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Research Article

The Effect of Experiential Learning Models on High School Students Learning Scores and Disaster Countermeasures Education Abilities

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Abstract
The purpose of this study was to: (a) to determine the effect of problem-based learning on learning outcomes; (b) to determine the effect of problem-based learning on disaster education abilities; (c) to know the effect of experiential learning on learning outcomes; and (d) to know the effect of experiential learning on disaster education abilities. This study used an experimental design with a pretest-posttest control group design. Data collection used observation sheets, which is questionnaires as an instrument of the implementation of learning models and education, and a tests that were used to know the learning scores. The results obtained was tested by ANOVA using SPSS for windows version 21. The results showed: 1) there is a significant influence of problem-based learning models on learning scores; 2) there is a significant influence of the problem based learning model on the disaster education ability; 3) there is a significant influence of experiential learning model on the learning scores; 4) there is a significant influence of the experiential learning model on disaster education abilities. The experiential learning model has higher influence to learning value than to problem based learning. The experiential learning model has higher priority on the disaster education abilities than on problem-based learning.

Keywords:
experiential learning, problem-based learning, learning score, disaster education.

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Introduction

Indonesia is one of the regions in the tropics that often experiences natural disasters, including East Java Province (Amirudin et al., 2016). Natural disasters that occur include volcanic and post-eruption disasters (Bachri et al., 2015; Irawan et al., 2018), flood disasters (Adi, 2014), earthquake disasters (Soehaimi, 2008), landslide disasters (Nurlaksito & Legowo, 2012), and tidal flood disasters on the coast of Madura Island (Syah, 2012). Community preparedness in facing natural disasters is needed to reduce the number of fatalities and material.

Preparedness is needed for the community, especially young people, specifically school students (Irawan et al., 2018). Through education, student preparedness in facing disasters can be prepared through classroom learning. Geography lessons at the high school level are able to provide learning experiences to students related to disaster countermeasures (Healey & Jenkins, 2000). This is also evident from previous studies that support the role of geography education in disaster education including: the use of local wisdom (Immaniar et al., 2019; Maryani & Yani, 2014), development of learning models (Maryani, 2010), and development of learning tools (Student activity sheets, modules, hand-outs, geography textbooks) (Akbar & Hartono, 2017; Iryanthony, 2015; Ridha et al., 2019; Ridhwan et al., 2019; Widyaningsih, 2014). Preparing students in facing disasters should be supported by curriculums that contain disaster education.

Performance is needed to help the national curriculum succeed in educational practice. For this matter, the government has made strategies, including: (1) training for teachers and other education stakeholders, (2) developing students' books and teacher guidelines, (3) and the curriculum evaluation (Kemendikbud, 2012). These efforts need to be supported by the participation of teachers by improving the quality of learning. Without teacher participation, curriculum implementation is difficult because teacher learning has a vital role. Therefore, one of the successes of the national curriculum is determined by the professionalism of teachers in learning. Professionalism of teachers in developing disaster education can be assessed on the application of problem based learning and experiential learning models.

The problem based learning (PBL) model is also learning that is considered as learning that requires experience (Education, 1994). The problem based learning (PBL) model has several advantages including: 1) students are directly involved in solving problems, 2) increasing student understanding of learning lesson topic, 3) student-centered learning, 4) utilizing objects in the environment around students. Stages of problem based learning models include: 1) giving problems, 2) identifying problems, 3) gathering information, 4) compiling reports on work, 5) reflecting and evaluating (Sumarmi, 2015).

Students are not accustomed to making direct observations in the field through observation, interviews, questionnaires, or taking direct action. The creativity of students in learning is still low, which makes them difficult when making reports or good scientific work (Baidowi et al., 2015). For this reason, experiential learning models need to be applied to improve the ability to think creatively and think critically in making scientific reports because experiential learning is included in scientific learning (Kurniawan et al., 2019; Marni et al., 2019; Nurhasanah et al., 2017; Sari et al., 2019). Experiential learning is learning that is carried out within a certain period in order to take concrete action (Sumarmi, 2015). These actions can take the form of solutions and actions to solve environmental problems. The stages of the experiential learning model are as follows: (1) Stages of real experience; (2) Stages of reflection observation; (3) Stages of conceptualization, and (4) Stages of implementation (Ives-Dewey, 2009; Kolb, 2014).

