

Using Scenario-Based Learning Applications in Field Work and Group Discussion for Disaster Education

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Abstract: Recently, natural disasters that are difficult to predict such as earthquakes, volcanoes, and tsunamis are increasing all over the world including in Japan. As a preliminary training to protect people from these crises, disaster prevention education also shows the importance of learning using geographical information and web applications. Therefore, in this research, we included location information that anyone can easily make, we conducted field work and group work for reviewing using scenario-based learning applications, and evaluated their usefulness. As a result, in terms of interest and motivation, the usefulness of this learning material was demonstrated. Especially, group work showed the importance of dialogue with others. In addition, improvements have been shown in this study.

Keywords: Disaster education, Risk management, Geographic information, Mobile device and applications

1. Introduction

In Japan, natural disasters such as earthquakes and volcanoes are difficult to predict. The Ministry of Education, Culture, Sports, Science and Technology (2011), based on the discussion of meetings of expert opinion after the Great East Japan Earthquake, decided that one of the priorities of disaster education was to nurture a subjective action to protect lives.

The importance of disaster prevention education is increasing, especially after the disaster, and a lot of teaching materials using ICT have been developed. However, the game elements are strong, the time in the story is different from the flow of real time, and movement is unnecessary by completing only within the teaching materials, so there is a lack of sensible elements (Hatakeyama et al. 2018). A system that allows the user to experience disaster events while actually traveling using the geographical information system (GPS) and learn how to cope with it is shown to be useful for cognitive support for disaster risk (Urano et al. 2013). By using GPS, the system showed that it is effective in assuming various phenomena depending on the purpose (Suzuki et al. 2015). In addition, evacuation training in the field using a scenario-based mobile learning system has been demonstrated to be useful (Hatakeyama et al. 2018). However, it is not possible to clarify the influence of the retrospective activity (Hatakeyama et al. 2018).

Therefore, in this research, we designed a selective scenario-based learning applications for disaster education which can correspond to all areas and can be easily created by anyone. In order to record peoples' judgment while assuming disaster scenes in everyday living areas and share the choices and conflicts with other people, we will utilize both field work and group work.

2. Outline for Scenario-Based Learning Applications

The outline for the scenario-based learning applications is shown in Figure 1. This material is used by a location based internet applications (Tale Blazer / made by MIT STEP Lab). The learning applications has GPS and a map search service (Google Maps); therefore, learners experience

disaster events during their own path choice. This location based internet applications (Tale Blazer) have block-based programming environment (scratch / made by MIT STEP Lab). Author only combine there blocks along own setting story. Therefore, teacher who have no programming experience could design application so simply. The theme of this practice is an earthquake at Nagasaki University.

The images of each event were taken and inserted by the author, and the stories assumed by the earthquake and the status of each event were documented. In addition, block-based programming languages were used, and different feedback was obtained depending on the subject's choice.

