

Evaluation of the Disaster Mitigation Action Card Game for international students in Japan

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Abstract

In this paper, Disaster Mitigation Action Card game (DMAC) is evaluated as a teaching material of disaster mitigation for international students in Japan. The DMAC is briefly introduced at the beginning. Evaluation of the DMAC as well as investigation of the consciousness of the international students for disasters in Japan were conducted by two questionnaire surveys. As a result, it is found that anxiety of the international students for disasters decreases as they stay in Japan long time. Most of the international students recognized an earthquake and a tsunami as disasters in Japan. The international students enjoyed playing the DMAC and learned disaster mitigation at some disaster situations. It is confirmed that the DMAC is applicable for the international students and is obtained good enough evaluation for an entrance of thinking disaster mitigation. From this research, it is revealed that the DMAC is an effective teaching material for the international students as their first step of thinking about disaster mitigation in Japan.

1. Introduction

Recently, the number of international students who study in Japan at higher education institutions and Japanese language institutes is increasing ^[1]. It was reported that some international students suffered large scale earthquake such as the Great East Japan Earthquake in 2011 and Kumamoto earthquake in 2016 ^{[2][3]}. Therefore, it is necessary to implement education for disaster mitigation for the international students to promote quick decision making at a disaster situation.

Hisamatsu et al. developed the DMAC for elementary school and junior high school students to learn disaster mitigation ^{[4][5]}. In DMAC, players learn and discuss disaster mitigation action at some situations relative to large scale earthquake or tsunami. Figure 1 is an example of DMAC cards which show different disaster mitigation actions. There are 27 kinds of DMAC cards in total. Players have to pick up one of the cards within 3 seconds, which simulates the short decision-making time during the real disaster. After picking the card, players are required to share their ideas of risk and disaster mitigation with the other players to induce awareness from the discussion. The DMAC cards are designed abstractly using pictogram, which enables players to explain their disaster mitigation action with their imagination. Pictogram also makes it available for players regardless of the language or country.

In this research, the consciousness of international students for disasters in Japan was investigated by questionnaire surveys. The DMAC was also evaluated as a teaching material of disaster mitigation for the international students.

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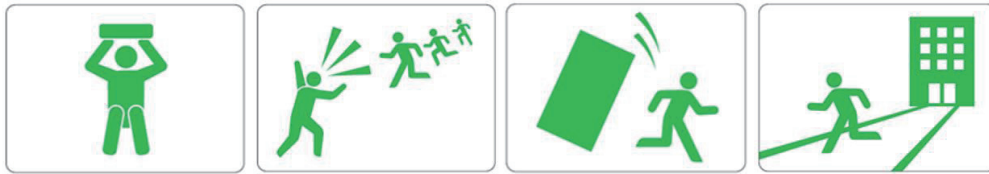


Figure 1 DMAC cards showing disaster mitigation actions designed by pictogram.

2. Questionnaire survey

The investigation was conducted at six different safety lectures for international students as shown in Table 1. Two questionnaire surveys were carried out as a part of the safety lectures, each before and after performing the DMAC. Table 2 and Table 3 summarize the questions of the former and the latter questionnaire survey, respectively. On the former survey, anxiety and consciousness for disasters in Japan as well as personal information were investigated. The latter questionnaire was used to evaluate their impression of the DMAC, understanding of rules, motivation to play the DMAC again and motivation to share the experience of the DMAC in their respective home countries. A comment space was also given for each question on the latter questionnaire. Table 4 summarizes the questions used in the lectures. Note that the number of questions was not same for each lecture because of different lecture time.

Valid respondents were defined as the respondents who answered over a half of the questions. Simple tabulation and cross tabulation were performed for the former and the latter survey from the answer of the respondents. On the analysis of the latter survey, the valid respondents were divided into three groups according to the characteristics of the safety lectures and players as shown in Table 5. Group A mainly consists of the respondents whose length of stay in Japan are less than one year. Most of the respondents in group A come from Asian countries. Group B consists of the respondents who participated in the Exploring Germination and Growth program for young Scientist (EGGS) to communicate with Japanese high school students. Although many respondents come from Asian countries, one of the characteristics of group B is the variety of their respective home country regions. Group C is the participants of safety lecture for Indonesian students. Indonesian language is used to play DMAC for this group.

Table 1 Outline of safety lectures.

Case	Safety lecture	Date	Participants	Organizers and facilitators	Players
1	Safety lecture at department of Literature in Tohoku University	2015/11/19	9	Japanese graduate students	International students
2	Exploring Germination and Growth program for young Scientist (EGGS) in Tohoku University	2015/01/18	22	Japanese high school students	International students
3	EGGS in Tohoku University	2015/12/19	27	Japanese lecturer in Tohoku University	International students and Japanese high school students
4	Communication event with American and Japanese high school students	2016/03/24	10	Japanese graduate students and high school students	American and Japanese high school students
5	Safety lecture for Indonesian students	2016/07/18	48	Indonesian graduate student	Indonesian students
6	Safety lecture for newcomer of international bachelor students in Tohoku University	2017/09/28	28	Indonesian graduate student	International students

Table 2 Questions of questionnaire survey before DMAC.

