Practical Use of 3D Images in the Interactive Slideshow to Study Traditional Buildings

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Abstract: This study developed the educational materials incorporating 3D images viewable with general application software. The material was the interactive PowerPoint slideshow to allow college students to study Japanese traditional buildings and their conservation independently. In the slideshow, students could explore different areas and watch 3D or 2D images with maps and text. Their impressions and watching behavior were documented to evaluate the impact of the slide show. The results indicated the increased availability of 3D images in the slideshow and the improved exploratory behavior of students to 3D images.

Keywords: 3D images, educational materials, interactive slideshow

1. Introduction

With the advances in digital image technology, the availability of stereoscopic 3D images has expanded not only for professional but also for personal use (Michel, 2013). Therefore, 3D images have become an appropriate and accessible medium for education. However, the ease of use of 3D images in education is limited because of the special computer environment required for its presentation. In this study, we propose a simpler way to incorporate 3D images into teaching material using general-purpose software along with 2D images.

Visual presentation of educational material plays roles in enhancing learning, improving comprehension of the content and attracting the learners' interest. 3D teaching materials have also been shown to perform these functions (Carrier, Saira, Rosen et al, 2012; Price & Lee, 2010).

2. Methodology

2.1 Learning objectives

We created Microsoft PowerPoint slides for students to help them learn about Japanese traditional buildings and their conservation. The topic was "Important Preservation Districts for Groups of Traditional Buildings" in Kurayoshi, Japan. This ancient district is preserved since approximately 300 years. The slides in this study are intended for students to explore the visuals in the slideshow and study the traditional buildings voluntarily. Thus, the slideshow is interactive and allows students to move from a slide to any other slide.

2.2 Equipment and Stimulus

The slideshow was displayed on a 27-inch passive 3D monitor (LG Electronics FLATRON D2743P-BN). In this monitor, the horizontal stripes of the film-type filter alternate polarization with each line of resolution and 3D images can be viewed through circularly polarized glasses.

All the images in this slideshow were taken by digital 3D camera (Fujifilm FinePix REAL W3). The each 3D image was adjusted adequately and saved in a row-interlaced format adapted for passive 3D monitors using stereo photo editing software StereoPhoto Maker (SPM). The 2D images were made from the left side of the 3D images. The quality of their images was pre-tested.

2.3 Slides

The materials comprise 43 slides (Figure 1). The first slide explains the general characteristics of the district to learn and the navigation method of the slide show. The second slide shows the whole map of this district divided between east and west; students can move between each location by clicking on the images.

