Fact-finding During Quick Response to Disaster: School Students’ Response to the Environment

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Abstract. Earthquakes, floods, and landslides are frequent disasters in Indonesia. They can happen anytime. Recently Department of Architecture Faculty of Engineering Universitas Indonesia, together with the Indonesian Red Cross in Bogor Regency and its volunteers squat (SIBAT) had conducted disaster role-playing as a preparedness program for elementary school students. The role-play was aimed to introduce a quick response for elementary school students by the time the disaster happened at their school. Two kinds of disasters were chosen based on the school location’s characteristics: flooding and earthquake. The method involved in this study is action-research. In the end, the students were asked to draw their spatial experience in one piece of paper as a reflection. Additionally, the team also gave feedback questions or quiz to measure the starting point of the role-playing which expected to shape their new knowledge. For in-depth aspects, the students also received a badge as the inauguration sign of “Agent of responsive to disaster”. This paper outlines the fact-finding during the role-playing as the students’ response to the environment. The findings are useful as the baseline for a disaster quick response preparedness module for elementary students’ development.

1. Introduction
In 2019, following the community engagement program conducted by Universitas Indonesia together with Palang Merah Indonesia (PMI) and American Red Cross titled “Revitalizing Green Open Space (RTH)” between 2016-2017. The Universitas Indonesia team revisited the sites where the program was conducted. This visit was aimed to review the green open space development after being used by the community. The visit led to an idea to utilize the green open space as an educational space for Disaster Quick Response. This was considered by the lack of educational disaster quick response program for elementary students in Indonesia.

Paraphrasing Article 1 Number 10 of Law Number 24 Year 2007 concerning Disaster Management, Disaster Emergency Response is a series of activities that are carried out immediately at the time of a disaster to address the adverse effects caused by the activities to save and evacuate victims, property, fulfillment of basic needs, protection, refugee management, rescue, and restoration of infrastructure and facilities [1]. This paper explains the process of disaster emergency response programs for elementary students of grades 1 to 6. The agenda includes possible emergency evacuation role-playing for the participant to the closest green open space, experience sharing through a drawing, and feedback questions. Universitas Indonesia team analyzed participant response to the program to create an easy-to-understand learning module for elementary students with a goal that it would be useful for them to understand what to do when a disaster occurs. As part of the process, this paper describes the fact-
finding during the role-playing as their response to spatial context as the input for the disaster quick responses learning modules.

2. Literature review

2.1. Disaster

Disaster can be defined as a serious disruption of the functioning of a community or a society involving widespread human, material or environmental losses and impacts, which exceeds the ability of the affected community to cope using its own resources [2]. As seen in figure 1, Disaster management involves putting efforts to prevent, mitigate, prepare for, respond to, and recover from the impact of an adverse event [2].

![Figure. 1 Disaster Management Cycle](image)

Disaster management starts with disaster risk reduction, where people minimize vulnerabilities and disaster risks to avoid or limit the impact [2][3]. Then it is followed by disaster preparedness, where people plan and make arrangements on their assets security, warning, and evacuation; so when it strikes, people can respond swiftly and in an orderly manner. Post-disaster events are responded by disaster recovery, which consists of relief, rehabilitation and reconstruction. Relief is where people support the victims by providing them food, water, shelter and sanitation, clothes, medical and trauma care. Rehabilitation is the restoration of basic services and functions, where it takes weeks or months to complete. Reconstruction is the full resumption of services, where it can take months or years to complete. And then it starts all over again, where people reduce risk and prepare for the next attack [3].

2.2. Children’s perception of disaster

Children are vulnerable before, during, and after a disaster. Children do not have the resources or independence to prepare for a disaster, so they are often reliant on adults to make evacuation decisions, secure shelter, and provide resources. After a disaster, children may also hide or have difficulties in articulating their distress to adults. Even the most resilient children cannot fully recover without the
necessary resources and social support [4]. That is why preparedness programs are required to reduce the vulnerability of children so that they can have a significant role in the preparedness [5]. It is also found that their involvement can advance social and democratic processes, reinforce their connections and commitment to their communities, and increase awareness of their needs and desires [6]. Children are often expected to be engaged in processes conceived by adults. But they are still developing and thus, need space and opportunity to do so. Therefore, they must be supported to carry out their own projects and participate in areas they feel are important [7].

Mitchell, Tanner, and Haynes (2009) found that children showed more concern about high magnitude, low-frequency events; while adults showed more concern about the low magnitude, high-frequency events. However, when children are able to address the low magnitude, high-frequency events, it gives them greater confidence and allows them to be agents of change [5]. In Indonesia, children created a more extensive list of disaster risks, understood a broader range of risks, and had better memories of disaster events that took place in their lifetime than their parents were [8].

Children in many communities appear to learn a lot about hazards in the school setting. Babugura (2008) found that their perceptions were mostly scientific knowledge-based and were generally well-informed [9]. Mudavanhu and colleagues (2015) reported that children were found to be effective risk communicators; passing information on to their parents, distributing disaster pamphlets to their communities, and helping with the distribution of chlorine tablets during a cholera outbreak [10]. However, adults also need to make sure that children don’t get constant exposure to crisis or disaster news since it can cause them serious emotional issues [11].