The application of experiential learning in scientific research activities, requires students to be able to think critically and creatively to solve the problems they face (Ives-Dewey, 2009). Experiential learning supports students to think critically in solving problems authentically with various disciplines. Experiential learning places more emphasis on solving authentic problems that occur daily through hands-on learning experiences with the teacher as a guide (Baidowi et al., 2015). Experiential learning has a significant influence on students' critical and creative thinking skills (Kurniawan et al., 2019; Nurhasanah et al., 2017). Like the SCAMPER technique with fun learning able to develop students' creative thinking (Ozyaprak,2015). S.C.A.M.P.E.R stands for Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, Reverse, a collection of techniques used to find creative solution to problems. Experiential learning has the characteristics of long, interdisciplinary, student-centered activities, integrated with real-life issues and problems (Mellor, 1991).

Knowledge and experience produce information that shapes disaster response attitudes (Irawan et al., 2018). A mature attitude is formed from knowledge of disasters, which then forms disaster preparedness actions (Amirudin et al., 2016; Bachri et al., 2015; Irawan et al., 2018). Therefore, it is necessary to instill knowledge of disaster preparedness in the community in the form of knowledge about the vulnerability of the disaster area to the efforts made to reduce disaster risk (Angriani et al., 2019). In order to instill knowledge to the community, concrete efforts are needed, one of which is through disaster education (Amirudin et al., 2016; Irawan et al., 2018; Maryani, 2010).

Disaster education has become the focus of the development of learning in Indonesia (Kemendikbud, 2012). The development of disaster learning in Indonesia has been contained in Law No. 24 of 2007 concerning disaster countermeasures (Irawan et al., 2018). This is also increasing in line with public awareness of potential disasters in Indonesia. Education was chosen as an effective way to enrich the knowledge of preparedness (Irawan et al., 2018; Ridha et al.,

2019) because knowledge transfer to the area's potential disasters, the level of vulnerability, and efforts in disaster risk reduction can be carried out through education (Amirudin et al., 2016; Bachri et al., 2015; Irawan et al., 2018). To realize this, universities can be a basic step towards achieving goals.

This experiential learning model has advantages: (1) Improving students' learning of disaster countermeasures, encouraging their ability to do important work, and to be respected. (2) Improving problem solving skills. (3) Making students become more active and successfully solving complex problems, (4) Improving collaboration, (5) Encouraging students to develop and practice communication skills. (6) Improving students in managing resources. (7) Giving the experience of students to manage to take concrete actions, and to make time allocation for problem solving. (8) Providing real-life learning experiences. (9) Making the atmosphere more pleasant (Kolb, 2014; Moon, 2013).

Experience-based learning is basically an effort to direct students into the learning process so that they can achieve learning goals in accordance with what is expected (Nomba et al., 2018). In the effort of students to achieve learning goals, it requires concrete student involvement so that they are able to experience and reflect the results of these activities (Davies, 2016). The experiential learning model emphasizes two interrelated approaches in understanding experiences, which is concrete experiences and abstract conceptualizations and two approaches in changing experiences, which is reflective observation and active experimentation (Ives-Dewey, 2009; Kolb, 2014).

Life experiences can be used as a source of learning lesson topic in schools (Ives-Dewey, 2009). Life experience is thought to have an effect in the cognitive development, emotional intelligence and behavior of students (Irawan et al., 2018). The application of experiential learning models can accommodate the life experiences experienced by students directly. Life experience of a tidal flood disaster is often experienced by students on the coast of Madura Island, Indonesia. The application of experiential learning model has been carried out by various previous researchers, application in the fields of biology, urban planning and economics (Ives-Dewey, 2009; Kotval, 2003), digital game-based learning (Kiili, 2005), learning of health informatics and bioinformatics (Ankem et al., 2019; Mallawaarachchi et al., 2018), learning promotes healthy brain development in children (Steele & Neimann, 2020), tradition, culture and history of Norwegians (Løvoll, 2019), influential in improving reading comprehension and ability to recognize vocabulary (Syafrizal et al., 2019), enhance critical thinking skills (Marni et al., 2019; Nurhasanah et al., 2017; Sari et al., 2019), learning achievement and care for the environment (Irfianti et al., 2016; Purnomo, 2015; Suryani et al., 2014; Trinugroho, 2017). However, the application of experiential learning models that examine the acquisition of student learning values and abilities in disaster countermeasures education has not been much studied by previous researchers.

