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War from the Perspective of Both Offenders and Victims: Lesson Plan Proposal using VR Learning Materials

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Abstract: This study evaluates the use of virtual reality (VR) learning materials on a table device about the Pearl Harbor attack in World War II. It proposes a classroom application for the VR learning material about the attack and the atomic bomb in Nagasaki, providing learners with the perspective of both an offender and victim in war. Another finding was that users experienced no problems with the VR learning material interface. This study contributes to peace education as it evaluates an opportunity to enhance interest and motivation in learning about peace and war.

Keywords: Virtual Reality, Tablet Device, Practice Class, Peace Education

1. Introduction

Although more than 70 years have passed since the end of World War II, peace education is still highly valued in Japan. However, historical issues, especially those concerning the War, have become increasingly difficult to communicate due to the decreasing number of people who actually experienced it. For the same reason, children's knowledge of the atomic bombing has decreased and few mass media outlets report on it nowadays, revealing a greater need for peace education (Ito, 2012). Ito (2012) reports that the younger generation's knowledge about the War and peace has also been decreasing due to a lack of interest in basic historical facts such as the date and time of the atomic bombing. Therefore, we must consider peace education approaches that enhance the younger generation's interest.

Furthermore, there are few opportunities to learn about the Pearl Harbor attack in Japan. Some experts have suggested that this is a necessary component of peace education, to emphasize both perspectives, of offenders and victims in war (Adachi et al., 1996).

Learners' interest in and understanding of these topics would be increased through the use of virtual reality (VR) learning materials. Several methods exist for displaying spherical panorama images to provide virtual immersive learning, such as CAVE (Ishikawa & Inoue, 2010) and Dome Type Audio Visual MR Environments (Suzuki et al., 2012), in which interior spherical images can be shown. Moreover, one presentation method uses Head Mounted Display (HMD), demonstrating the usefulness of a wide view (Arthur, 2000; Hassan et al., 2007).

Another reason for adopting VR learning materials is that tablet device usage has become ubiquitous and their practical applications in education are highly anticipated (Savilla, 2010). Furthermore, spherical panorama cameras (Ricoh Theta) are commercially available, enabling spherical panorama images to be easily made (Shohara & Takeuchi, 2014). Therefore, spherical panorama VR learning materials employing a tablet device can be easily developed.

Setozaki and Sato (2016) developed a spherical panorama VR learning material about the atomic bomb in Nagasaki for peace education. However, in order to learn about Japan from both perspectives, as offenders and victims in war, it is insufficient to only present learning material about Nagasaki. To this effect, Setozaki et al. (2017a) developed spherical panorama VR learning materials on the atomic bomb explosion in Nagasaki and distance learning from Pearl Harbor. They mentioned

the possibility that learners' motivation would be improved by practicing distance learning and using VR materials. However, taking distance classes to learn about the Pearl Harbor attack is not realistic in terms of labor and cost. So, Setozaki et al. (2017b) developed a spherical panorama VR learning material about the Pearl Harbor attack. While they discuss the learning opportunities realized from developing materials from the dual viewpoint of war offender and victim, the evaluation of the learning materials and methods of utilization in classes are not mentioned.

Therefore, this study aims to evaluate the usefulness of the Pearl Harbor attack VR learning materials. It also proposes a lesson plan application using VR learning materials about Pearl Harbor attack and the atomic bomb in Nagasaki.

2. Development and Assessment of VR Learning Material about Pearl Harbor Attack

2.1. Outline of the VR Learning Material about Pearl Harbor Attack

Figure 1 displays an outline of the spherical panorama VR learning material. This learning material was developed using a cross-platform game engine (Unity 5). This learning material has three content locations around Pearl Harbor. The main content is focused on the USS Arizona Memorial. In addition to the spherical panorama photo showing the inside of the Arizona Memorial Hall, nine

photos of the present day and seven photos of the Pearl Harbor attack are displayed. The other two content locations are inside the Pearl Harbor Visitor Center.

These locations are displayed on the map of the tablet device application. When learners tap a button at each location, they can see spherical panorama content and images, which are synchronized with learner-operated movements of the tablet device. Additionally, photos taken just after the Pearl Harbor attack and present monuments are overlaid on the spherical panorama images. Moreover, when learners touch photos, the photo sizes scale up and down. Learners can also access audio and text descriptions of the photos.

2.2. Subjective Assessment by Survey

A total of 24 undergraduate university students participated in the survey. After “operating” the learning material, students responded to nine questions (in three categories: Interest and Motivation, Usefulness, and Interface) by selecting from the following four responses: Strongly Agree, Agree,

Disagree, and Strongly Disagree. The positive (Strongly Agree and Agree) and negative (Disagree and Strongly Disagree) responses were totalled for each item and compared using Fisher's exact test.

2.3. Results and Discussion

Evaluation results are shown in Table 1. There were significantly more positive responses to all survey items. Therefore, the use of VR learning materials about the Pearl Harbor attack is expected to increase learners' interest and motivation and be useful in peace education. Also, there was no reported problem viewing the content, such as audio commentary or image display, demonstrating that the VR learning materials can provide the feeling of being in the field.

Table 1: Subjective Assessment Results of VR Learning Materials about the Pearl Harbor Attack

Survey Items	Positive		Negative		Fisher's Exact Test
	Strongly Agree	Agree	Disagree	Strongly Disagree	
Interest and Motivation					
The learning material is interesting.	16	7	1	0	**
This learning material enhances learner's interest in peace education.	12	9	3	0	**
This learning material enhances learning motivation for peace education.	7	11	6	0	*
Usefulness					
This learning material is useful for peace education.	10	12	2	0	**
This learning material urges exploratory learning.	7	14	3	0	**
Interface					
Audio guide was easy to hear.	14	10	0	0	**
The photos in the contents were easy to see.	10	12	2	0	**
Even if there are no explanations, the technology can be operated.	13	8	3	0	**
Using this learning material provides the sensation of being in Pearl Harbor.	6	14	4	0	**

**: $p<.0.1$, *: $p<.05$, †: $p<.10$, *n. s.*: not significant.

3. Lesson Plan Proposal Emphasizing Both Perspectives as Offenders and Victims

In this research, in order to emphasize both perspectives, of offenders and victims in war, we propose a sample lesson as shown in Figure 2. The lesson is intended to target elementary school or junior high school students in Japan.

