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Increasing student knowledge with counseling on anticipating earthquakes

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ABSTRACT

West Java experienced 522 earthquake events, of which 93 occurred in Tasikmalaya City and Regency. This has made a lot of noise in the community and created excessive concern, so the community needs to be educated, especially in terms of preparedness in dealing with earthquake disasters in order to prevent more severe impacts. Elementary school education is the first door to introduce students to disaster preparedness and mitigation. One of the elementary schools that does not have non-structural mitigation efforts is Cihideungbalong Islamic Elementary School. The location, which is in a densely populated area, is also vulnerable to the effects of earthquake disasters, so it is necessary to have an earthquake anticipation evacuation route and counseling in the Cihideungbalong Islamic Elementary School environment. The method used is socialization about earthquake anticipation and simulation assistance after an earthquake by following the evacuation route. Increasing students' knowledge of the earthquake, which consists of knowledge about the dangers of the earthquake, making support tools and evacuation routes for earthquake anticipation. The results of this activity have increased student preparedness, from an increase of 17 percent for student knowledge of how the earthquake occurs, 33 percent regarding student calmness in facing the earthquake, 56 percent for self-rescue during an earthquake, and 78 percent for accuracy/skill of students in simulating self-rescue through the earthquake evacuation route.

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1. INTRODUCTION

The West Java province boasts a series of mountains arranged in parallel due to the position of the Java Island, which is a result of the collision between the Eurasian and Indo-Australian plates, forming a subduction zone along the southern part of Java (Angraeni et al., 2023). Over a period of 10 years from 2012 to 2021, West Java experienced 522 earthquake events from 2012 to 2022. The number of earthquake events in Tasikmalaya City and Tasikmalaya District amounted to 93 events (Badan Penanggulangan Bencana Daerah, 2023). The most recent earthquake felt significantly in Tasikmalaya occurred on December 4, 2022, with a magnitude of 2.9 SR located 9 km southeast of Tasikmalaya (Ardhiananta, 2022). This caused unrest in the community and heightened concerns, necessitating public education, especially regarding preparedness for earthquake disasters to prevent more severe impacts. Earthquake disasters can have severe consequences, especially in densely populated areas such as SDI

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Islam Cihideungbalong. SD Islam Cihideungbalong is situated on Jl. Cihideungbalong, Kel. Nagarawangi, Kec. Cihideung, Tasikmalaya City. Access to the location is through a narrow alley approximately 1.6 m wide. This location falls under the densely populated category, posing a challenge during earthquakes due to limited access and the necessity to traverse on foot.

The impact of earthquake events in densely populated areas can be mitigated through community preparedness, starting with early education. Therefore, the community needs to be educated, especially in earthquake disaster preparedness to mitigate the severe impacts of earthquakes (Biomi et al., 2023). Education can be provided directly to villages or urban neighborhoods or through schools. Elementary education is one of the first educational stages to introduce students to disaster preparedness and mitigation. Activities can include landscaping school grounds oriented towards disaster mitigation, planning evacuation route signage, and other emergency-related information, especially related to disaster mitigation (Alfian et al., 2023).

Disaster mitigation comprises a series of activities or efforts aimed at reducing disaster risk, both through physical infrastructure development and awareness-raising and capacity-building to face disaster threats (Nazwin et al., 2023). Disaster mitigation is divided into two categories: structural and non-structural. Efforts to reduce disaster risk through technology utilization are termed structural mitigation, while efforts involving urban spatial planning, community capacity building, legislation, regional planning, and insurance fall under structural mitigation (Faturahman, 2018). Non-structural mitigation is the most suitable for elementary schools because it minimizes changes to existing building structures and facilitates information dissemination regarding disaster mitigation, especially earthquake disasters.

SD Islam Cihideungbalong currently lacks non-structural mitigation efforts, hence, this endeavor aims to provide knowledge about earthquake hazards, create supporting tools, and evacuation routes for earthquake anticipation.

