Emergency-drill Online Visual System to Build Ability against Unexpected Situations

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ABSTRACT
This paper introduces the emergency-drill system for building ability against unexpected situations. The system consists of main and local systems. Trainees at local location watch the video sent from a main location, and judge what to do on the unexpected situation that video shows.

Several short scenarios are prepared before training, and trainer connects some of them according to the behavior of the trainees in training.

1 Introduction
The Ministry of Education, Culture, Sports, Science and Technology (MEXT) has outlined the following objectives for disaster education in schools since the Great East Japan Earthquake[1]:

1) to understand natural disasters deeply so that students can make appropriate decisions and choose appropriate actions.
2) to understand the dangers of disasters so that students can take action to ensure their own safety and prepare for everyday life.
3) to participate in and contribute to school, home and community safety activities.

To achieve the upper objectives, 99.7% of schools provide guidance on disaster safety in Japan. However, the training is simple-scenario-based training even now, and does not provide training for actual disasters, especially when unexpected situations occur. The urgent task must be to train the ability of responding quickly and flexibly to unexpected situations. For this purpose, a lot of groups research and develop their own systems [2-4].

In Kagawa prefecture, the Institute of Education, Research and Regional Cooperation for Crisis Management Shikoku (IECMS) at Kagawa university developed the visual-disaster-generation and response-capacity-training system in 2013 [5] as shown in Fig. 1. However, the current system is located at Kagawa university, which means that the trainees have to visit the facility in order to participate in the training. This is a challenge for the popularization of the training, and the system needs to be expanded to include online or mobile versions.

This paper presents an online version of the training system. The online system is equipped with three displays and connects Kagawa university and Tokushima university in 2023, where the main system is located at Kagawa university and the new local system is at Tokushima university. It is designed between them; however, the new local system can be moved easily from Tokushima university to any locations in future. In addition, it can be work at the same time at many locations in future. This paper introduces the system.

Fig. 1 Offline system [5]

2 System Design
The final goal of our new online system is designed as shown in Fig. 2(a) as follows:

1) The main system at Kagawa university sends unexpected-situation video to many local systems at the same time.
2) The trainer at local system watches the trainees at local system, decides the next unexpected-situation short scenario (hereafter, scene), and asks the operator for the main system at Kagawa university to proceed the scene.
Several scenes have been prepared before training, and the trainer selects next scene from them.

Trainees judge what to do on the scenes.

Trainee-monitoring video camera is prepared to share the training atmosphere at Tokushima.

### 3 System Configuration

The following system was constructed under the mentioned system design. However, at the beginning of online system, we constructed the systems for one-to-one communication as shown in Fig. 2(b).

#### 3.1 Hardware Setup

The main system located at Kagawa university had three PCs to render the three High-Definition (HD) videos for unexpected situations from scene data as shown in Fig. 3. The three HD videos were transferred to three communication PCs by HDMI. The PCs transmitted the three HD videos to the internet. The video software was the zoom [6].

At Tokushima university, there were three communication PCs that received the three HD videos and projected them by three projectors to show the videos to trainees as shown in Fig. 4.

#### 3.2 Procedure of Emergency Drill

At first, trainer at Tokushima gave the opening address to share the background of this drill. After that, the trainer selected a scene, asked the operator at Kagawa to transfer the scene, described the current scene situation briefly to trainees, and prompted the trainees to act on what to do. For example, when the scene at the classroom when earthquake occurred was shown, the trainer asked trainee to act the best, and trainee considered and acted something.

After the scene, trainer selected next another scene from the prepared scenes according to his intention with reference to the trainee behavior. In addition, the trainer selected the viewpoint, zoom-in/out for the rendering if he/she wanted. Trainees were trained by the next scene.

After the trainees were trained some scenes, the emergency drill was finished.

#### 3.3 After Emergency Drill

To build the ability against unexpected situations, the trainer and trainee discussed about the behavior on
4 Conclusions
In this paper, we described emergency-drill system between Kagawa university and Tokushima university. The main system renders three HD videos and transfers them to local system. The local system displays them to trainees. During the training, the trainer can select the unexpected situations for training according to the trainee behavior, which is a character of our system.

The local system can be moved easily from Tokushima university to any locations. In addition, it can be work at the same time at many locations in future.

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