Emergency-drill Scenarios to Build Ability against Unexpected Situations on Tsunami

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Keywords: emergency drill, scenario, visual system

ABSTRACT
This paper introduces the scenarios to build ability against unexpected situations between giant earthquake and tsunami. Some authors walked around the area where tsunami is expected in order to find the unexpected and possible situations after giant earthquake. After that, they generated some scenes such as walking near a falling signboard etc. The scenes are combined to be scenarios and used on our developed training system.

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.

Fig. 1 Offline system [2]

To achieve the upper objectives, 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 [2] in Fig. 1. Now the system is renewed as online system equipped with thee displays between Kagawa university and Tokushima university in 2023 as shown in Fig. 2, where the main system is located at Kagawa university and the new local system is at Tokushima university (hereafter, KT system).

Fig. 2 KT system

The most important thing on this kind of system is the scenarios trainee experiences. In general, the training at schools in Japan is simple-scenario-based one, and does not provide training for actual disasters, especially when unexpected situations occur. We consider this is quite a big issue of current training, so we try to prepare scenarios to train the ability of responding quickly and flexibly to unexpected situations.

In this paper, we introduce how to prepare scenarios, and the scenarios we exactly prepared. Nowadays the scenarios can be used on our KT system.
2 Approach to prepare scenarios
It was better to prepare many scenarios because trainer could select the best scenario according to trainee’s ability. To achieve it, KT system was very flexible and could switch the small scenario (hereafter, scene) during training duration by trainer’s intension easily. In other words, trainer could select the best scene and built scenario for the trainee while seeing the trainee’s behavior during training duration. Then, the preparation of scenarios was exactly the preparation of scenes in KT system.

2.1 Walking around the area where tsunami is expected
The main purpose of scenes was to build the ability against unexpected situations on tsunami. Because the actions between giant earthquake and tsunami was very important, we focused on the situation then. At the beginning of preparing scenarios, we walked around central area of Tokushima city to find the unexpected situations, i.e. to find the unexpected and possible situations after giant earthquake that ordinary people did not realized.

2.2 Re-use of existing scenes (addition to existing scenes)
The original system at Kagawa university [2] had already prepared great number of scenes. Many of them could be used for our purpose. Then, we used them. In other viewpoints, some new scenes were added to the original scenes by this preparation.

3 Scenes
All scenes we prepared were the scenes while walking along the road to evacuation site with elementary school students. They were as follows and shown in Fig. 3:
(a) An ordinary person calls for help from his/her house.
(b) Scaffolding under construction is crumbling.
(c) Electric poles have fallen down, making it difficult to walk along the road.
(d) The bridge we want to walk along is damaged.
(e) Electric pole wires are hanging down.
(f) The signboard along the road is about to fall.
(g) Traffic light is off.
(h) The crossing gate remains closed.
(i) A part of the stone stairs has collapsed, making it difficult to walk up.
(j) A part of the road has been buried by a landslide; walking looks dangerous.
(k) It’s a low cliff, but some students are afraid to walk on it.
(l) People gather at the trailhead to hill, and it seems unlikely to walk up soon.
We implemented some of the scenes in this list this time, and we did not implement others because there have already been similar scenes in the original system.

4 Conclusions
In this paper, we described emergency-drill scenes we prepared. During the training, the trainer could combine them to be scenarios according to the trainee behavior, which was a character of our KT system. The scenes can be used on the KT system.

Acknowledgement
A part of this work was obtained from the commissioned research (No.22604) by NICT, and other parts was supported by JSPS Grants-in-Aid for Scientific Research JP19K02328, JP19H04155, JP20H05702, JP20K21817, JP20K11919, JP22H00535 and JP23H03485.

References