EARTHQUAKE SIMULATION METHOD IN MAN 1 SRAGEN

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Abstract

This study aims to determine whether there is an influence and the magnitude of the effect of the use of earthquake simulation learning methods on learning outcomes in geography subjects XI IPS MAN 1 Sragen. Researchers collected data using questionnaires, tests, observations, and documentation. Data analysis techniques using percentage descriptive analysis and simple linear regression analysis. The results showed the experimental class obtained cognitive learning outcomes of 87.7%, affective learning outcomes of 90.74%, and psychomotor of 93.00%. Then the control class got 79.94% cognitive learning outcomes, affective 59.76%, and psychomotor at 62.43%. The conclusion of this study is "there is a significant influence on the implementation of earthquake simulation learning methods on the learning outcomes of students of class XI IPS MAN 1 Sragen 2018/2019.

Keywords: Disaster, Geography, Mitigation, Simulation

1. Introduction

Education according to Kun [2] is an important component in human life. Education is a conscious effort to develop human qualities, therefore education plays a very important role in the intellectual life of the nation. The progress of a nation depends on the quality of education that has been implemented in the country. Education will run well if all components work in a professional manner. Teachers are one important component in the world of education. Education will run well if the teacher has sufficient teaching competence.

One of the professional teacher competencies is to choose the most appropriate learning method for students. One of the criteria for successful teachers in choosing appropriate learning methods in class is from student learning outcomes that meet the Minimum Mastery Criteria (KKM), including one of which is the use of learning methods in Geography subjects. In addition, the selection of learning methods that have not been right will affect student learning outcomes that are not optimal. Conventional methods such as lectures used by teachers require more modern renewal to adapt 21st century learning so students become interested in following the learning process.

Muhammad [5] explained that the learning process requires positive interaction between the teacher and students, so that two-way communication will be realized in a conducive atmosphere and there is a balance between the freedom of students to express their feelings with the authority of the teacher. Student- centered learning process (student center) will be able to make students become more active in participating in class because in learning in class not only is a teacher who can convey knowledge to students, but students can also express opinions about knowledge or experience according to learning being studied. Then students can also practice directly about the understanding that has been learned before by implementing it directly in daily life, so students can

learn cognitively, affective and psychomotor. The problem in learning Geography subject matter is knowledge that is still considered difficult to understand because it only studies theory without implementing it, so that it causes students to be confused in learning Geography subjects because they have not been able to harmonize knowledge in theory through direct simulation. The main material that requires simulation is natural disaster mitigation and adaptation.

2. Literature Review

2.1. Disaster Perspective

This is based on the background of Indonesia's territory from a disaster perspective. Indonesia is a country prone to natural disasters. According to Law Number 24 of 2007, natural disasters are disasters caused by events or a series of events caused by nature including earthquakes, tsunamis, volcanic eruptions, floods, droughts, hurricanes, and landslides. This is due to the geological territory of Indonesia which is traversed by three world tectonic plates namely the Australian plate, the Pacific plate, and the Eurasian plate (BNPB, 2018). One of the natural disasters that occurred in Indonesia was an earthquake. According to Nur (2018: 67), earthquakes are original vibrations from inside the earth, originating in the earth which then propagates to the surface of the earth due to the earth's cracks breaking and shifting violently. An earthquake is a natural disaster that has a broad reach and cannot be estimated at the time of its occurrence. Earthquake disasters can cause a variety of impact losses such as casualties, injuries, property losses and psychological effects. Recorded several earthquakes have struck the Indonesian region such as the Aceh earthquake, the Yogyakarta earthquake, the Padang earthquake, and the Palu earthquake. The reason researchers chose the subject matter of natural disaster mitigation and adaptation class XI IPS is the right material to use simulation methods because learning requires direct and real implementation. The next reason is because this material is the latest material in the 2013 curriculum which has been revised, because in the previous curriculum, the 2006 curriculum natural disaster mitigation material was not included in the Geography Competency of class XI IPS, so the results of this study could assist teachers in developing learning methods. Researchers will test simulation learning methods in improving student learning outcomes viewed from cognitive (knowledge), affective (attitude), and psychomotor (actions) in dealing with earthquake disasters, so that they can be compared with conventional methods.

Then the research was carried out in MAN 1 Sragen because based on the results of the 2011 BNPB Disaster Risk Assessment stated that Sragen Regency was included in the high risk class of earthquake disasters.

3. Research Methods

The research location is in MA Negeri 1 Sragen, this study population is all class XI IPS. This study uses a purposive sampling technique that is sampling by taking subjects not based on strata, random or region but based on the existence of certain objectives (Arikunto, 2006: 139). Samples taken were 73 students from class XI IPS 3 as an experimental class and class XI IPS 4 as a control class. For more details, the status of the sample to be examined can be seen in the following table 1 :

Table 1. Sample Details

No.	Class	Number of Sample	Sample Status
1.	XI IPS 3	37	Experiment
2.	XI IPS 4	34	Control

4. Result and Discussion

4.1. Implementation of Learning Methods for Earthquake Disaster Mitigation Simulation

Earthquake simulation learning methods are implemented into the subject matter of natural disaster mitigation and adaptation. Based on the calculation of the observation sheet, the percentage of descriptive results obtained was 95.49%, which included very high criteria. The activity of learning methods for earthquake disaster mitigation simulation is carried out on Monday and Wednesday according to the hours of Geography subject class XI IPS 3.