Research Problems

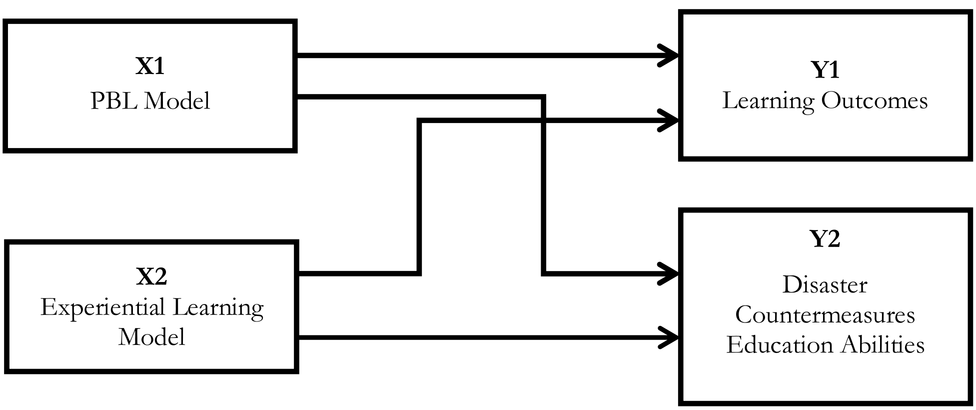
Preparing students' to have preparedness in the community, this research conducted to cover problems;

- Is there an effect of PBL model on learning outcomes of high school students?,
- Is there an effect of PBL model on disaster education abilities of high school students?,
- Is there an effect of experiential learning model on learning outcomes of high school students?,
- Is there an effect of experiential learning model on disaster education abilities of high school students?.

Method

Research Design

This quantitative study used a quasi-experimental design by applying the non-equivalent pretest and posttest control groups using 3 x 2 factors. There were three independent variables and two dependent variables. The independent variable was the conventional learning model (control class), problem-based learning model (experimental class I) and experiential learning model (experimental class II). The dependent variable was the learning outcomes of geography and the ability of education in disaster countermeasures. The following research flowchart is explained in figure 1.



Notes:
X1 = Problem Based Learning Model
X2 = Experiential Learning Model
Y1 = Learning Outcomes
Y1 = Disaster Countermeasures Education Abilities

Figure 1.
Research Flowchart

The description of experimental research designs can be seen in Table 1.

Table 1.
Experimental Research Design

Pretest	Group	Post-test
O1	X_1 Y1 Y2	O2
O3	X2 Y1 Y2	O4
O5	X3 Y1 Y2	O6

Notes:

O1, O3, O5 = Pre-test (Learning Scores and Disaster Education Ability)
O2, O4, O6 = Post-test (Learning Scores and Disaster Education Ability)
X1 = Conventional Learning Model
X2 = Problem Based Learning (PBL) Model
X3 = Experiential Learning Model
Y1 = Senior High School I Sampang
Y2 = Senior High School I Torjun

The first step of research was to determine the control group and the experimental group. The second step was students' work on the pretest of learning outcomes and disaster education abilities. The third step was the treatment for the experimental group number 1 using the PBL model and the experimental group number 2 using the experiential learning model, while the control group used conventional learning. The final step of the study was that students' work on a post-test related to learning outcomes and disaster countermeasures education abilities. The following are the stages of experimental class activities that apply experiential learning.

Participants

The population is a set of units for complete analysis and the subject being studied (Gall et al., 2006). The study population was 288 students in class XI of Senior High School 1 Sampang and Senior High School 1 Torjun. In Senior High School 1 Sampang, the research classes used were class XI IIS 1, XI IIS 2, XI IIS 3, while the research classes at Senior High School I Torjun used were class XI IIS 4, XI IIS 7, XI IIS 8 with a total sample of 168 students. Sampling used a systematic random sampling technique that was taking samples taking classes that have almost the same ability (Gall et al., 2006).

Data Collection Tools and Data Analysis

The instrument used in this study was an observation sheet for PBL model variables and experiential learning models. The instrument for measuring learning value variables and disaster education ability used an essay test. Tests carried out in the form of normality tests, homogeneity tests and one way ANOVA. Tests was carried out using SPSS version 21 for windows.

Process

The stages on learning activities conducted for students on experimental class was:

Stage of Real Experience

Students and teachers did an introduction to the real conditions of the environment that potential for disasters, which is coastal abrasion and waste from fishermen. Picture followed below:

Waste for fishermen

Learn about the environment

Learn about the abrasion

Photo 1.