2. METHODS

The stages of implementing this activity can be seen in Figure 1. The implementation of activities is carried out using three methods: (1) Preparation; (2) Educational Outreach; (3) Simulation and Evaluation.

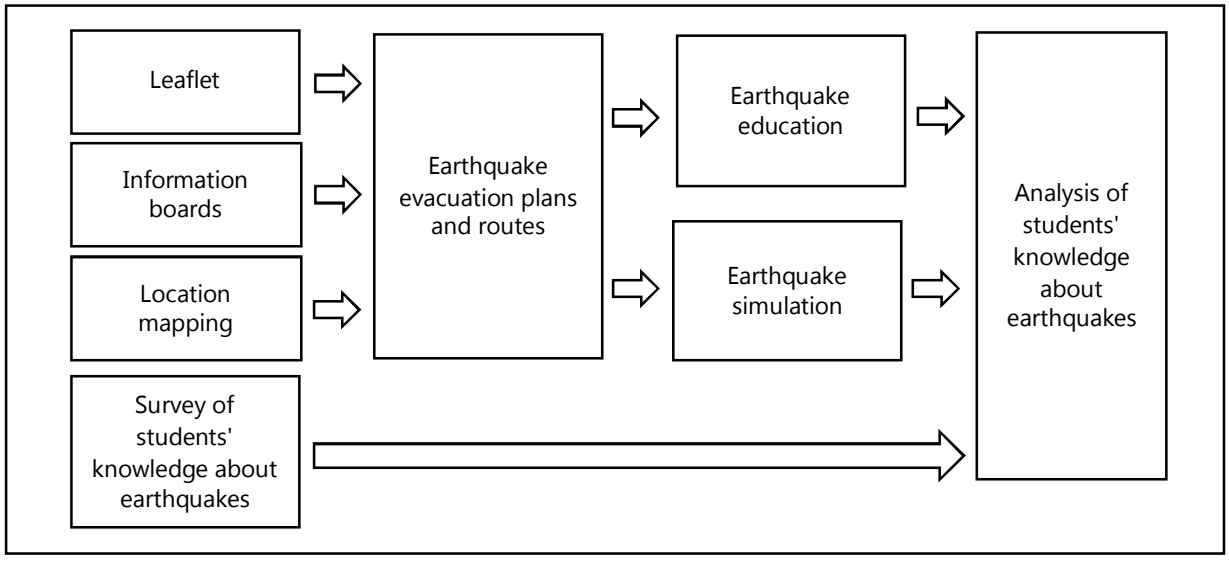

Figure 1. Activity framework

Location survey

The survey method is commonly employed to map areas, typically utilized for tsunami-prone (Rumaal et al., 2018), tsunami-affected (Erfani & Wibowo, 2022), earthquake mapping (Asrurifak et al., 2012), liquefaction potential (Mufardis et al., 2023), and so forth. For this community service project, it is also necessary to map the locations where the service will be conducted through site surveys. Additionally, surveys are conducted to assess the knowledge regarding earthquake preparedness among students and teaching staff at SD Islam Cihideungbalong. The location survey was conducted on August 10, 2023, by students from the service team.

Making evacuation plans and routes

The method of creating floor plans and evacuation routes is utilized to designate which areas should be used as shelter/evacuation zones (Nakoe et al., 2023; Ria Amanda, 2022; Widyawarman et al., 2022). Additionally, with the presence of school floor plans, students and school personnel develop resilience and preparedness in facing disasters through school readiness programs (Maliki et al., 2023). Furthermore, determining the number of information boards needed for the community service location is crucial. This activity was carried out from August 11, 2023, to August 25, 2023, involving both faculty members and students from the service team.

Determination of leaflets and information boards

The leaflet establishment method is employed to provide information on what to do before, during, and after an earthquake (Mertha, 2022; Sari & Nugraha, 2023). This activity was conducted from August 26, 2023, to August 28, 2023, by faculty members. Additionally, the number of information boards was determined and installed on walls as a means to facilitate self-rescue/evacuation direction.