The implementation of the simulation learning method is measured using an observation sheet instrument and observed by the observer. Observation sheet calculations using descriptive percentages with a score of 95.49% so that it includes very high criteria. so that in the observation sheet because the implementation of the earthquake disaster mitigation simulation learning method has been carried out systematically, most of the answers obtained "Yes" with a score of 1 for each statement from the observer observing the course of simulation activities carried out by researchers.

4.2. Student Learning Outcomes

Student learning outcomes in the experimental class were calculated using descriptive percentages. The calculated learning outcomes consist of cognitive (knowledge), affective (attitude), and psychomotor (action) aspects. The following are the figure of results of the calculation of experimental class learning outcomes:
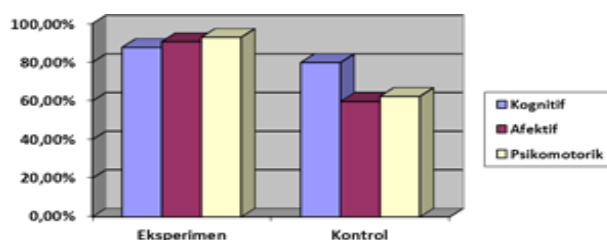

Fig.1 Student Learning Outcomes of Experimental Classes

Based on the data above, it can be explained that the experimental class obtained cognitive learning outcomes score of 87.77% including very high criteria, affective aspects of 90.74% including very high criteria, and cognitive aspects of 90.74% including very high criteria. While the control class gained cognitive aspects of learning outcomes of 79.94% including high criteria, affective aspects of 59.76% including medium criteria, and psychomotor aspects of 62.43% including medium criteria. The research data above from the three aspects of student learning outcomes obtained that the comparison of experimental class learning outcomes is higher than the control class. Comparison of affective and psychomotor learning outcomes reaches 30%.

4.3. Implementation Of Learning Methods For Earthquake Disaster Mitigation Simulation

The implementation of learning methods for earthquake disaster mitigation simulation has been carried out in five meetings in the experimental class. Based on the results of the research that has been carried out, it is obtained that the results of the descriptive calculation of the percentage of simulation learning methods using the observation sheet instrument obtained 95.49% which is included in the very high criteria. This is caused by various factors from simulation learning methods, researchers, and infrastructure.

The earthquake simulation mitigation learning method is the main factor that determines the acquisition of a descriptive percentage of percentage included in the very high criteria. The observation sheet instrument made by the researcher consisted of questions about the course of implementing the earthquake mitigation simulation learning method that was carried out. Researchers have made observation sheets in accordance with procedures and systematically sourced from the disaster preparedness training manual from the National Disaster Management Agency (BNPB).

Very high percentage descriptive results were also influenced by students in the experimental class. The influence of students in the experimental class is because all students follow the implementation of simulation learning methods from the first meeting to the fifth. So that all students already know about the procedures that must be carried out in learning activities with simulation methods. Students who did not answer "Yes" were caused by illness, did not pay enough attention to instructions from researchers, and did not understand the learning methods of earthquake disaster mitigation simulation.

The infrastructure used in conducting research affects the results of descriptive percentages of the implementation of earthquake mitigation simulation learning methods. Infrastructure facilities such as those that must be carried by each group are different, so that it affects students' understanding in answering statements in the observation sheet. The statement of students who did not understand the infrastructure caused the percentage of descriptive results to be 95.49%.

The earthquake simulation learning method is divided into 3 stages: pre, during and after disaster. The implementation of the simulation learning method is carried out using the role playing method in which all students play roles by dividing into 5 groups. Each group numbered 6-7 students with their respective roles. The function of the researcher dividing 37 students into 5 groups is to facilitate coordination in earthquake disaster simulation activities.

The simulation learning method used is in accordance with the procedure and systematic so that students will not be confused in applying it. Researchers used the theme of disaster, namely earthquake according to the subject matter taught. The implementation of simulation learning methods is taught systematically and

gradually so that students can understand deeply about how to deal with earthquake disasters, especially in schools. The implementation of the simulation learning method involves researchers, Geography subject teachers, UKS management teachers, PMR organizations, office boys, and security guards. The simulation learning method cannot be carried out by the researchers themselves because it requires infrastructure, activity permits, and security during the earthquake disaster mitigation simulation activity.

4.4. Discussion of Student Learning Outcomes

Student learning outcomes carried out in the experimental class and control class. Experimental class XI IPS 3 using simulation learning methods and control class XI IPS 4 using lecture learning methods vary from Geography teaching teachers in schools. Based on the learning outcomes of the control class from the cognitive aspect, it obtained a score of 79.94% which included high criteria, affective aspects with a score of 59.76% which included moderate criteria, and psychomotor aspects with a score of 62.43% which included moderate criteria. Then for the learning outcomes of the experimental class students from cognitive aspects it has a score of 87.77% with very high criteria, affective aspects with a score of 90.74% with very high criteria, and psychomotor aspects with a score of 93.00% with very high criteria.