Photos of Real Experience Stage

Stage of Reflection Observation

This stage was to reflect on observation of areas prone to abrasion and waste on the beach. The reflection aimed to help students get to know the environment and plan solution out to anticipate the disaster of coastal abrasion and waste on the beach. More detail pictured below:

Reflection session with teachers

Plan the solution

Get result from reflection session

Photo 2.

Photos of Reflection Observation Stage

Stage of Conceptualization

The teacher gave an understanding of natural resource management and disaster mitigation lesson topic. Students discussed activity plans to anticipate coastal abrasion disasters and waste around the beach. †hey planned to plant mangrove seeds and clean up waste around the mangrove location. These activities can be seen in the following pictures:

Discuss session

Teachers help student plan

Choose mangrove seeds

Photo 3.
Photos of Conceptualization Stage

Stage of Implementation

In this stage, students conducted concrete activities in anticipation of coastal abrasion disasters and cleaning activities around the mangrove location. The activity guided by the teacher so that the implementation went well. Details can be seen in below:

Planting session

Take mangrove seeds

Plant

Photo 4.

Photos of Implementation Stage

This research was conducted for six weeks or 1.5 months with a duration of six meetings from the beginning of April to May 2019 (Even Semester 2018/2019). This research was applied to lesson topic that is taking place in class XI, which is lesson topic management of natural resources and the environment and disaster mitigation. This lesson was delivered for 90 minutes at each meeting.

Results

Scores Results of Geography in Pretest and Posttest

Learning outcomes and educational skills in disaster countermeasures in high school students in terms of the application of conventional learning models, models of problem-based learning and experiential learning can be seen in the following table.

Table 2.

Description of Geography Scores (Pretest) of Senior High School 1 Torjun

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Control	33	69.5455	3.27959	.57090	68.382	70.708	63.00	76.00
PBL	33	68.8182	2.63930	.45944	67.882	69.754	64.00	76.00
Experiential Learning	29	68.3103	3.60658	.66972	66.938	69.682	63.00	75.00
Total	95	68.9158	3.18795	.32708	68.266	69.565	63.00	76.00

Based on table 2, the geography scores in the pretest of the three research classes at Senior High School 1 Torjun is not too significantly different. This can be seen from the average value of 68.9158 and the average standard deviation of 3.18795. The highest average geography learning score was 76 and the lowest average geography learning score was 63. These results prove that the three research classes have almost the same geography learning ability and research can be conducted in these three classes. The value of learning geography of students of Senior High School 1 Torjun obtained after the application of conventional learning models, PBL and experiential learning can be seen in table 3.

Table 3.

Description of Geography Scores (Post-test) of Senior High School 1 Torjun

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Control	33	78.1818	3.06650	.53381	77.094	79.269	71.00	84.00
PBL	33	81.9394	3.73279	.64980	80.615	83.263	75.00	90.00
Experiential Learning	29	90.0000	1.38873	.25788	89.471	90.528	87.00	93.00
Total	95	83.0947	5.67202	.58194	81.939	84.250	71.00	93.00

The average geography learning value described in table 3 was 83.0947 with a standard deviation of 5.67202. The highest value of the posttest score was 93 and the lowest value was 71. The geography learning value increased due to the application of the geography learning model conducted for six weeks. Meanwhile, the pretest and posttest geography learning scores of students at Senior High School 1 Sampang can be seen in tables 4 and 5.

Table 4.
Description Geography Scores (Pretest) of Senior High School 1 Sampang

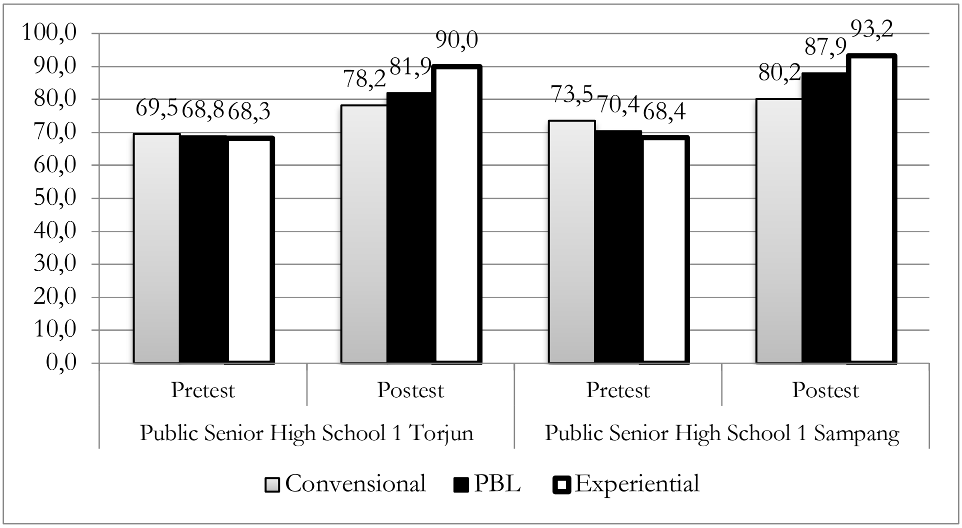
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Control	24	73.5417	3.34897	.68361	72.127	74.955	67.00	78.00
PBL	24	70.3750	3.39837	.69369	68.940	71.810	65.00	77.00
Experiential Learning	25	68.3600	3.77359	.75472	66.802	69.917	63.00	75.00
Total	73	70.7260	4.07997	.47752	69.774	71.678	63.00	78.00