NO.	Questions	Options
pre-1	Personal information	Age, gender, nationality, length of stay in Japan
pre-2	Do you worry about disasters in Japan?	Yes / No
pre-3	Among the following, please put all checks which you think is (are) disaster(s), in particular which may occur in Japan.	Earthquake / tsunami / typhoon / volcanic eruption / landslides / heavy rain / flood / heavy snow / tornado / fire / accident / disease / others

Table 3 Questions of questionnaire survey after DMAC.

NO.	Questions	Options
post-1	Please write down what you learned today for the first time.	Comment
post-2	Did you enjoy the game today?	Yes/ No/ I don't know
post-3	Was the rule of the game understandable?	Yes/ No
post-4	Do you want to play the game again?	Yes / No Comment
post-5	Will your experience of this game be useful in your country?	Yes/ No Comment
post-6	Please write down what was the most impressive to you in this activity.	Comment

Table 4 Questions of DMAC.

NO.	Questions	Keyword
1	You're at a lecture room. An earthquake suddenly occurs. The building is strongly shaking.	Earthquake
2	You're on your way home. A large earthquake occurs. A tsunami warning was issued.	Tsunami warning
3	You're cooking in the kitchen. You hear an alarm of Earthquake Early Warning. You don't understand its meaning.	Earthquake Early Warning
4	You're at a beach. A small earthquake occurs. People seems to do nothing.	Small earthquake, tsunami earthquake
5	You're in a subway station. A hanging sign is shaking. There are a lot of people in the station.	Subway station
6	You're at a lecture room. An earthquake suddenly occurs. The building is strongly shaking.	Earthquake

Table 5 Group category for analysis of questionnaire survey after DMAC.

Group		A	B	C
Characteristics		Newcomers	With Japanese high school students	Indonesian students
Safety lectures		Case 1, 4, 6	Case 2, 3	Case 5
Total number of valid respondents		47	49	48
Language		English	English	Indonesian
Country regions	Asian	36	36	48
	Middle East	0	1	0
	Europe	0	3	0
	America	9	4	0
	Africa	0	3	0
	blank	2	2	0
Gender	Male	21	28	29
	Female	21	17	14
	blank	5	4	5
Length of stay t [years]	$t < 1$	38	5	17
	$1 \leq t < 3$	8	29	18
	$t \geq 3$	1	15	13
	blank	0	0	0

3. Results

151 international students in total answered the questionnaire survey and 144 valid respondents were obtained. Table 6 shows the results of the cross tabulation of pre-2 relative to the length of stay in Japan. The respondents who stay in Japan less than one year tend to have anxiety for disaster in Japan. In opposite, 65 % of the respondents who stay more than three years do not have the anxiety. This is probably because the latter gets used to the life in Japan and able to obtain information in the disaster situation easily. Figure 2 shows the result of pre-3. Over 95% of the respondents recognized an earthquake and a tsunami as disasters in Japan. A typhoon (70%), a heavy snow (62%) and a volcanic eruption (61%) are also recognized by many respondents.

Table 7 shows the result of the cross tabulation of post-2 relative to the three groups. Most of the respondents in each group enjoyed the DMAC. Table 8 shows the result of the cross tabulation of post-3 relative to the three groups. 100% of the respondents in group C who played the DMAC in their mother language understood the rule. Over 90% of the respondents in the other groups also thought it understandable. Table 9 shows the result of the cross tabulation of post-4 relative to the three groups. Group B has many positive answers (92%), but the other two groups have relatively many negative answers. Comments for this question were categorized to consider the reasons. Table 9 also summarizes the opinions from positive side and negative side. Most of the respondents who answered negatively thought they had learned enough at one time. Some respondents commented they wanted to play in other situations. Table 10 shows the result of the cross tabulation of post-5 relative to the three groups. Most of the respondents in group C answered positively, while some respondents in the other groups answered negatively. Comments were also categorized for this question as shown in Table 10. According to the positive opinions, the DMAC was useful for the respondents whose respective home countries have disasters or require education for disaster mitigation. On the other hand, the DMAC was not so useful for the respondents whose respective home countries do not have earthquake. Table 11 and Table 12 summarize the comments of post-1 and post-6, respectively. Many respondents learned disaster mitigation actions from the DMAC. Some respondents commented they knew Earthquake Early Warning for the first time. Regarding the most impressive thing, it was interesting that many respondents commented different ideas and opinions of other students.