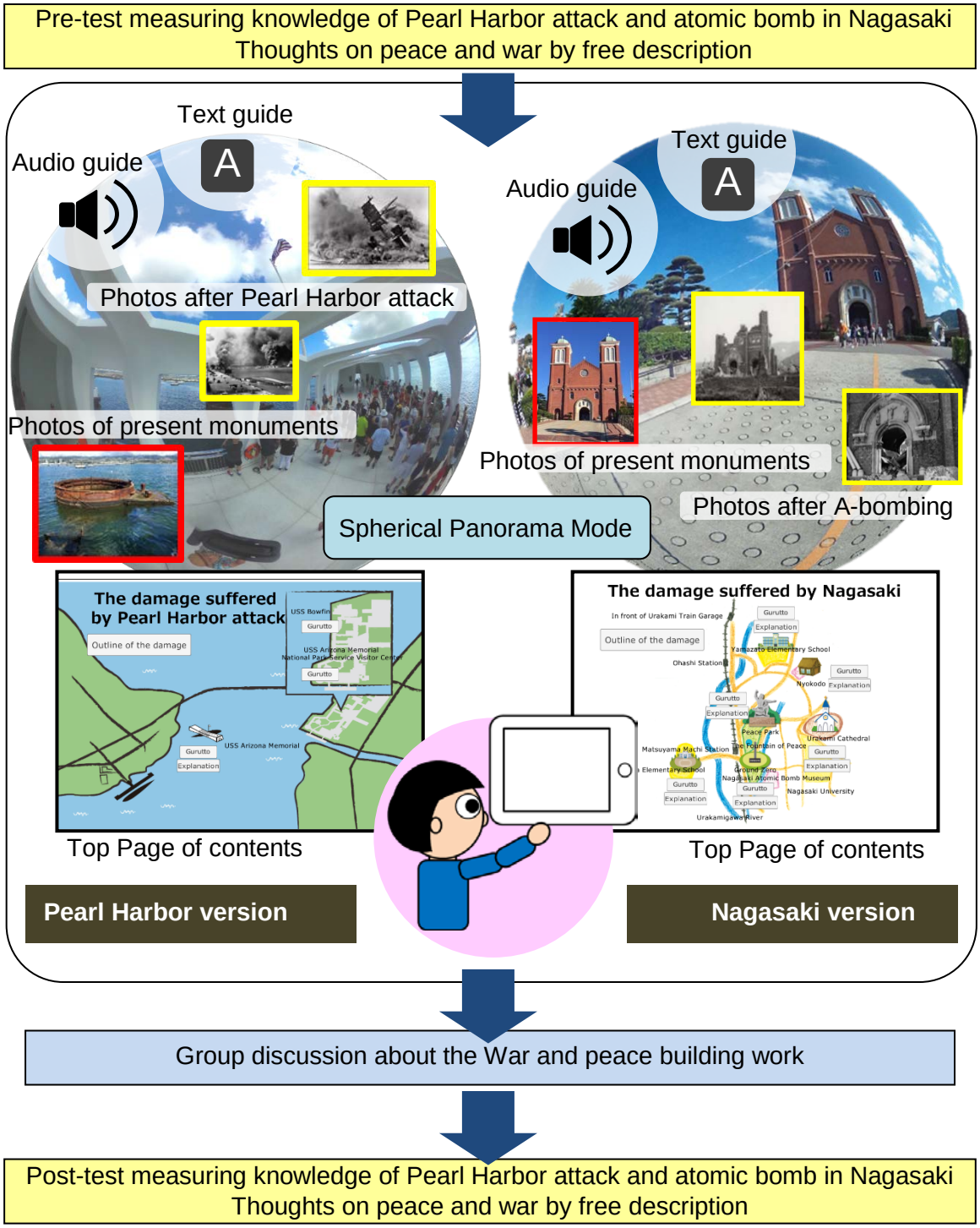

Figure 2. Image of Practice Lesson using VR Learning Materials

First of all, as a pre-test prior to the lesson, we gauge the students' knowledge of the Pearl Harbor attack and atomic bomb explosion in Nagasaki. We also obtain their thoughts by having them

freely describe peace and war. We then conduct the exploratory learning with the learners using VR learning materials about the Pearl Harbor attack and atomic bomb explosion in Nagasaki. It is desirable to use one tablet device for one or two learners. Afterwards, learners discuss war and peace building as a group composed of four to five people.

Finally, the same task as the pre-test is set up as a post-test. We will analyze the change in knowledge about the Pearl Harbor attack and Nagasaki's atomic bombing and in thoughts on peace and war. Based on the results of this analysis, we will examine the usefulness of these learning materials and obtain knowledge about the lesson's effect on learning.

4. Conclusion

This study evaluated the usefulness of the Pearl Harbor attack VR learning materials. Findings suggest that use of VR learning materials about the Pearl Harbor attack will increase learners' interest and motivation and be useful in peace education. The study also proposed an application of the materials in a lesson plan about the attack and the atomic bomb in Nagasaki, from the perspective of both offenders and victims in war. The users reported no problems with the interface.

The future task is to practice the proposed lesson and clarify the learning effect of these learning materials.

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