C Elementary School are as follows. First, actual usability is very low considering the number of contents established in the school and only 1 teacher was using the system. Second, the teacher had to lead the class while he/she was operating the contents program of virtual reality experiencing system, and therefore problems were made as the location of the teacher had to be fixed at system operating PC. Third, there was inconvenience to move desks and chairs placed in the virtual reality experiencing room in order to secure an Action Zone to operate Kinect recognizing students. Fourth, as Kinect can only recognize one or two students in the Action Zone, rest of students had to watch them experiencing virtual reality. Fifth, virtual reality experiencing class operation guidelines for teachers were not sufficient.

Role Play Lessons Plan using Mixed Reality Contents in VR Classroom

In this study, three kinds of lessons were planned based on role playing model focusing on mixed reality contents as fairy tales. These classes can be utilized for elementary school students and each class is composed of 2 units. Table 1 shows the summary of the devised virtual reality experiencing contents teaching-learning activities.

Table 1. Role Playing Activities

Contents Title	Subject	Grade	Major Teaching-Learning Activities	Mixed Reality Contents Screen
Three Piglet Brothers	Creativity Experiencing Korean Language	2	○ Learning objectives: "To make free and creative expressions through role playing activities" ○ Major Activities · To watch 'Three Piglet Brothers' and learn songs · Role distribution (characters, choirs, musical instruments and superintendent) · Perform role playing activities (Two teams as Team A and Team B)	

Old Man with a Lump	Creativity Experiencing Korean Language	3	○Learning objectives: To express fairy tales with various reading activities ○ Major Activities · To watch 'Old Man with a Lump' through Mixed reality content · To make reading poster and fairy tale advertisement	
The Wizard of Oz	English	5	○Learning objectives: To perform role playing activities using expressions to ask and show the way ○ Major Activities · To listen and to comprehend the fairy tale using expressions to ask and show the way · To let students compose their own role playing activities · To reconstruct a part of the tale using asking and showing the way and asking help	

Table 2. Role Play Lesson Example using "Three Piglet Brothers" Mixed Reality Content (Suh, et al., 2012)

Grade	Grade 2		Subject	Creativity Experiencing Korean Language	
Course	Beauty of Story	Place	VR Classroom	Time	1~2/2 (80 minutes)
Learning Subject	Fun of fairy tales expressed in role playing activities				
Learning objectives	▪ To perform role playing activities cooperatively using props, background and costumes. ▪ To enjoy creative expressing processes by participating in art activities in 3D virtual reality experiencing program. ▪ To learn and understand the lesson of the fairy tale through 'Three Piglet Brothers.'				
Learning Materials	Teacher	Electronic blackboard, 3D virtual reality experiencing program, images of major scenes of the fairy tale, video of songs in the fairy tale, props matching with roles (2 sets), role play scripts			
	Student	Musical instruments (tambourine, small drums, castanets and so on)			

Stage	Detailed Activities	Time
Setting a Situation	O To understand learning objectives O To listen to 'Three Piglet Brothers' and learn songs using virtual reality experiencing contents O To talk about the story (background and characters)	15 Minutes
Preparation and Practice	O To distribute roles (characters, choir, instruments, superintendant and narrator) O To practice the role O To prepare costumes and props and to put on make-up	25 Minutes

	O Rehearsal and feedback	
Performance	O To perform a role play (Perform by Team A, and Team B) • To fix the order of role play presentation • To instruct how to appreciate the role play • To make them pay attention to the role play by letting them know the start of the play	25 Minutes
Evaluation	O To redistribute seats and arrange props after role play O To share thoughts • To give their thought about the role play • Strengths and weaknesses of each team O To herald the next session	15 Minutes

Conclusion

Three class activities utilizing role playing model based on mixed reality contents were proposed as the results of this study. It is needed to apply the role play lessons to elementary school students and to evaluate the effectiveness of these lessons in further studies. To expand the role paly lesson utilizing mixed reality contents, first it is needed to develop a complete subject contents highly related to curriculum from the perspective of educational contents quality. Second, virtual reality experiencing system should be easy to use so that a teacher can lead the class while operating virtual reality experiencing system from the perspective of the environments of virtual reality experiencing classroom. Third, it is need to develop teaching-learning activity teaching plan utilizing mixed reality contents and virtual reality experiencing system operation guidelines for teachers from the perspective of class operation.

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