Pretest conducted on the three research classes showed an average value of 70.7260 with a standard deviation of 4.07997. The average highest score was 78 and the lowest average score was 63. Meanwhile, the average posttest scores can be seen in table 5.

Table 5.
Description of Geography Scores (Posttest) of Senior High School 1 Sampang

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Control	24	80.1667	2.68112	.54728	79.034	81.298	75.00	84.00
PBL	24	87.9167	1.52990	.31229	87.270	88.562	85.00	90.00
Experiential Learning	25	93.2400	2.22261	.44452	92.322	94.157	89.00	96.00
Total	73	87.1918	5.83252	.68264	85.831	88.552	75.00	96.00

The acquisition of posttest scores from the three research classes at Senior High School 1 Sampang can be explained that the average scores was 87.1919 with a standard deviation of 5.83252. The highest average scores obtained was 96 while the lowest average geography learning outcomes was 84. Based on the pre-test and post-test, geography learning scores of the six research classes required further analysis, the details can be seen in graph 1.



Graph 1.
Comparison of Geography Learning Scores in the Research Classes

According to comparison of the Geography learning scores displayed by graph 1, it can be explained that there is an increase in the geography learning scores from pretest to posttest. In addition, the geography learning scores at the posttest in a research class applying conventional learning was lower than the research class applying the PBL model and experiential learning model. This was evidenced by the posttest scores of conventional learning class at Senior High School 1 Torjun that is only obtaining an average value of 78.2 and lower than PBL model class with a value of 81.9 while the experiential learning model class has a value of 90. The posttest average scores of learning outcomes of conventional class in Senior High School 1 Sampang was 80.2. It was lower than the posttest score of PBL model class that was equal to 87.9 and both of these classes had lower average scores compared to the learning outcomes of experiential learning model class with the score of 93.2. Based on the application of experiential learning models in both classes of research, it can be seen that there is an increase in the value of learning geography that is higher than other classes applying conventional learning models and PBL models.

Test for Average Difference

The tests were carried out using the one way ANOVA test (for more than 2 treatment groups). Before the test was carried out, there were underlying assumptions namely data normality using the Kolmogorov-Smirnov test, and homogeneity test of variance between groups with Levene's test. If the data used does not meet one or all of the assumptions, a replacement test was carried out, namely the Kruskal-Wallis test. If the one way ANOVA test results were significant, a LSD follow-up test was carried out. The Kruskal-Wallis test used the Mann-Whitney test. If the notation of the results of further tests was the same between the 2 treatments, it showed that the results were not significantly different, and if the notation was different, the results showed a significantly different between the two treatments. The analysis hypotheses used were as follows:

H_0: There was no significant difference in the average between the control group, the experimental group I (PBL) and the experimental group II (Experiential learning) based on learning outcomes and disaster education abilities;
H_1: There are significant mean differences between the control group, the experimental group I (PBL) and the experimental group II (Experiential learning) based on learning outcomes and disaster education abilities;

With the following testing criteria:

1. If the value of F count > F table (chi-square count> chi-square table), or a significance value <0.05, then **H_0 is rejected**;
2. If the calculated F value <F table (chi-square count <chi-square table), or the significance value> 0.05, then **H_0 is accepted**.

Geography Scores Variable (Pretest) of Senior High School 1 Torjun
One way ANOVA analysis carried out to see differences in the average number of geography scores of the research class applying conventional learning models, PBL models and experiential learning can be seen in table 6.