Table 6 Cross tabulation of pre-2.

	Less than 1 year	1~3 years	Over 3 years
YES [%]	52	43	35
NO [%]	48	57	65
Total [%]	100	100	100
Number of blanks	3	7	3

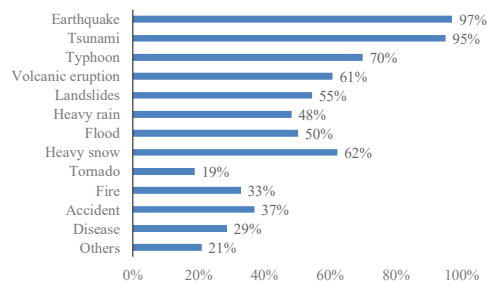


Figure 2 Results of pre-3.

Table 7 Cross tabulation of post-2.

Group	A	B	C
YES [%]	94	100	98
NO [%]	0	0	0
I don't know [%]	6	0	2
Total [%]	100	100	100
Number of blanks	0	0	0

Table 8 Cross tabulation of post-3.

Group	A	B	C
YES [%]	91	94	100
NO [%]	9	6	0
Total [%]	100	100	100
Number of blanks	0	0	0

Table 9 Cross tabulation of post-4 and summary of comments.

Group	A	B	C
YES [%]	72	92	80
NO [%]	28	8	20
Total [%]	100	100	100
Number of blanks	0	1	4

Opinions of YES

- ✓ I want to learn disaster mitigation action more. (30%)
- ✓ I want to play at different disaster situations. (15%)
- ✓ I want to discuss with other players. (12%)
- ✓ Others

Opinions of NO

- ✓ One time is enough. (57%)
- ✓ Different questions and DMAC cards are needed. (19%)
- ✓ We can repeat same answer even in different questions. (10%)
- ✓ Others

Table 11 Summary of comments of post-1.

- ✓ Disaster mitigation action (59%)
- ✓ Knowledge about disasters. (13%)
- ✓ Disaster mitigation system in Japan (Earthquake Early Warning, ...). (10%)
- ✓ What I found from discussion with other players. (7%)
- ✓ Others

Table 10 Cross tabulation of post-5 and summary of comments.

Group	A	B	C
YES [%]	79	85	94
NO [%]	21	15	6
Total [%]	100	100	100
Number of blanks	0	1	0

Opinions of YES

- ✓ Home country also has disasters like Japan. (41%)
- ✓ There is no education for disaster mitigation. (39%)
- ✓ I want to teach for students who will come to Japan in the future. (5%)
- ✓ Others

Opinions of NO

- ✓ Home country does not have earthquake. (79%)
- ✓ Home country has disasters, but It is unclear that the DMAC is useful for that. (14%)
- ✓ Home country has disasters, but does not have disaster mitigation system like Japan. (7%)
- ✓ Others

Table 12 Summary of comments of post-6.

- ✓ DMAC and its card design (31%)
- ✓ Different ideas and opinions of other players. (26%)
- ✓ Disaster mitigation actions. (20%)
- ✓ Others

4. Discussion

The results of post-1 and post-2 indicate that the respondents enjoyed learning disaster mitigation actions at disaster situations by the DMAC. The result of post-3 shows most of the respondents understood the rule of the DMAC in English or in their mother language. That of post-6 also indicates that some of the respondents have an impression regarding discussion with other players, which is one of the characteristics of the DMAC. These results confirm that the DMAC is applicable for the international students.

On the other hand, the motivation of the respondents to play the DMAC again was relatively lower than

that of elementary school and junior high school students^[5]. It may be because many of the respondents who answered negatively thought that they learned enough in playing one time. However, the results of the questionnaire surveys confirm that the evaluation of the DMAC from the respondents is good enough for an entrance of thinking about disaster mitigation. Accordingly, it is concluded that the DMAC is an effective teaching material for the international students for their first step of thinking disaster mitigation.

5. Conclusion

The consciousness of international students for disasters was investigated by a questionnaire survey. The result of 144 valid respondents were used for the evaluation. The respondents who stayed in Japan less than one year are more anxious for disasters in Japan than others. Almost all the respondents recognized an earthquake and a tsunami as disasters in Japan. The DMAC is performed for the international students to evaluate the effect as a teaching material of disaster mitigation by a questionnaire survey in the same way. Most of the respondents enjoyed learning the disaster mitigation action from the DMAC. As a result, it is confirmed that the DMAC is applicable for the international students. A part of the respondents did not have a motivation to play the DMAC again and to play it in their respective home countries. However, the results of the survey confirm that the evaluation of the DMAC from the respondents is good enough for an entrance of thinking about disaster mitigation. In conclusion, the DMAC is an effective teaching material for the international students as their first step to learn disaster mitigation in Japan.

6. Reference

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