Based on descriptive percentage of student learning outcomes from both classes, it can be analyzed that the experimental class has a higher learning outcome score than the control class. The experimental class with 37 students had a score that included very high criteria compared to the control class which was in the high and medium criteria. Learning outcomes that have the least percentage difference is from the cognitive aspect (knowledge) that has a difference of 7.83%. Then for the affective aspect (attitude) has a difference of 30.98%, and the psychomotor aspect (action) has a difference of 30.57%.

Learning outcomes with cognitive aspects are measured using a test instrument consisting of 30 multiple choice questions. Analysis of the learning outcomes between the experimental class and the control class has clear differences when students answer the question of mitigation during the disaster and post-disaster stages. The experimental class answered the correct questions more than the control class, such as the example questions as in number 17 namely the question of the basic colors used to make the evacuation route board. The experimental class has implemented a pre-disaster natural disaster mitigation simulation by making an evacuation route board so that all students know the answers to the item. Then 19 examples of test questions are asking about disaster mitigation measures while on the 2nd floor. The experimental class has been taught how to apply earthquake disaster simulations if they are on the 2nd floor.

The affective learning outcomes (attitudes) of the experimental class are higher than those of the control class. The criteria for affective learning outcomes in the experimental class are very high, while the control class is in the moderate criteria. Differences in descriptive scores on the percentage of affective learning outcomes that reached 30.98%. Factors that influence differences in learning outcomes are in the implementation of learning methods used by researchers. The experimental class has higher learning outcomes because it implements simulations that can shape and improve attitudes in earthquake disaster mitigation. Attitude learning outcomes are measured using a questionnaire instrument, in the questionnaire there are criteria and scores, namely (1) Not skilled, (2) Less skilled, (3) Pretty skilled, (4) Skilled, (5) Very skilled. The total score of the experimental class was 5986 out of 37 students, while the control

class had a score of 3981 out of 34 students. Affective learning outcomes (attitudes) of the experimental class that are superior to the control class are supported by teaching and learning activities carried out by the researchers. Supporting factors such as knowing and participating in making the required documents in earthquake disaster mitigation simulations, carrying out action plan activities to be carried out in schools, and complying with procedural rules during the simulation activities. So that most students in the experimental class answered the questionnaire with answers (5) Very skilled, while students in the control class mostly answered by choosing (3) Quite skilled because students were not taught simulations or practice directly about attitudes that must be implemented in earthquake disaster mitigation earth.

Psychomotor learning outcomes (actions) are measured using a questionnaire instrument. The score criteria used are the same as attitude measurement. The psychomotor learning outcomes questionnaire (action) has 4 indicators. The experimental class had a total score of 4607 out of 37 students, while the control class had a total score of 3132 from 34 students. Psychomotor learning outcomes (actions) between the experimental class and the control class have a percentage difference that is almost the same as the affective learning outcomes (attitude). The difference in learning outcomes in the two classes is because students in the experimental class as a whole have been taught about mitigation measures in tackling the risk of earthquake disasters in schools starting from the pre, during and post disaster stages. Students in the experimental class have participated in the series of activities during 3 core meetings so that they understand and know how to practice them according to the theory they have learned.

Based on these results it is analyzed that the subject matter of natural disaster mitigation and adaptation in class is influenced by the learning methods used. Cognitive learning outcomes (knowledge) tend to be the smallest relative difference because using theories and instruments used are tests. Students' knowledge in both classes about the subject matter of earthquake disaster mitigation tends to be the same. Then the difference is learning outcomes in terms of affective (attitude) and psychomotor (action) aspects where the control class has a higher percentage descriptive score than the experimental class. The control class has superior learning outcomes (attitudes) and psychomotor (actions) because students can directly practice or simulate knowledge gained from theories about earthquake disaster mitigation, especially in schools. While the control class is taught about cognitive aspects (knowledge) so that most students only have the ability to memorize without doing simulation directly in the field.

4.5. Strengths and Weaknesses of Simulation Learning Method

Simulation learning method has advantages compared to conventional learning methods applied by the teaching teacher in the control class. The advantages of simulation learning methods in the subject matter of natural disaster mitigation and adaptation are students directly practicing or direct simulation with existing theories. Then students are also more active in Geography learning activities, next is students can remember the subject matter as well as practice it directly.

5. Conclusions and suggestions

Based on the results of the research and discussion, it can be concluded that the implementation of learning methods for earthquake disaster mitigation simulation can improve student learning outcomes from cognitive (knowledge), affective (attitude), and psychomotor (action) aspects. Improved student learning outcomes in the experimental class are caused by students' ability to understand natural disaster mitigation and adaptation material in a real way. Student learning outcomes in the experimental class as a whole were higher compared to the control class. Three aspects of student learning outcomes in the experimental class are included in the very high criteria. So that the implementation of simulation learning methods can be applied in natural disaster mitigation and adaptation material in class XI IPS.

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