Table 6.
The Average of Geography Scores (Pretest) in Every Treatment

Group	Average	Standard of Deviation	Notation
Control	69.5455	3.27959	a
PBL	68.8182	2.63930	a
Experiential Learning	68.3103	3.60658	A

Based on table 6, it can be seen that the highest average of geography scores (pretest) in the control class is 69.55 ± 3.28, and the lowest average of geography scores (pretest) in the experiential learning class is 68.31 ± 3.61. To prove whether there is a significant difference in the average of geography scores (pre-test) between groups, one way ANOVA statistical analysis was performed after its normality and homogeneity were tested.

The results of the normality test with the Kolmogorov-Smirnov test showed a significant value greater than α (0.075>0.05), then the data were normally distributed. Significance value in the homogeneity test of data variance is greater than α (0.092>0.05) proved homogeneous data variation. Because the data used has met the assumptions, one way ANOVA test was performed.

Based on the one way ANOVA test results, the F count value was smaller than the F table (1,187 <3,094), and a significance value greater than α (0.310> 0.050), the decision **H_0 is accepted**. Based on this result, it can be concluded that there are insignificant differences in the average number of geography scores (pretest) between groups. It can be seen in the average geography pretest value of Senior High School 1 Torjun between classes that is relatively not too much different.

Geography Value Variables (Post-test) of Senior High School 1 Torjun

After the posttest was done, it is necessary to analyze the learning value of the research class to see the difference from the application of the learning model. The detail can be seen in table 7.

Table 7.
The average of Geography Value (Post-test) in Every Treatment

Group	Average	Standard of Deviation	Notation
Control	78.1818	3.06650	a
PBL	81.9394	3.73279	b
Experiential Learning	90.0000	1.38873	c

Based on table 7, it can be seen that the average of highest average of geography scores (posttest) in the experiential learning class is 90.00 ± 1.39, and the lowest average of geography scores (posttest) in the control class is 78.18 ± 3.07. To prove whether there is a significant difference in the geography average scores (posttest) between groups, then one way ANOVA statistical analysis was conducted after its normality and homogeneity were tested.

The results of the normality test with the Kolmogorov-Smirnov test showed a significance value smaller than α (0.000<0.05), so the data were not normally distributed. Significance value in the homogeneity test of data variations smaller than α (0.000<0.05) proved that the data types are not homogeneous. Because the data used did not meet the assumptions, a Kruskal-Wallis replacement test was performed.

Based on the results of the Kruskal-Wallis test, the calculated chi-square value is greater than the chi-square table (65,735> 5,991), and the significance value is smaller than α (0,000 <0.050), the **H_0 decision is rejected**. So it can be concluded that there are significant differences in the average of geography scores (posttest) between groups. To see the differences, Mann-Whitney advanced tests was performed. Based on the Mann-Whitney advanced test results, it can be seen that the average geography learning outcomes (posttest) is highest in the experiential learning class and significantly different from the control class and PBL class. The average geography scores (posttest) of the control class is also significantly different from the PBL class.

Variable of Disaster Education Ability Scores (Senior High School 1 Torjun)
The application of the research class learning model at Senior High School 1 Torjun in influencing the ability of disaster education can be seen in table 8.

Table 8.
The Average of Disaster Education Ability Scores in Treatment Class

Group	Average	Standard of Deviation	Notation
Control Class	76.8788	2.30160	a
PBL Class	81.6061	3.88056	b
Experiential Learning	89.0000	2.72554	c

Based on table 8, it can be seen that the highest average of the disaster education ability scores in experiential learning class is 89.00 ± 2.73, and the lowest average of the disaster education ability scores in the control class is 76.88 ± 2.30. To prove whether there is a significant difference in the average of disaster education ability scores between groups, then one way ANOVA statistical analysis was carried out after its normality and homogeneity were tested.

The results of the normality test with the Kolmogorov-Smirnov test showed a significance value smaller than α (0.000<0.05), so the data were not normally distributed. Significance value in the homogeneity test of data variations smaller than α (0.003<0.05) proved that the data types were not homogeneous. Because the data used did not meet the assumptions, then a replacement test for Kruskal-Wallis was conducted.

Based on the results of the Kruskal-Wallis test, the chi-square count that is greater than the chi-square table (63.361> 5.991) was obtained, and the significance value is smaller than α (0.000 <0.050) so that the **H_0 decision is rejected**. Therefore, it can be concluded that there are significant differences in the average number of disaster education ability scores between groups. To see the differences, Mann-Whitney advanced tests were performed. From the results of Mann-Whitney advanced tests, it can be seen that the highest average of disaster education ability scores is in the experiential learning class and significantly different from the control class and PBL class. The average scores of disaster education ability of the control class is also significantly different from the PBL class.