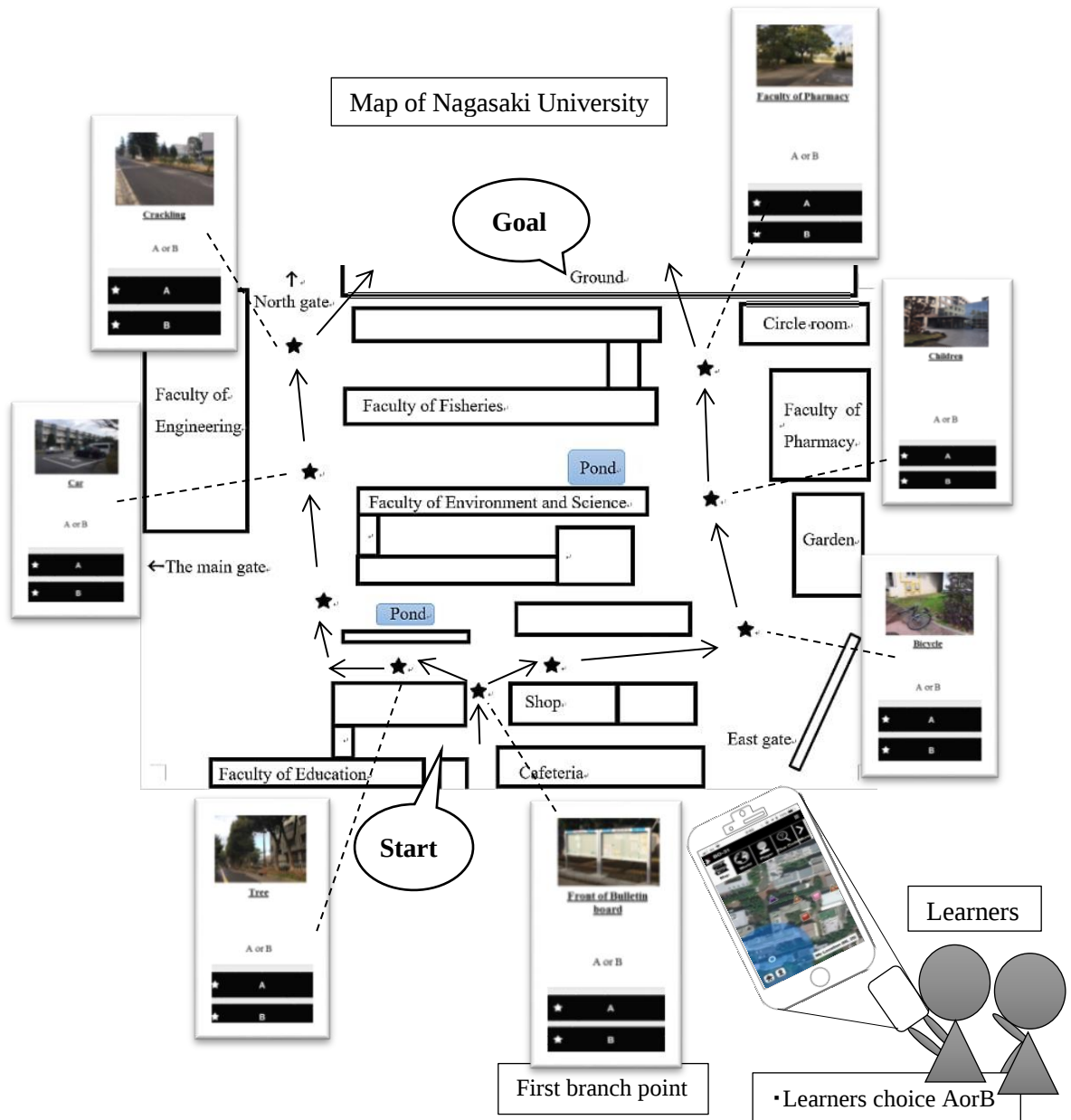


Figure 1. Use of Scenario-Based Learning Applications

3. Procedure

A practice scenario-based learning applications for sixteen undergraduate students was conducted. First, we conducted a five-minute preliminary survey to place the students on the "disaster prevention consciousness scale" (Shimazaki et al. 2017). Next, the author explained the outline of

the practice. Subsequently, subjects used the downloaded learning applications and carried out field work in pairs in the university for twenty minutes. After returning to the classroom and reporting back about the disaster events and their choices, we discussed the dangers that are supposed to occur for twenty minutes in the group. Finally, after conducting the "disaster prevention consciousness scale" again as a posterior survey, a questionnaire survey on the practice was conducted for ten minutes. This questionnaire survey also has a section for free description.



Figure 2. Scene of the practice using Scenario-Based Learning Applications for disaster education

4. Results and Discussion

4.1 Results of disaster prevention consciousness scale

Three factors were considered, "imagination for disaster", "interest in disaster", and "anxiety", and there was a significant difference between the prior and posterior mean for each. Therefore, it was inferred that field work and group work utilizing this learning applications promoted anxiety and raised interest by imagining the time of disaster.

Specifically, the opinion on the value of the dialogue with others was positive as each person had the same choices to make. It is difficult to instantaneously move at the time of a disaster without assumption, but the possibility of being able to make a safe choice even a little by thinking about it in advance might be higher. It can be inferred that the opinion on the importance of these supposition, etc. was raised.

