

Design of Idenation Support System for Project Based Learning

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Abstract

Kanazawa Technical College (KTC) is an intensive 5-year educational institution focusing on experiential learning. Project Based Learning (PBL) has been positively introduced into the education of KTC. The brainstorming that uses Post-it by the member of the group is often perform to an initial stage of PBL. It is more effective in this brainstorming that not only the student but also the person of the enterprise joins. However, the participation of the person in the remote place such as the enterprises is difficult. Then, the Idenation Support (IS) system that was able to use it even in the remote place was constructed. In this paper, the outline of the IS system and three-dimensional (3D) projection system that had developed by using it were described.

1. Introduction

Kanazawa Technical College (KTC) is an intensive 5-year educational institution focusing on experiential learning. First-year students take general subjects, hands-on courses, and technical classes related to their major. As the students' progress through the curriculum, these general subjects are faded out, and the students take more and more technical classes until their schedules look like those of college students. In the fifth year of study, students perform a capstone project that spans the entire year. Many of the projects are hands-on activities involving system manufacturing, robot manufacturing, and program creation.

Project Based Learning (PBL) [1] has been positively introduced into the education of KTC. The brainstorming [2] that uses Post-it by the member of the group is often perform to an initial stage of PBL. It is more effective in this brainstorming that not only the student but also the person of the enterprise joins. However, the participation of the person in the remote place such as the enterprises is difficult.

Then, the Idenation Support (IS) system that was able to use it even in the remote place was constructed. In this paper, the outline of the IS system and three-dimensional (3D) projection system that had developed by using it were described.

2. Outline of Idenation Support System

The brainstorming that uses Post-it by the member of the group is often perform to an initial stage of PBL. Figure 1 shows a scene that the student is brainstorming. The following two problems exist when the brainstorm that uses Post-it in the class is executed.

- 1) The board keeping that has put Post-it is troublesome.
- 2) Participation from the remote place is difficult.

To solve these problems, the Idenation Support (IS) system was developed. Figure 2 shows an outline of IS system. The IS table is composed of two 23-inch touch panel monitors. The brainstorming participant writes various ideas like writing the idea in Post-it with a tablet PC or a smartphone. The written idea is submitted to the server, and displayed in the monitor of the IS table. A remote user can be able to do the site and communications by the video chat of client PC, and to submit the idea through the Internet. To arrange the submitted idea, the idea displayed in the monitor is arranged touching. It becomes easy to interrupt and to restart the brainstorming because it can preserve the arranged idea group in the server.



Fig.1. Figure 1. Scene of Brainstorming by Students.

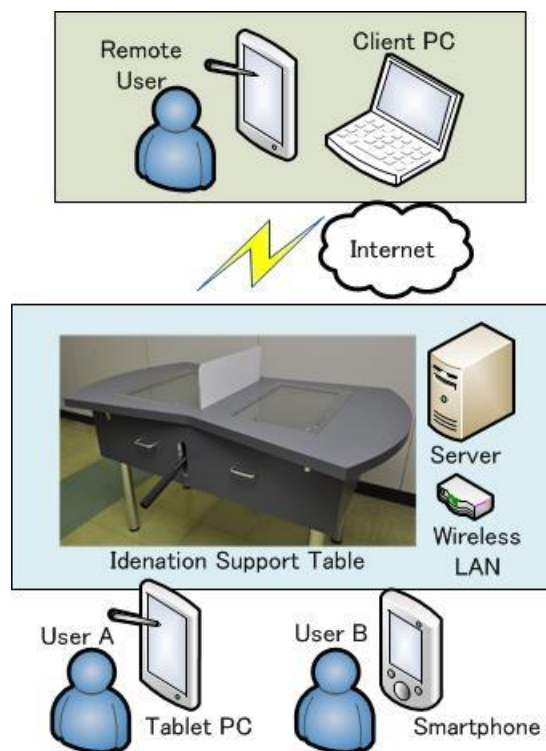


Fig.2. Outline of the Idenation Support System.

3. Design of New Mobile 3D Projection System

Mitaka [3] is software for visualizing the known universe with up-to-date observational data and theoretical models. To achieve natural stereoscopic vision using the binocular disparity, the images projected from each projector to the screen needed to be accurately overlapped. To accomplish this, we decided to prepare a mobile 3D projection system that could be used anywhere. Especially, it is important that the system is a size that the airplane can install when taking it to foreign countries.

Students brainstormed by using the IS system, and arranged the idea. Students examined it by various aspects like not only the size of the system but also the package, weight, and easiness, etc. to use. Next, to verify the created ideas, students fabricated prototypes of the 3D system. Figure 3 shows photographs of the prototype-creation process. The prototypes were made of a styrene board that

could be processed easily. Students processed the boards by using a cutter, vinyl tape, and a glue gun. To verify the size and feeling of the 3D system, three prototypes were produced. Finally, the prototypes of the student productions were verified by an industrial designer and an engineer. Figure 4 shows the appearance of the verified prototypes.



Fig.3. Prototype Production by Students.



Fig.4. Verification by Industrial Designer and Engineer.

The final drawing was made based on the verification result, and a 3D system was produced. Figure 5 shows the actual 3D projection system. To keep the system strong, the structure was made in the shape of a cube. Therefore, the system was named SORa Cube. Two DLP projectors were set up in the cube, heat radiation fans and circularly polarizing plates were installed in the pre-cover of the cube. In addition, there was function to adjust the position of the image easily in the Cube. The system can be loaded into the airplane without an extra charge.

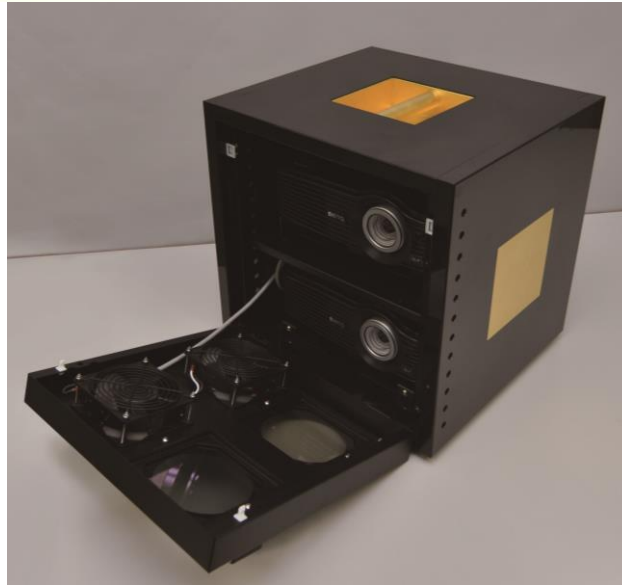


Fig.5. *Developed SORa Cube.*

4. Mitaka Classes in Singapore

Mitaka classes were performed using the SORa Cube system in the Japanese Association, Singapore on September 1, 2012. The class was taught four times, and the schoolchildren and 130 or more guardians enjoyed the presentation on cosmic science. After the class, a questionnaire survey was done among the guardians. The results showed that all guardians were very satisfied with the class.



Fig.6. *Photographs of the MITAKA class.*

5. Conclusions

The outline of the Idenation Support system and three-dimensional (3D) projection system that had developed by using it were described. Finally, students executed the Mitaka classes by using the development system.

References

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