Educational Outreach

Educational outreach is conducted to broaden the insights (Antoni, 2022; Maryani, 2023; Yuniarti & Junialdi, 2023) of both students and teaching staff to understand the causes of earthquakes and what should be done before, during, and after an earthquake. Preparation for the educational outreach was carried out on September 4, 2023, and the outreach activities were conducted on September 5, 2023.

Simulation during an earthquake

Following the educational outreach, a simulation is conducted during an earthquake scenario. All students are involved in following the evacuation routes installed at various points in the school, along with the entire service team. The objective of this activity is to assess the effectiveness of the established evacuation routes and enhance the students' skills during an earthquake event.

Evaluation design

In the implementation of the community service program, there are three criteria that will serve as the basic benchmarks for the achievement of the training activities. The success indicators of the program implementation include the creation of floor plans and evacuation routes, as well as the

installation of informative boards for all students and educators. Success indicators for the participants include their ability to comprehend the dangers of earthquakes and the necessary actions to be taken before, during, and after an earthquake. Success indicators for the organizers include their ability to provide explanations and create clear information boards for SD Islam Cihideungbalong.

3. RESULTS AND DISCUSSION

Results

The implementation of this community service activity is divided into three stages: (1) The first stage involves preparation, starting from the creation of leaflets, making information boards, and mapping locations; (2) The second stage is planning, which includes creating floor plans and evacuation routes as well as conducting educational outreach; (3) The third stage is evaluation, which is carried out to assess the outcomes of the educational outreach, analyze encountered obstacles, and identify solutions.

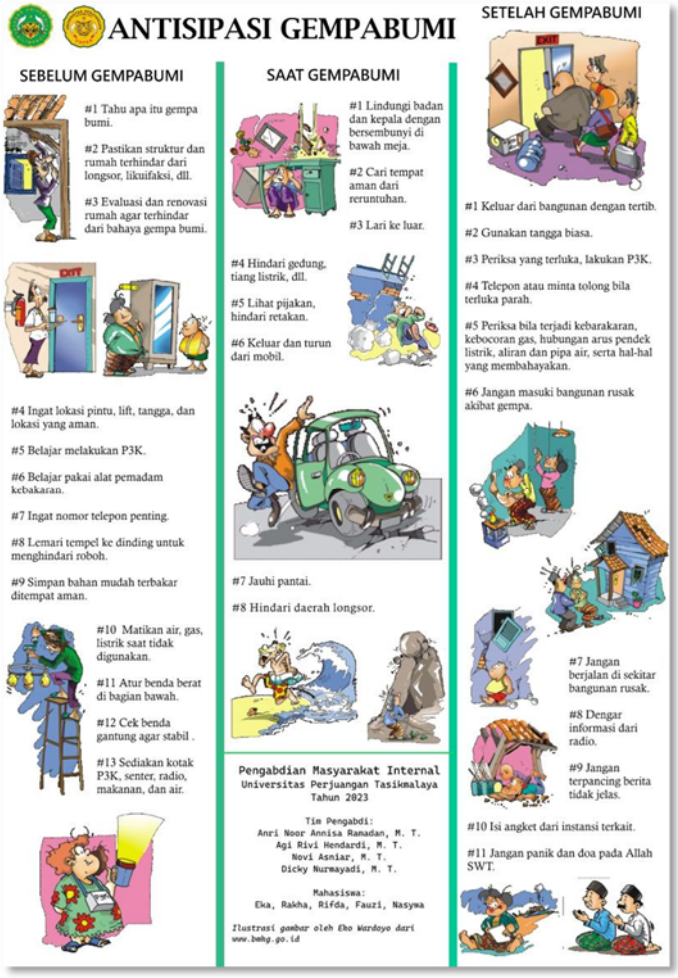

Figure 2. Leaflet "Antisipasi Gempabumi"

Implementation Stages

Designing leaflets

In this stage, the creation of leaflets is conducted to enhance the understanding among students. The information presented in the leaflets pertains to earthquake preparedness. The content includes actions to be taken before, during, and after an earthquake (Temukonco, 2014), which has been modified and can be seen in Figure 2. These leaflets are provided to homeroom teachers, who will then display them in the classroom for student reference.