2.3. Disaster preparedness for children

To prepare children for disaster, they first need to learn about disaster itself, so they can expect what to do when it strikes. But since they haven’t experienced with the real thing, adults need to guide them on what to do and what not to do. Learning is best developed through practice [12] and it is most effective when children participate in experiential activities [13].

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**Figure. 2 Youth Preparation in Disaster Management [14]**
Adults can teach children about: 1) the danger of fire and severe weather; 2) the types of disasters and what to do in each incident; 3) the evacuation routes from the place of origin to the place of destination, and provide them with a simple floor plan if necessary; 4) people in the neighbourhood who can help them; 5) how to call on local emergency services, recognize them and accept their help. In case they are separated from adults, they need to carry: 1) contact info to reach parents; 2) communication cards, flashlight, paper, and pencil in case of a blackout [11].

Figure 2 shows what youths do to prepare for disaster. Teenagers (13 – 19 y.o.) and young adults (20 – 25 y.o.) need less guidance than children do and have more ideas and energy than adults do. To get the general idea about disaster, they read books or surf the internet. Then they interview the community to learn about past disasters in their area and how to handle them. To gain experience, they participate in a neighborhood disaster response team. Then they assess and survey the neighborhood, should they find new things to improve the disaster mitigation and management program. After that, they disseminate their findings to the community through posters, writings, murals, etc [14].

During disaster, aside from being taught to rescue themselves; in India, children are also trained to actively participate in disaster management, such as in first aid, search, rescue, and warnings. They are trained using role-playing, posters, mapping activities, mock drills, and making lists of all children in the village. They are also trained to broadcast warnings and guide people into cyclone structures [15]. In the Gulf Coast, children and youth helped with numerous preparedness activities before Hurricane

**Figure 3** Youth Participation in Disaster Management [14]
Katrina [16]. Children can help prepare younger siblings, pack up belongings, and do specific chores for their parents as the family prepares to evacuate [4].

Figure 3 shows what youths do before, during, and after disaster. Before disaster, they socialize evacuation routes, identify local services, secure supplies, make emergency kits, create identification cards and family communication plans. During disaster, they help younger children evacuate, distribute supplies, assist at shelters, solicit funding, engage in clean up campaign, and provide peer counseling. After disaster, they evaluate and analysis current events to improve the disaster mitigation and management program in the future.

3. Methods

3.1. Overview
Children are the main subjects to participate in this research. These children are elementary school students and live near to the study site, namely the Kedung Waringin and Waringin Jaya, Bogor, West Java, Indonesia. Students are selected evenly from grade 1-6 at school. There are 60 students from two different schools. This research method is an action-research that begins with a role-playing of disasters and occurs when students are at school. Before the disaster response roleplaying begins, preliminary role-playing is carried out by providing an initial understanding of disaster response. This research aims to evaluate their response to the environment and action of students during disasters and after disasters, and also the relationship to spatial context.

3.2. Role-playing area
As disaster preparedness program 2 locations were chosen. The first location is Kedung Waringin Village and 30 students were selected from Kedung Waringin Elementary School. The group consists of students from grade 1 to grade 6 in order to take a disaster response in the role-playing. The nature-based disaster scenario at this location is the occurrence of flash floods or “banjir bandang” originating from a river that is located right behind their school. The gathering point when a disaster occurs is a green open space that is located at a higher location but not too far from the river.

The second location is Waringin Jaya Village and 30 students were selected from Waringin Jaya elementary school. The group also consists of students from grade 1 through grade 6. The disaster scenario at this location is the occurrence of an earthquake while students are studying. A green open space which is located in the vicinity of their school is the gathering place for students.

3.3. Levelized trigger questions
As a set preparedness program, the pointers from Walker & Davidson (2015), especially point number 2 are taken. The students were given levelized trigger nature-based disaster questions and those are:

1st-year elementary school: If you hear “disaster”, what comes to your mind?
2nd-year elementary school: What are the natural disasters that you know?
3rd-year elementary school: What are the types of a natural disasters?
4th-year elementary school: If you are facing a natural disaster, what should you do?
5th-year elementary school: If you are facing a natural disaster, where should you go?
6th-year elementary school (multiple choices answer):

Case 1: While you are sleeping in your room during night time, an earthquake happened. What should you do? (a) run outside the house, (b) run to parents’ room, (c) hide under the bed
Case 2: While you are sleeping in your room during night time, an earthquake happened. Who do you need to help at first? Is it (a) your little brother/sister who is still a baby, (2) your grandmother, (3) your brother, who is a blind person.
Note: all of the answers are countered by the expert from the Indonesian Red Cross Team.

3.4. Evaluation parameters of response and action
Responses and actions from students in grades 1-3 of the elementary school were measured using a set of drawings of the disasters. As a response to the role-playing, the students need to select which one is categorized as disasters and color them later while students in grades 4 - 6 elementary school were
assessed based on the results of the spatial experience drawings undertaken by students after passing through role-playing stage. The results of the quiz answers and the quality of spatial images done by students become the success parameters of this disaster response role-playing.