Variable Geography Scores (Pretest) of Senior High School 1 Sampang
The geography score of the students of Senior High School 1 Sampang shows a difference. The scores difference between classes of research can be seen in table 9.

Table 9.

The Average of Geography Scores (Pretest) in Every Treatment

Group	Average	Standard of Deviation	Notation
Control Class	73.5417	3.34897	c
PBL Class	70.3750	3.39837	b
Experiential Learning	68.3600	3.77359	a

Based on table 9, it can be seen that the highest average of the geography scores (pretest) in the control class is 73.54 ± 3.35, and the lowest average of the geography scores (pretest) in the experiential learning class is 68.36 ± 3.77. To prove whether there is a significant difference in the average of geography scores (pre-test) between groups, one way ANOVA statistical analysis was performed after normality and homogeneity were performed.

The results of the normality test with the Kolmogorov-Smirnov test showed a significant value greater than α (0.073>0.05), then the data were normally distributed. Significance value in the homogeneity test of data variance is greater than α (0.672>0.05) proved homogeneous data variation. Because the data used has met the assumptions, one way ANOVA test was performed.

Based on the one way ANOVA test results, the F count value is greater than the F table (13,476> 3,128), and the significance value is smaller than α (0,000 <0.050) so that the **H_0 decision is rejected**. Therefore, it can be concluded that there are significant differences in the average of geography scores (pretest) between groups. To see the difference, LSD advanced test. Based on the LSD advanced test results, it can be seen that the highest average geography scores (pretest) in the control class and significantly different from the PBL class and experiential learning class. The average geography scores (posttest) of the PBL class was also significantly different from the experiential learning class.

Variable of Geography Scores (Post-test) of Senior High School 1 Sampang

Each research class has a different geography learning value after applying the learning model. Statistical differences in the value of learning geography can be seen in table 10.

Table 10.

The Average of Geography Scores (Post-test) in Each Treatment

Group	Average	Standard of Deviation	Notation
Control Class	80.1667	2.68112	a
PBL Class	87.9167	1.52990	b
Experiential Learning	93.2400	2.22261	c

Based on table 10, it can be seen that the highest average geography scores (posttest) in the experiential learning class is 93.24 ± 2.22, and the lowest average geography scores (posttest) in the control class is 80.17 ± 2.68. To prove whether there is a significant difference in the average of geography scores (posttest) between groups, one way ANOVA statistical analysis was performed after normality and homogeneity tests were performed.

The results of the normality test with the Kolmogorov-Smirnov test showed a significance value smaller than α (0.018<0.05), so the data were not normally distributed. Significance value in the homogeneity test of data variance is greater than α (0.063>0.05) proved homogeneous data variation. Because the data used does not meet the assumption of normality, a replacement test for Kruskal-Wallis was then performed.

Based on the results of the Kruskal-Wallis test, the chi-square count value is greater than the chi-square table (62.877>5.991), and the significance value is smaller than α (0.000<0.050) so that the **H_0 decision is rejected**. Therefore, it can be concluded that there are significant differences in the average of geography scores (posttest) between groups. To see the differences, Mann-Whitney advanced tests was performed. Based on the Mann-Whitney test results, it can be seen that the highest average geography scores (posttest) is in the experiential learning class and significantly different from the control class and PBL class. The average geography scores (posttest) of the control class is also significantly different from the PBL class.

Variable of Disaster Education Ability Scores (Senior High School 1 Sampang)

Disaster education ability of students of Senior High School 1 Sampang after the adoption of conventional learning models, PBL models and experiential learning can be explained based on table 11.

Table 11.

The Average of Disaster Education Ability Scores in the Treatment Class

Group	Average	Standard of Deviation	Notation
Control Class	79.2083	2.02117	a
PBL Class	88.1250	1.56906	b
Experiential Learning	91.4000	1.32288	c

Based on table 11, it can be seen that the highest average of disaster education ability score in experiential learning class is 89.00 ± 2.73, and the lowest average of the disaster education ability score in the control class is 76.88 ± 2.30. To prove whether there is a significant difference in the average of disaster education ability scores between groups, one way ANOVA statistical analysis was carried out after normality and homogeneity were tested.