Making information boards

In this stage, the design of information boards, as depicted in Figure 3, is carried out for placement in classrooms and school hallways. The number of information boards is adjusted according to the mapping results of the locations. The information boards created consist of evacuation routes, EXIT signs, and assembly points. The evacuation routes installed for this school are divided into three types: flat right evacuation route, flat left evacuation route, and left stair evacuation route. Additionally, an EXIT information board is installed in each room. Therefore, the total number of information boards installed is as follows: (1) 8 flat right evacuation routes; (2) 3 flat left evacuation routes; (3) 8 left stair evacuation routes; (4) 8 EXIT signs.

Figure 3. Information boards and placement of information boards in accordance with the location plan

Locations mapping

This stage aims to map the area for creating evacuation route plans. Based on the field survey results, floor plans are created on-site, specifically at SD Islam Cihideungbalong. SD Islam Cihideungbalong comprises six classrooms, one for each grade level. Additionally, there is one teacher's room, one office room, and one cafeteria.

Earthquake evacuation plan and route

In this stage, the determination of the installation locations for information boards and the direction of evacuation routes is carried out. The floor plan and evacuation routes can be seen in Figure 4. From the diagram, it is observed that there are classrooms 1 through 6, a teacher's room, an office, a cafeteria, a computer room, a kitchen, a principal's office, a health unit (UKS) room, each comprising one room, and three restrooms.

The designation of evacuation routes is directed towards locations adjacent to the field. SD Islam Cihideungbalong has two fields, one located in front of the entrance and one at the back. For the area

in front of the entrance, the assembly/evacuation area is directed towards field 1, while classroom 5 and classroom 6 are directed towards field 2.