4. Result and discussion

Triggered Question no.1
This question was raised for the 1st year elementary school and it was about what comes to the student’s mind when she/he heard a word: “disaster”. Their answers were: the victim, destroying the earth and the environment, disaster, happened naturally, can make the houses and trees collapsed. It shows that students are aware of the impact of disasters. All answers are individual disaster response [3].

Triggered question no. 2
This question was raised for the 2nd year elementary school and it was about the names of the disasters that they have known before. Three names of the disaster were mentioned. Their answers were the flood, tsunami, landslides. It shows that the 2nd-grade students have no difficulties in naming the disasters even though their knowledge about them is very limited. All answers are nature-based disaster.

Triggered question no. 3
This question was raised for the 3rd year elementary school and it was about types of natural disasters. The answers were waste, flood, earthquake, mount eruption, wind and storm. Similar to triggered question no. 2, but this time the answers came with more variations.

Triggered question no. 4
Triggered question no. 4 for the 4th year elementary school and it was about what to do when the disaster happened. The answer was escaping to a safer location, ask for help and run. It showed that the logics of rescuing is applied. All answers are individual disaster response [3].

Triggered question no. 5
This question was raised for the 5th year elementary school and it was about where should you go when disaster happens. The answer was into a safe place, open space, higher place, and to the field. All answers are individual disaster response [3].

Triggered question no. 6
The sixth grade students are the highest year and therefore they get 2 questions in multiple-choice form.

Case 1: What to do when you experience an earthquake in the middle of the night, while you are sleeping? Where should you go?

| No | Options                  | School A | % | School B | % | Total | % |
|----|--------------------------|----------|---|----------|---|-------|---|
| 1  | run outside the house    | 12       | 40| 11       | 36.67| 23    | 38.33|
| 2  | run to parents’ room     | 0        | 0 | 0        | 0   | 0     | 0 |
| 3  | hide under the bed       | 17       | 56.67| 13       | 43.33| 30    | 50 |
| 4  | I don’t know the answer  | 1        | 0.33| 6        | 20   | 7     | 23.33|

The result of option (1) and (3) are quite advanced from School A and School B. The students of both schools A and B preferred to hide under the bed (50%) while the second preferred option is to run outside the house. Moreover, none of the students picked the (2) answer ‘run to parents' room’. In total, 7 students out of 60 said they do not know the answer (Table 1).

From the clarification by the expert (the Indonesian Red Cross), it is known that option (1) and (3) are correct answers, but each option has its own priority. Option ‘run outside the house’ is allowed only if
the entrance door of the house is in the near, while the option 'hides under the bed' are most preferable as long as the bed is strong enough to take cover. Above all, option ‘run to parents’ room’ is not an option as it will not help anything. The experts also added information that the most important thing is the evacuation point should be the closest point to take cover during the earthquake.

Case 2: What to do when you experience an earthquake in the middle of the night, while you are sleeping, who should you help at first?

| No | Options                               | School A | %   | School B | %   | Total | %   |
|----|---------------------------------------|----------|-----|----------|-----|-------|-----|
| 1  | your little brother/sister (baby)     | 15       | 50  | 11       | 36.67| 26    | 43.33|
| 2  | your grandmother                      | 5        | 16.67| 7        | 23.33| 12    | 20  |
| 3  | your young brother who is blind       | 10       | 33.33| 12       | 40   | 22    | 36.67|

The number of options chosen by the students of both schools A and B namely to help the little brother/sister who is a baby was almost equal to the option helping young brother who is a blind person. The latter option is less chosen compared to the option of helping a baby brother/sister. Moreover, option saving grandmother is 16.67% and 20% respectively in school A and B and occupied the lowest rank for both schools (Table 2).

From the clarification by the experts (the Indonesian Red Cross): In any case, saving as much as people are the main purpose. However, due to the limited time during the disaster, it is preferred to rescue the productive aged person. People of this age can move faster. Thus, for the options above, saving the younger brother is the highest priority even though he/she is a blind person, then comes the baby and followed by the grandmother. The reason for not putting the option of saving the baby is because normally the baby always stays near his/her mom.

Additionally, as part of the recovery program, grade 4-6 students are asked to put their simulation experience into drawings, as shown in figure 4. 10 of 16 drawings showed rescuing action by climbing higher place (rooftop and mountain), 5 drawings of rescuing by boat, while 4 among them shows both drawings. Moreover, 5 persons did not show any rescue action. This means that the students are gaining knowledge about disaster after the role-playing. They can mention the names of the disaster and also addressing the action of rescuing, but not yet the rehabilitation and reconstruction.

5. Conclusion
This role-playing program followed the stepwise of disaster quick response program: preparedness, response and recovery [14]. Role-playing is one of disaster quick response managements where children have a significant role in program preparedness [15]. Although the program has not been conducted as a full package yet, the role-playing here involved education, training, and assessment which then lead to various plans as shown by their drawings after the role-playing. This activity also
had given new inputs both for the students, the teachers, and us as the initiator of the program regarding the actions during and after the nature-based disasters. Their response for the environment is taken as input for the baseline for quick response: Preparedness module for elementary school.

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