The Effectiveness Of Problem-Based Learning (PBL) And Project-Based Learning (PJBL) Learning Models On Disaster Mitigation Materials On Learning Motivation Of Xi Social Studies Class

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Abstract.

The purpose of this research is (1) Researchers want to know the learning motivation of students in disaster mitigation material if using the PBL model, (2) Researchers want to know the learning motivation of students in disaster mitigation material if using the PJBL model. This research method uses quantitative methods with a quasi-experimental approach. This research was conducted in two classes, namely class XI IPS 2 as the first experimental group with a project-based learning method (PBL) and class XI IPS 3 as the second experimental group with a problem-based learning method (PBL). The analysis used is the MANOVA analysis technique, which is a multivariate analysis to test stimulate differences between two or more dependent variables. The results of this study are: (1) the PjBL learning model is effectively used in the first experimental class (2) the PBL learning model is effectively used in the second experimental class.

Keywords: *Problem-Based Learning (PBL), Project-Based Learning (PjBL), MANOVA and Learning Motivation.*

I. INTRODUCTION

Natural disasters such as earthquakes, volcanic eruptions, tsunamis, floods, landslides, forest and land fires, and droughts often occur in Indonesia. Law of the Republic of Indonesia No. 24 of 2007 on disaster management defines disaster as an event or series of events that threaten and disrupt the life or livelihood of the community caused by neither natural factors nor non-natural factors and human factors resulting in human casualties, environmental damage to property, and psychological impact. To reduce disaster risk, disaster management in the form of disaster mitigation is necessary. Public awareness of disaster needs to be increased, and schools are one of the right institutions to play a role in agents of change towards a culture of disaster preparedness and mitigation starting from school age. (Johan et al., 2021) said that school institutions can collaborate on disaster mitigation awareness and education in schools through class-based science content on the discussion of earth science or geography.

Learning disaster mitigation from geography is expected so that students can have a high level of preparedness for disasters that can occur at any time and anywhere.Given that geography plays an important role in the application of disaster mitigation for students, it is unfortunate that geography subjects themselves, in reality, have quite a bit of interest, students have difficulty understanding geography subjects, so geography subjects are considered boring which causes students' learning motivation to decrease in geography lessons. The learning process carried out by an educator should ideally use interesting models, methods, or media so that students are interested in participating in the learning process (Sudargono & Khabibur, 2019).One way that can be used to increase students' motivation to learn based on the background above is to use problem-based learning (PBL) and project-based learning (PjBL) models. this learning model is a problem-oriented learning model that must be solved by students. So, it is hoped that by applying these two learning models, the motivation of students can increase.

II. METHODS

This research refers to a quantitative approach, according to Moh. Kasiram (Djollong, 2014) quantitative research itself is a process of determining knowledge that uses data in the form of numbers as a tool to analyze information about what you want to know. The type of research used in this study is the quasi-experimental research method. Quasi-experiment or pseudo-experiment is better called pre-experimental because this experiment still uses group comparison (Ratminingsih, 2010).This research was conducted in class XI IPS at SMAN 1 TAWANGSARI the population in this study were all students of class XI IPS at SMAN 1 Tawangsari which amounted to 3 classes. With the research sample taken by random sampling of 3 classes XI IPS taken only 2 classes randomly.Data collection used in this study is questionnaire learning motivation, observation, and documentation.

The research stages are in the form of pre-experiment stages (preparing everything needed in the experiment), experimental stages (learning motivation before treatment, giving treatment, and learning motivation questionnaire after treatment), and experimental stages (data processing analyzed using statistical calculations).The instrument analysis test is carried out in three stages, namely: 1. Determination of research instruments, namely non-test research instruments consisting of learning motivation questionnaire instruments. 2. Test the instrument, namely the research instrument was first tested on the population outside the sample, to know the quality of instruments such as the level of validity, and reliability. This instrument trial was conducted in class XII IPS. 3. Instrument validity is said to be valid if the instrument can measure what is desired and can explain the data from the variables studied precisely. The validity used is content validity. 4. The reliability test used to calculate the learning motivation trial test and student learning outcomes is the Alpha Cronbach formula The alpha formula is used to estimate the reliability of instruments whose scores are not only 1 and 0, but also a polytomous scale, for example, using a questionnaire (Likert scale 1-2-3-4-5) or description form questions (The maximum score can depend on the researcher). The Alpha formula is as follows:

$$\alpha = \left(\frac{k}{k-1}\right)\left(1 - \frac{\sum \sigma i^2}{\sigma t^2}\right)$$

The data analysis technique used in this study is the MANOVA analysis technique which is an extension of the ANOVA analysis technique. MANOVA, whose use is not limited, can involve two or more independent variables.

III. RESULT AND DISCUSSION

This research involves two classes, namely XI IPS 2 and XI IPS 3 classes using two learning models that are based on group investigation settings, where in the teaching and learning process, the teacher provides opportunities for students to develop their creativity and productivity in thinking and collaborating with their peers. Two learning models, namely PBL and PjBL, have the same strength, namely centered on students.