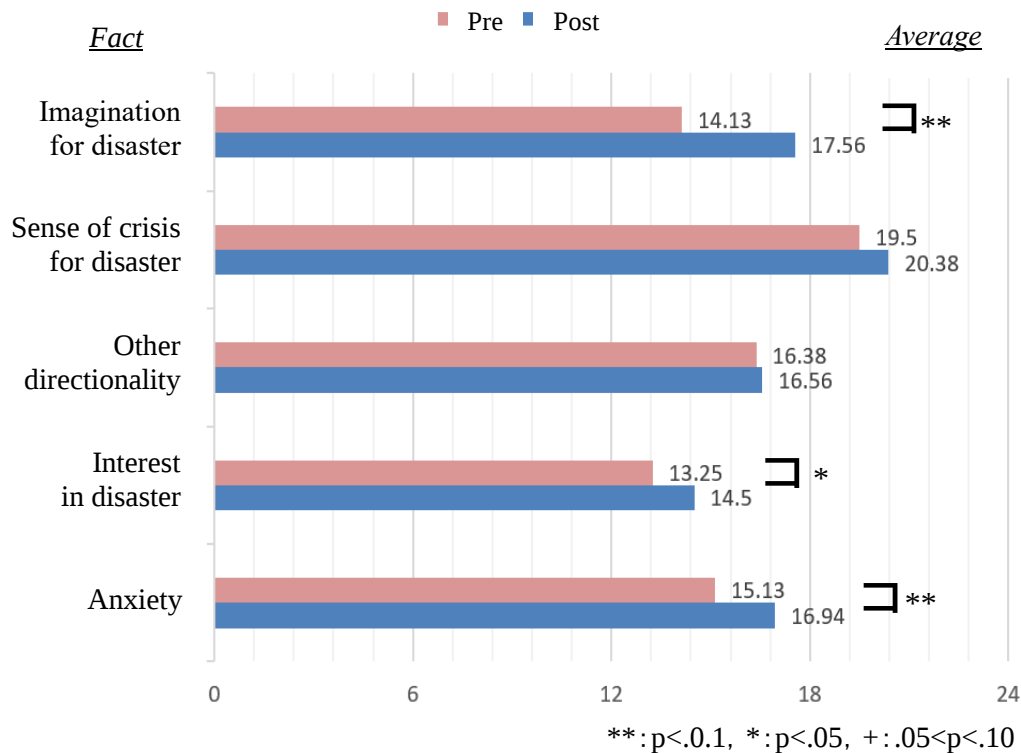


Figure3. Results of Disaster Prevention Consciousness Scale

4.2 Results of Subjective Assessment

Table1 shows the results of the subjective assessment. Regarding the learning applications to disaster prevention education that nurtures subjective judgment skills, learning motivation and practical motivation, it is estimated that there were more answers of "strongly agree" than any other, and the satisfaction level of the subjects were high. Therefore, it was suggested that this learning applications is effective for subjective judgment skills and stimulating learners' interest. There were also learners who thought about spreading the imagination to the case where the cracking occurred in the landfill Dejima. In other words, it showed that we were able to deepen their thoughts freely and disseminate their opinions freely by setting up themes that can be assumed at the time of a disaster, that is, without correct answers.

In the free description of the subjects, it was said that "it can be simulated, but difficult to associate with reality", "if there are photographs that show the specific situation, you can think of reasons for action more", "even if there is more realism". Improvements on the reality of teaching materials were also suggested. While lacking in reality, it was said that feedback to stories and options that were unpredictable to the subjects led to a simulated experience that the actual disaster site could not be assumed. One subject said, "Things that were not expected to have any damage as feedback to the options I also felt keenly that I do not know what will happen with disasters." However, due to the fostering of sense of tightness and sense of reality that encourages deeper learning, design using Utilizing AR (Augmented Reality) and VR (Virtual Reality) can be greatly expected. In VR (Virtual Reality), it is possible to enhance immersive feeling and realism, and to provide simulated experiences in virtual space. Applications of these technologies are reported not only in the industrial field and entertainment field but also in the educational setting (Setozaki et al. 2009).

Table1

Subjective assessment results of Learning Applications for disaster education

Question Categories	Strongly Agree	Agree	Disagree	Strongly Disagree	Fisher's Exact Test
	Positive		Negative		
Usefulness					
It is easier to image correspondence in the time of disaster.	7	8	1	0	**
	15		1		
It is effective for disaster education.	7	9	0	0	**
	16		0		
It is effective for subjective learning.	8	8	0	0	**
	16		0		
It is effective for cultivating judgement in the time of disaster.	8	8	0	0	**
	16		0		
The learning material is expected to apply to school education.	10	6	0	0	**
	16		0		
Motivation					
It is improve to motivate learning about disaster education.	9	7	0	0	**
	16		0		
It is improve to motivate practicing disaster education by using learning applications.	10	6	0	0	**
	16		0		
Interest					
The learning applications is interesting.	15	1	0	0	**
	16		0		
The practicing with the learning applications is interesting.	15	1	0	0	**
	16		0		

** (p<.0.1) , n.s. (.10<p)

5. Conclusion

This study, including locational information that anyone can easily make, conducted field work and group work using scenario-based learning applications and evaluated their usefulness. As a result, the usefulness of using this learning applications was proved from the viewpoint of interest and motivation.

In particular, group work showed the importance of dialogue with others. In addition, improvements have been shown in this study. It is also an important task to investigate the correlation with the stereotype of the evacuation drills that have been experienced so far.

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