The Scientific Argumentation Profile of Earthquake Mitigation of Non-Science Undergraduate Student in Universitas Negeri Surabaya

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The Scientific Argumentation Profile of Earthquake Mitigation of Non-Science Undergraduate Student in Universitas Negeri Surabaya

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Abstract. Arguments are one of the important purposes in the modern era of learning because it is the basic step to promote student's critical thinking process and science literature. This research aims to describe and analyse scientific argumentation profile of earthquake of non-science undergraduate student in Universitas Negeri Surabaya. This research uses a qualitative descriptive with the subject of research is 37 first-year non-science students from Universitas Negeri Surabaya. The subject asked to choose the right answer and write their reasons or arguments that support their answer. The results showed that the subject's ability in providing scientific argument is at the level of providing claims with the support of well warrant.

1. Introduction

Arguments are one of the important purposes in the modern era of learning because it is the basic step to promote student's critical thinking process and science literature. Argumentation also plays important roles in determining how strong science is constructed [1]–[5]. The argument was processed which used by someone to analyze information on a topic and then results of the analysis was communicated to others [4], [6], [7]. Thus the using of argumentation in science learning was part of the development of higher order thinking skills [8], [9], [10].

As a country surrounded by volcanic paths, Indonesia has become one of the countries that has a high level of risk from earthquake and tsunami disasters. The earthquake and tsunami disaster in Aceh in 2004 which claimed 126,741 lives and more than 750,000 people lost their livelihoods showed the magnitude of the loss caused by this disaster [11].

Build the preparedness in facing disasters is one of the important things in disaster management efforts. Preparing for disaster can be done by anyone, be it government institutions, the community, or individuals. Forms of readiness in this case can be seen physically in the form of the availability of facilities and infrastructure as well as non-physical form of increasing knowledge, attitudes, behavior, and management of institutions in dealing with disasters [12].

Many prone areas of disaster in Indonesia, so the importance of increasing disaster risk reduction efforts are a strong foundation for the Indonesian people to jointly carry out these efforts in an

integrated and directed manner [13], [14], [15]. As educators, the research team will contribute in increasing public understanding of disaster. Therefore, this research conducted to determine the knowledge of Non-Science Undergraduate Student in Universitas Negeri Surabaya related to natural disaster mitigation through the argumentation process. It is aims to that of Non-Science Undergraduate Student in Universitas Negeri Surabaya can prepare themselves non-physically in the form of knowledge, attitudes and behaviors in order to be able to convey information about natural disaster mitigation to the community when natural disasters occur.

2. Method

The research use qualitative descriptive method. The method used to describe and analyse scientific argumentation profile of earthquake mitigation of Non-Science Undergraduate Student in Universitas Negeri Surabaya. The subject of the research is undergraduate student of Management Study Program in Universitas Negeri Surabaya. The data obtained by questionnaire. There is 10 research questions related to the topic in the questionnaire. The data analysis technique used in this research is qualitative descriptive analysis technique. Data related to the students' scientific argument are analyzed by using an observer rubric adapted of Toulmin. The data that had been analyzed categorized into the level of argumentation developed by Erduran, Simon, and Osborne [16].

3. Results and Discussion

Based on the results of a questionnaire (10 research question) by non-science undergraduate students related to the Scientific Argumentation about Earthquake Mitigation. The following results are obtained,