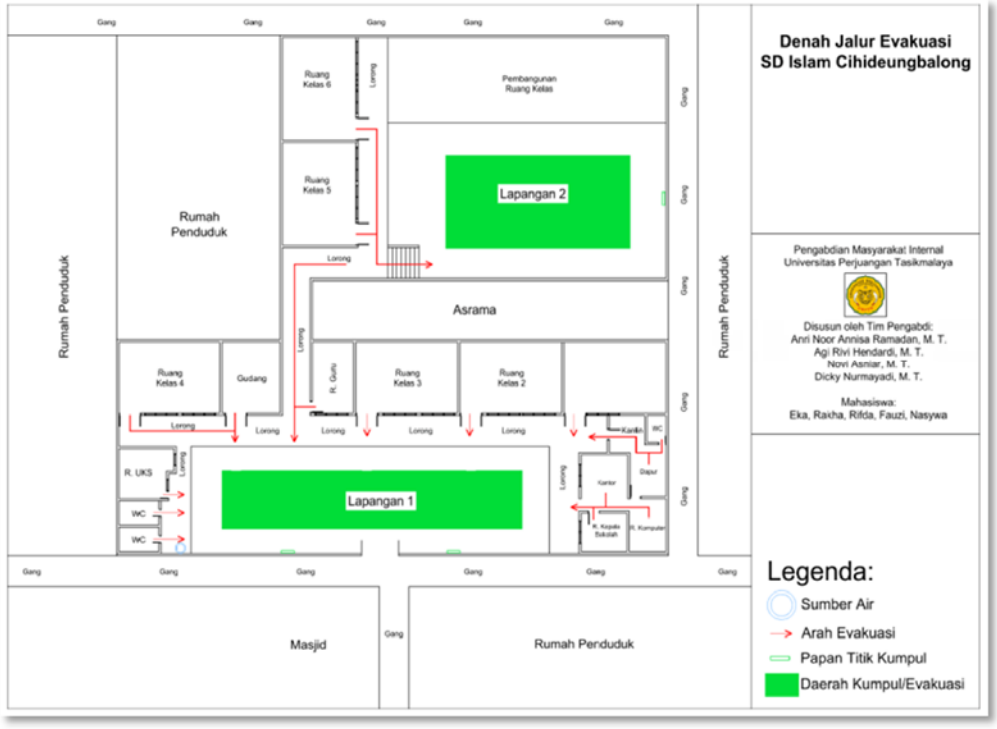

Figure 4. Plan and evacuation route for SD Islam Cihideungbalong

Educational Outreach

The final stage of this activity is the educational outreach. The outreach is conducted within a one-day timeframe. The outreach activities begin with preparation, followed by the opening and welcoming remarks. To encourage students participating in this activity, a break is taken and an ice-breaking activity is conducted. This activity aims to prepare students to be more focused during the material presentation. Next, the educational material on the topic "Earthquake Preparedness" is presented, followed by another ice-breaking session. To implement the educational material, simulation preparation, earthquake simulation, closing remarks, and finally, the distribution of door prizes and a group photo are carried out.

Discussion

The community service activity in the form of earthquake preparedness outreach is one of the efforts to educate students to be ready to face potential disasters in the future. The educational aspect of this community service activity includes expecting students to understand evacuation routes and the information boards used along these routes, comprehend the triggers of earthquakes, understand the actions to be taken before, during, and after an earthquake, and strengthen students' mental resilience so they are not afraid of earthquakes and can act to save themselves when an earthquake occurs. Before the implementation of the community service activity, we conducted a survey to assess the knowledge of teachers and students at SD Islam Cihideungbalong. The survey was conducted with 9 teachers, and the list of questions asked is presented in Table 1.

Table 1. Questionnaire on knowledge of teacher preparedness for earthquake disasters

Question(s)
Do you know how earthquakes happen?
Do you often panic when an earthquake occurs?
Do you know how to save yourself during an earthquake?
Do you know the evacuation route during an earthquake?
Did you know that if a building is damaged by an earthquake, we are not allowed to approach it, let alone live in that location?
Do students know about the dangers of earthquakes?
Have students been given an explanation about the dangers of earthquakes?
Have students been briefed on earthquake evacuation routes?

From the respondents' results according to Figure 4, it was found that all teachers know how earthquakes occur, self-rescue during earthquakes, and the importance of not approaching buildings damaged by earthquakes. Additionally, 33 percent of teachers admitted to frequently experiencing panic during earthquakes, and only 11 percent of teachers have provided guidance on earthquake evacuation routes to students. This means that there are still 89 percent of teachers who have not provided guidance to students regarding earthquake evacuation routes. Based on these results, the implementation of this community service is in line with the expected objectives.