The results of the normality test with the Kolmogorov-Smirnov test showed a significance value smaller than α (0.000<0.05), so the data were not normally distributed. Significance value in the homogeneity test of data variance is greater than α (0.261>0.05) proved homogeneous data variation. Because the data used does not meet the assumption of normality, then a replacement test for Kruskal-Wallis was performed.

Based on the results of the Kruskal-Wallis test, the chi-square count score is greater than the chi-square table (61,738>5,991), and the significance value is smaller than α (0,000<0.050) so that the **H_0 decision is rejected**. Therefore, it can be concluded that there are significant differences in the average of disaster education ability scores between groups. To see the difference, Mann-Whitney advanced test was performed. Based on the results of Mann-Whitney advanced test, it can be seen that the highest average of disaster education ability scores is in the experiential learning class and significantly different from the control class and PBL class. The average of disaster education ability score of the control class is also significantly different from the PBL class.

Discussion and Conclusion

Based on the results of the analysis of research data, it can be formulated that there is a significant influence of the PBL model on learning outcomes, there is a significant influence on the PBL model on disaster education ability, there is a significant influence on experiential learning models on learning outcomes and there is a significant influence of the experiential learning model on disaster education abilities. The experiential learning model has a higher influence on learning outcomes than the PBL model. The experiential learning model has a higher influence on the ability of disaster education than the PBL model. There was a significant average difference between the control class, experimental class I and experimental class II at Senior High School 1 Sampang and Senior High School 1 Torjun on the variable geography scores (pretest), geography scores (posttest), and the disaster education ability scores, with each significant scores is smaller than 0.05.

The advantages of applying experiential learning models in increasing the students' learning scores compared to conventional learning and PBL models are also supported by the results of previous studies (Irfianti et al., 2016; Mallawaarachchi et al., 2018; Purnomo, 2015; Suryani et al., 2014; Trinugroho, 2017). The increasing of geography learning scores in students applying experiential learning was due to the syntax of learning that was students observing and reflecting (Mallawaarachchi et al., 2018). This stage was thought to stimulate students' critical thinking abilities towards real-life experiences and able to improve students abilities in reading comprehension (Nurhasanah et al., 2017; Syafrizal et al., 2019). Besides the observation and reflection stages, another syntax that is able to improve student learning outcomes was the conceptualization syntax. The conceptualization syntax helps students to keep in mind and understand practical applications such as events that are experienced so that they are able to master the basics of the material tested at posttest (Healey & Jenkins, 2000; Kiili, 2005; Mallawaarachchi et al., 2018; Moon, 2013; Trinugroho, 2017). The implementation phase contributed to the increasing value of learning geography because students carried out activities directly in the field to be able to develop individual abilities and turn them into disaster countermeasures skills (Kurniawan et al., 2019). This activity can also teach students to solve problems in their environment (Aliman et al., 2019). Resolving these environmental problems is a human responsibility in reducing the potential for disasters (Ridhwan et al., 2019).

Increased ability of disaster education in research classes that apply the experiential learning model is influenced by students' real experiences. This is consistent with the syntax of experiential learning namely the real experience stage (Ives-Dewey, 2009; Kolb, 2014; Sumarmi, 2015). Students' experiences during disasters become memories that is difficult to erase. However, memories of such disasters can be managed well into disaster mitigation abilities (Bachri et al., 2015; Irawan et al., 2018). In addition to a strong memory formed from experience, experiential learning is also a contextual learning that gives freedom to students to understand the lesson topic, the surrounding environment including understanding disaster mitigation (Immaniar et al., 2019).

The results of this study support several studies that have used experiential learning models including: the outdoor experiential learning model has a better influence on students' environmental care attitudes on natural science and biology subjects that show t count greater than t table (Suryani et al., 2014; Trinugroho, 2017). Experiential learning also has a positive effect on student achievement, student behavior in water conservation and developing environmental care characters (Immaniar et al., 2019; Irfianti et al., 2016; Mallawaarachchi et al., 2018; Nurhasanah et al., 2017; Trinugroho, 2017). Based on the result of this study, experiential learning that based on experience learning activities such as making observations and taking concrete actions in the environment can increase the sensitivity, activeness of students in finding something or a problem, improve the skills of students during a series of learning, and do disaster education to the community.

Recommendations

This study recommends that all teachers who teach in schools in areas of potential disaster to implement experiential learning. This research can be developed using other educational variables in the context of qualitative or quantitative research.

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