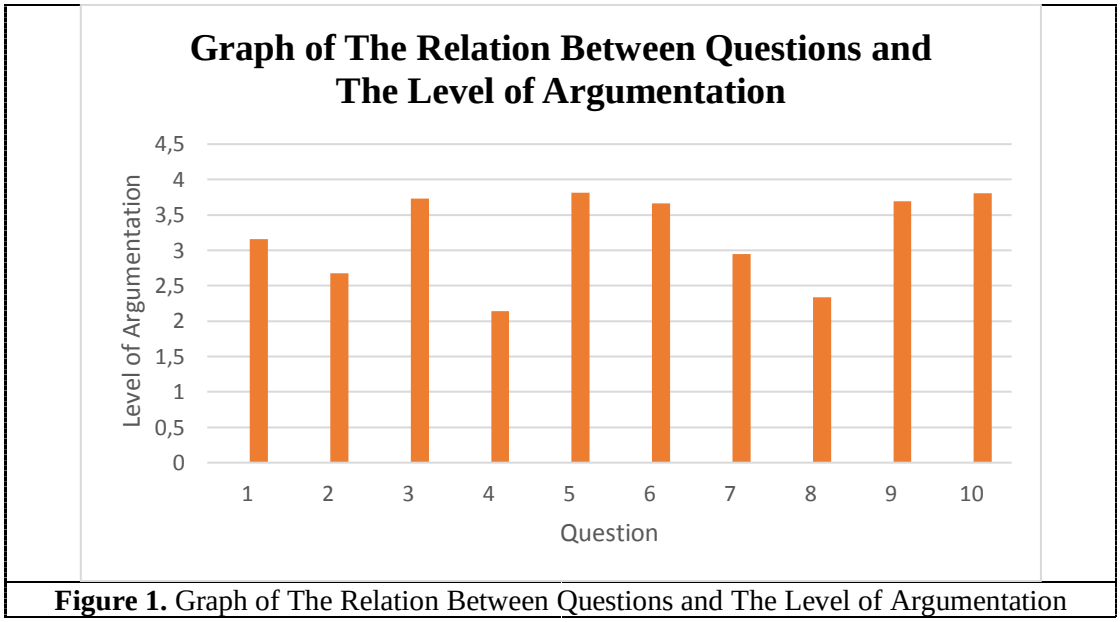

Figure 1. Graph of The Relation Between Questions and The Level of Argumentation

Based on the graph of the relation between questions and the level of argumentation show that argumentation by non-science undergraduate students is at the range level 3 from 10 research questions related to the topic about earthquake mitigation. The subject can answer the question well according to indicators of scientific argumentation. The subject gives a claim, but there are still many who provide justification / explanation with relevant evidence and theory.

The value of techniques used for this argument skill that is written assessment technique performed with a written test with a test to supply answers (Description) by scoring every point because given a score based on Table 3.1 [16],.

Table 3.1 Matrix scoring Arguments
(Adapted from Toulmin's Argumentation Pattern)

Point	Criteria
1	a) The argument is very weak b) The claim is invalid and the data is not reliable c) The relationship between the claims, data, warrant very weak d) The relationship between the components no argument
2	a) The argument is quite good b) Claims inadequate and insufficient data good c) The relationship between claims and evidence good enough d) The relationship between the components is sufficient argument
3	a) strong argument b) The claim is valid, the data is strong and well warrant c) The relationship between claims and evidence d) Relationships between components are strong arguments
4	a) The argument is very strong b) Very valid claim, the data to clarify the claims, include a strong evidence c) The relationship between the claim and the evidence is very strong d) The relationship between the components very strong argument

Based on the data obtained, the graph shows that questions 2, 4 and 8 produce a mean score at level 2. This is due to the lack of understanding by students at the university. In number 2 regarding natural disaster mitigation measures; number 4 regarding the sequence of the disaster management cycle; and number 8 regarding mitigation carried out in the event of an earthquake.

In number 2 with questions:

"Natural disaster mitigation measures are carried out .....

a. Before a disaster occurs

b. After there is certainty that disaster will occur

c. After the disaster passed

d. Before, during and after disaster "

The average subject answered correctly, but some subjects still answered that natural disaster mitigation was only during and after a disaster. Whereas natural disaster mitigation is carried out before, during and after natural disasters. With justification / explanation that mitigation before disaster occurs to prevent; when a disaster occurs to minimize casualties, and after a disaster to repair damage caused by the earthquake so as to be more vigilant in the future.

In number 4 with questions:

"The correct sequence for disaster management cycles is ...

a. Mitigation, response, preparedness, recovery

b. Mitigation, preparedness, response, recovery

c. Mitigation, emergency response, preparedness, response, development

d. Mitigation, supervision, response, recovery "

Correct answers to the sequence of the disaster management cycle are mitigation, emergency response, preparedness, response, development. But the average subject's answers lacked "emergency response". In this question, obtained justification / explanation from the subject that is mitigation is done with the aim of minimizing risk; emergency response is the same as attitude toward environment if disaster comes suddenly; preparedness to protect themselves; response to disasters; and development after the earthquake occurred to repair the damage.

In number 8 with the questions:

"Statement:

1) Get out of the room;
2) Looking for a large enough field to take cover;
3) Approaching tall buildings;
4) If in a room, hide under a table;
5) Contact certain parties.

Mitigation is carried out if an earthquake occurs in the figure ....

a. (1), (2), and (3) c. (1), (3) and (4)
b. (1), (2), and (5) d. (2), (4) and (5)

The correct answers are (2), (4), and (5) with justification / explanation from the subject that those things are the right steps to save themselves from earthquakes in everything so that there are not many casualties when an earthquake occurs. However, some subjects are still weak warrant / explanation in accordance with the relevant theory.

From the research produced when compared with research by Ain, et al. by title The scientific argumentation profile of physics teacher candidate in Surabaya, the results show that the student's ability in providing scientific argument is at the level of providing claims with the support of a weak warrant [17], [18], [19], [20]. But, this research show that the claim is valid with the support of data and well warrant. And from the research of Khoirul anam, et al., Shows that the readiness of subjects in dealing with natural disasters was identified through physical and non-physical aspects related to tsunami risk reduction [11]. However, in this research only identified through non-physical aspects to find out the understanding and knowledge of Non-Science Undergraduate Student in Universitas Negeri Surabaya.

4. Conclusions

From the research, the result show that the subject's ability in providing scientific argument is at the level of providing claims with the support well warrant. The subject will not able to argue if the knowledge that they owned are low sufficient. Therefore, it can be recommended that the first step to be improved is correcting the wrong concepts of students through the argumentation process.

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