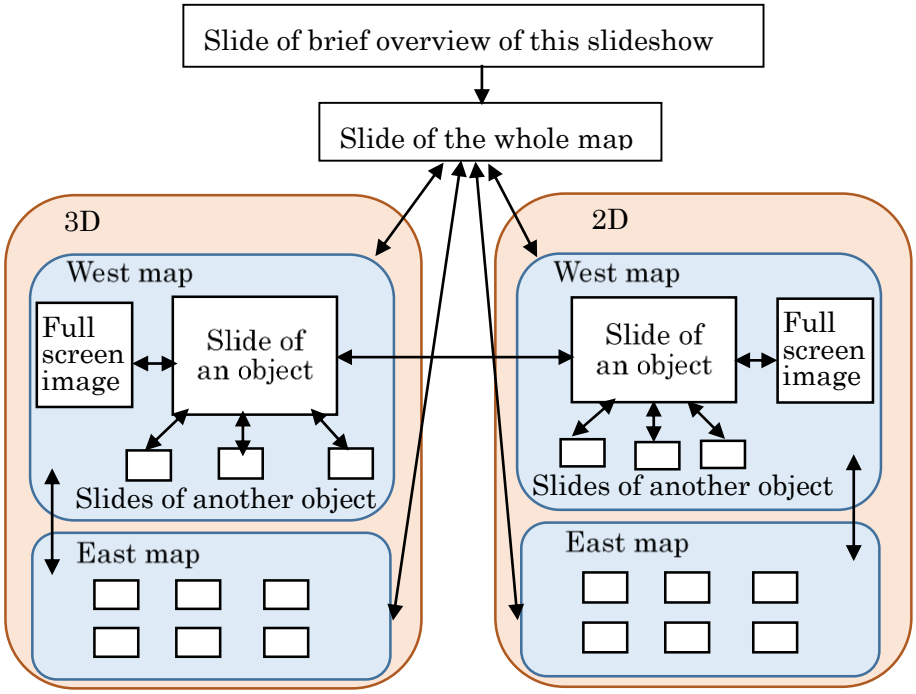

Figure 1. Structure and navigation flow of the slide-show

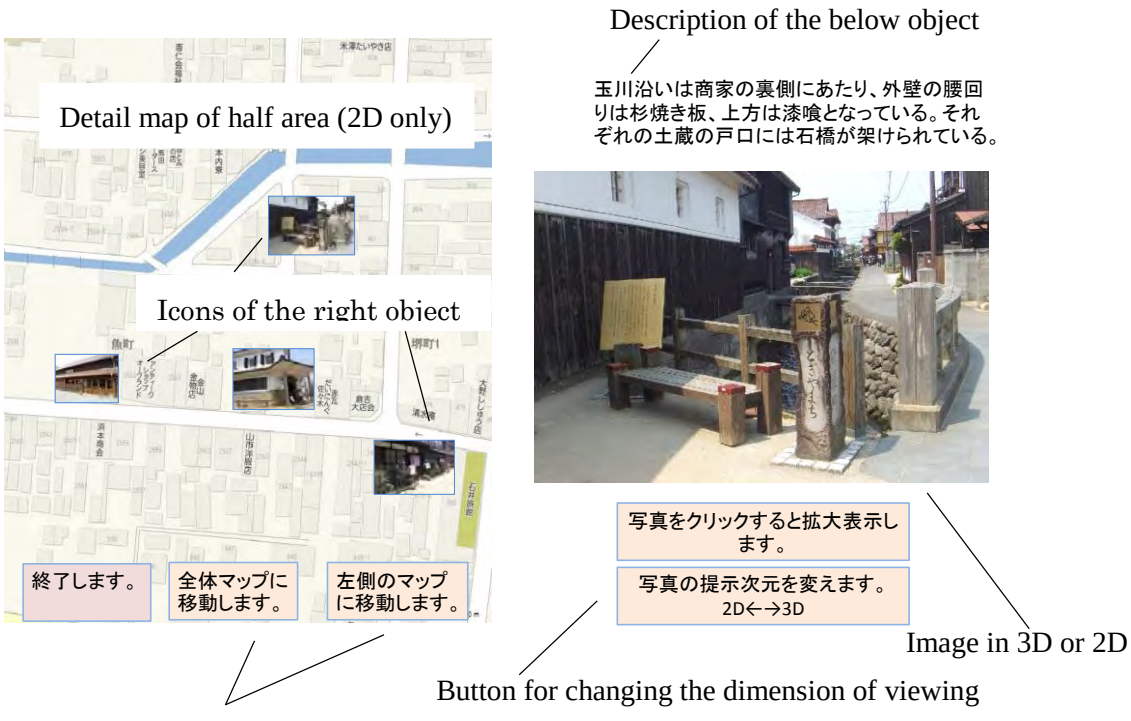

Figure 2. An example of a slide show showing a map, an image, and a description of an object

In the subsequent slides a detailed map containing photo icons appears on the left side. By using PowerPoint's hyperlink function, students can see a slide of an object when they click a photo icon on the map. The maps contain total 10 icons.

On the right side, an image of an object (i.e., a building or street) and its description appear (Figure 2). The image is viewed in 3D or 2D and students can choose the dimension. Their resolution is 800 × 600 pixels. When students click on the image, it maximizes to full screen size (1920 × 1080).

3. Evaluation of the slide-show

3.1 Procedure

In order to evaluate the impact of the slideshow in this study, students' impressions and watching behaviors were documented. The participants were 24 college students. Pairs of participants watched the slideshow together without any constraints on slide order or number of viewings. The participants' behaviors were recorded by macro recorder software. After watching the slide show, the participants rated their impression on a 7-point Likert scale.

3.2 Results

The impressions of the slideshow are shown in Figure 3. The ease of viewing images and the operability of the slideshow were determined to be good. The rated attention to 3D images was stronger than that to 2D images.

It was found that the average number of the images watched in full screen was 4.8 in 3D and 1.8 in 2D and that their average viewing time (sec) was 5.1 in 3D and 4.0 in 2D. Thus, exploratory behavior in watching was greater in 3D than 2D. It is likely that participants were more interested in 3D images than 2D.

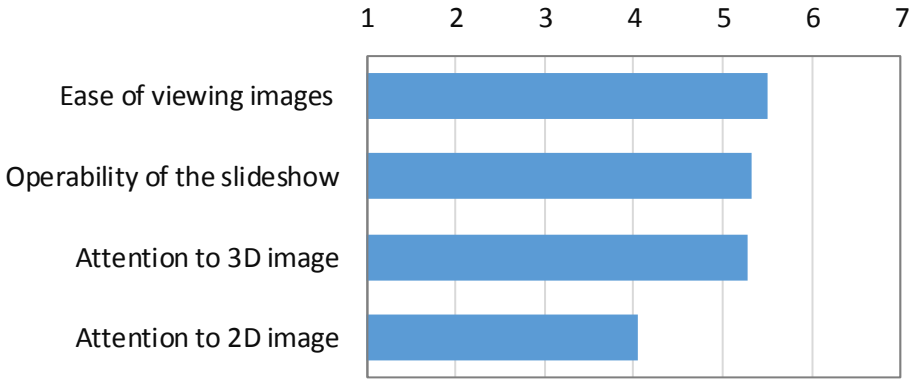

Figure 3. Results of the evaluation of the slide-show

4. Discussion

These evaluation results show that slides combining 3D and 2D images and text in a single display are easy to understand and operate, indicating the increased availability of 3D images used in general presentation software for educational materials. The results also suggest that motivation for learning may be improved by incorporating 3D images into digital teaching materials.

References

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