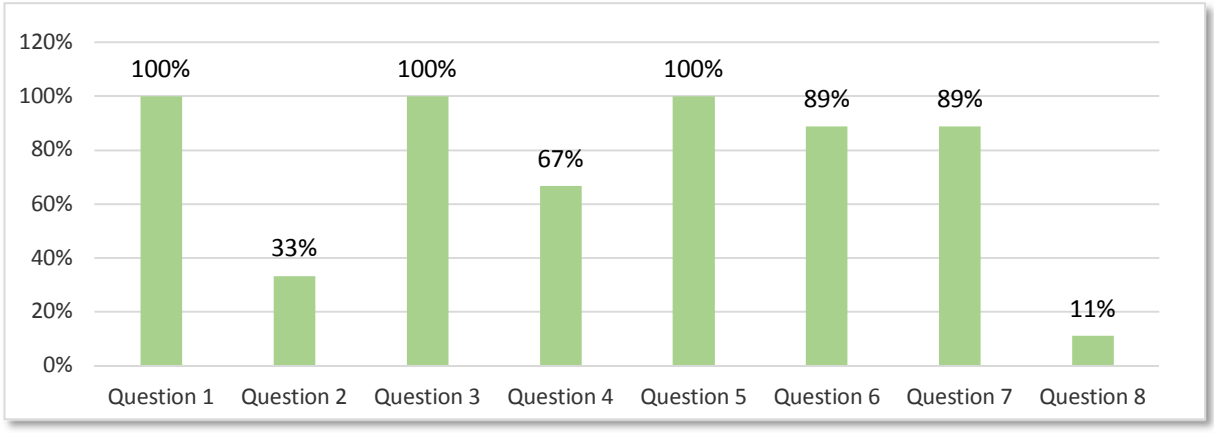

Figure 5. Teacher respondent results

The preparation conducted before the educational outreach activity involved mapping the locations and placing information boards regarding evacuation routes. Prior to the implementation of these activities, the service team coordinated with the partner or school authorities, namely the school principal. The school principal welcomed the arrival of the service team, thus, during the installation of banners, leaflets, and information boards, assistance was provided by the school authorities, as shown in Figure 5.

After all preparations were completed, the educational outreach activity was conducted. The outreach activity proceeded through the following agenda: preparation, opening remarks, ice-breaking session, presentation of educational materials, another ice-breaking session, simulation preparation,

earthquake simulation, closing remarks, and distribution of door prizes. This activity also included ice-breaking sessions to motivate students to remain focused during the educational outreach. The activity was accompanied by teachers/educators tasked with supervising students who may lack sufficient knowledge and skills to handle emergencies/injuries so that emergency situations can be anticipated by the teachers if they arise (Zakaria et al., 2018). During the material presentation, there were pauses, and the service team posed several questions about earthquake preparedness and distributed door prizes to ensure that students understood the material well. The educational material presented by the service team consisted of (1) The causes of earthquakes; (2) The impacts of earthquakes; (3) What to do during earthquakes; and (4) Evacuation procedures after an earthquake, which can be viewed at the following link: https://drive.google.com/drive/folders/1LjFndZbKR93SMhWbvBF0ex5K1g4xINff?usp=drive_link.

Figure 6. Placement of information boards regarding evacuation routes

The educational information provided about earthquake evacuation procedures was presented using animated video media (Maghriza, 2023) to make it engaging for students, as depicted in Figure 7. Additionally, animated video media, or instructional videos, can clarify the meaning of teaching material and make it easier for students to understand (Nurdewanto et al., 2018). Animated video media is one form of learning utilizing information technology. Learning with information technology can also enhance the quality of educational resources (Rahmidani et al., 2018). After the educational outreach activity, an earthquake evacuation simulation was conducted. Students were directed back to their respective classrooms and provided with guidance in each class, as shown in Figure 8.

The sirens were sounded by the service team to mimic earthquake emergency situation. Students in each classroom were directed to fields 1 and 2 according to the evacuation route directions to save themselves from the danger of the earthquake. Students were guided to the fields while carrying bags or other items to cover their heads to protect themselves from debris in the event of an earthquake. Students brought the necessary equipment to save themselves in the field as depicted in Figure 9.

Figure 7. Outreach providing material on earthquake anticipation

Figure 8. Classical delivery of material

Figure 9. Earthquake simulation in the field

After the simulation, students were directed back to the educational outreach area for sample collection. Sample collection involved filling out questionnaires as per Table 2. Three students from each class were sampled to complete the questionnaire. This was done to evaluate the outcomes of the earthquake preparedness educational outreach.

Table 2. Questionnaire for students

Question(s)
Do you know how earthquakes happen?
Do you often panic when an earthquake occurs?
Do you know how to save yourself during an earthquake?
Do you know the evacuation route during an earthquake?
Did you know that if a building is damaged by an earthquake, we are not allowed to approach it, let alone live in that location?

From the respondents' results regarding the questionnaire in Table 2, it was found that before the educational outreach, all students were aware that they should not approach damaged buildings, except for those in class 1. This is because the knowledge of class 1 students was still lacking. Additionally, all students frequently panicked during earthquakes, except for those in class 4 and class 6, where 33 percent did not panic when an earthquake occurred.

Figure 10. Results of student respondents for each class

After the educational outreach, an increase in knowledge regarding earthquake preparedness can also be observed from Figure 10. However, there was a decrease in knowledge in class 3 regarding the understanding that one should not approach damaged buildings due to earthquakes. The average respondent results from all classes can be seen in Figure 11. From the figure, it is evident that there was an improvement in all questions except for question 5, which remained at the same percentage. At least with the educational outreach, the students' calmness during earthquakes improved. This is reflected in the respondent results, where the percentage of students who did not panic during earthquakes increased from 11 percent to 44 percent. Additionally, there was a significant increase in knowledge about earthquake evacuation routes, reaching 78 percent.

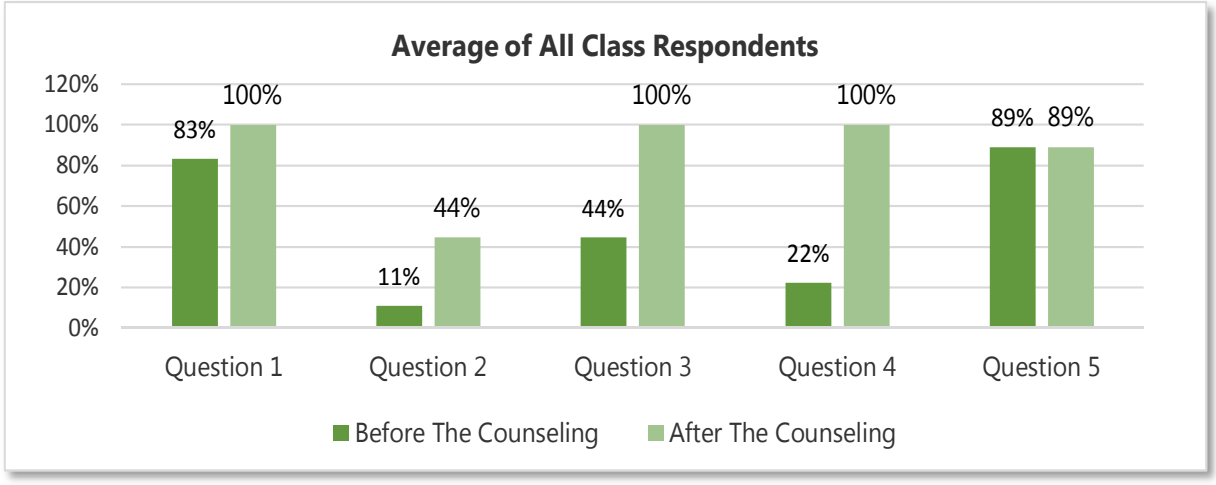

Figure 11. Average results of student respondents

The results of this activity show an improvement in students' preparedness, as evidenced by Figure 11, where each component experienced a 17 percent increase in students' knowledge of how earthquakes occur. There was a 33 percent increase in students' calmness in facing earthquakes. Furthermore, there was a 56 percent improvement in self-rescue during earthquakes and a significant 78 percent increase in knowledge about evacuation routes. The final activity of the educational outreach can be seen in Figure 9.

Figure 12. Closing of outreach

4. CONCLUSION AND RECOMMENDATIONS

The community service program aims to enhance students' knowledge of earthquakes, which includes understanding the dangers of earthquakes, creating supporting tools, and evacuation routes for earthquake preparedness. The program's achievement targets include participants being able to recognize and comprehend the dangers of earthquakes and to conduct evacuations in the event of an earthquake using designated evacuation routes. The outcomes include an improvement in students' ability to understand the dangers of earthquakes and the proficiency of students in conducting self-rescue simulations through earthquake evacuation routes. The hope is that through this activity, students will remain vigilant in the event of an earthquake disaster.

In this activity, there were limitations encountered, including some students being unable to participate due to the panic caused by the presence of many people and the sound of the siren, necessitating special assistance for students who panic. Additionally, there is a need for periodic provision of material to strengthen students' mental preparedness to face earthquake disasters. It is advisable for the program to be followed up through the addition of earthquake hazard material to the school's developed curriculum.

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