Geography learning motivation data that will be described consists of pre-test data and post-test data. Pre-test data is obtained from a test before being given treatment that has been carried out by researchers in two experimental classes, namely class XI IPS 3 with the PBL model and class XI IPS 2 with the PjBL model, while post-test data is obtained from a test after being given treatment or learning. The results of student statement data are divided into a Likert scale which has a score of 1-5 where the Likert scale is divided into two forms, namely negative statements and positive statements which can be measured from the following table:

Table 1. Questionnaire Score Statements

Questionnaire Category	Positive Question Score	Negative Question Score
Strongly Agree	5	1
Agree	4	2
Moderately Agree	3	3
Disagree	2	4
Strongly Disagree	1	5

In this study, researchers used 10 statement questions that were shown to students, so the following are the results of the statement score and the results of the student learning motivation category:

Table 2. Learning Motivation Questionnaire Category Score

Learning Motivation Category	Score
Very High	41-50
High	31-40
Moderately High (Medium)	21-30
Less High (Low)	11-20
Not High (Very Low)	1-10

The results of the geography learning motivation test in both classes before and after treatment are as follows:

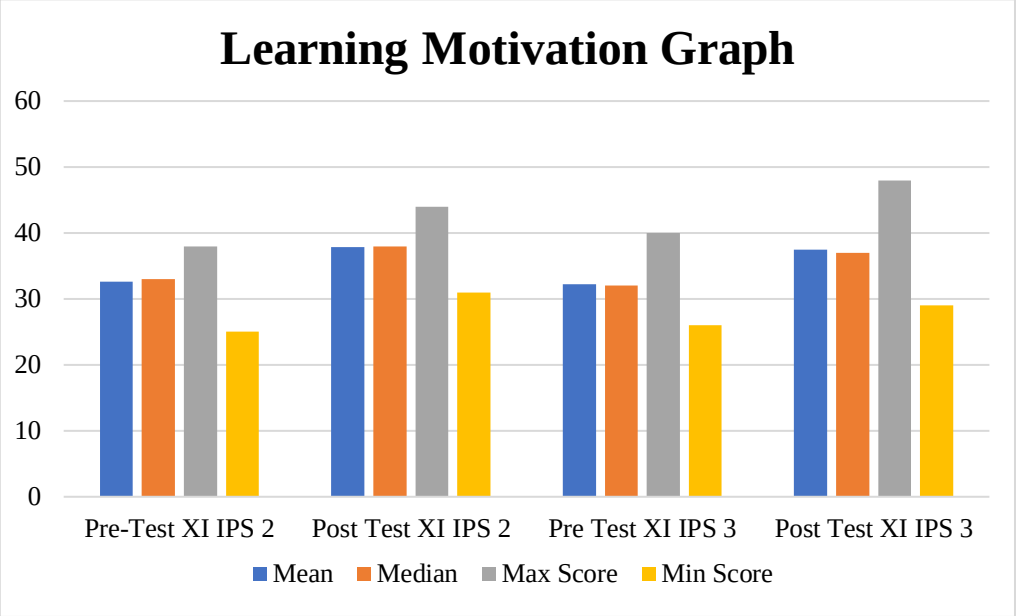

Fig 1. Learning Motivation Graph

Table 3. Pre-Test and Post-Test Results of Learning Motivation

	XI IPS 3 (PBL)		XI IPS 2 (PjBL)	
	Pre-Test	***Post-Test***	***Pre-Test***	***Post-Test***
Mean	32,26	37,43	32,64	37,89
Median	32	37	33	38
Max	40	48	38	44
Min	26	29	25	31

Based on the table above, it can be concluded that there is no significant difference in learning motivation between class XI IPS 2 and XI IPS 3 before the treatment and when the treatment was given. However, there is a change in learning motivation when both classes are given treatment, namely where the average value of both classes has increased from a score of 32 with a moderate learning motivation category but leads to less learning motivation, given the treatment the score changes to 37 with a moderate learning motivation category but leads to high learning motivation.

Table 4. Normality Test for Learning Motivation

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Class		Statistic	df	Sig.	Statistic	df	Sig.
Learning Motivation	Pre-Test PjBL (XI IPS 2)	0,113	36	.200*	0,966	36	0,336
	Post-Test PjBL (XI IPS 2)	0,114	36	.200*	0,970	36	0,414
	Pre-Test PBL (XI IPS 3)	0,132	35	0,126	0,959	35	0,217
	Post-Test PBL (XI IPS 3)	0,124	35	0,189	0,967	35	0,372

The normality test is carried out to determine whether the research data is normally distributed or not. In parametric statistics, two types of normality tests are often used, namely the Kolomogorov-Simirnov and Shapiro-Wilk tests which say that data is considered normal if the significant value is greater than 0.05. Based on the table above, the results show that each test has a significant value of more than 0.05, which means that the normality test of learning outcomes shows that the data is normal.

Table 5. Pre-Test "Levene" Variance Homogeneity Test

Levene's Test of Equality of Error Variances[a]
Pre-Test

		Levene Statistic	df1	df2	Sig.
Pre-Test Learning Motivation	Based on Mean	1,696	1	69	0,197
	Based on Median	1,670	1	69	0,201
	Based on the Median and with adjusted df	1,670	1	68,977	0,201
	Based on trimmed mean	1,691	1	69	0,198

The Levene statistic method is used to compare the variance in each variable specifically or individually. The following are the test criteria:

1. If the value> 0.05 then the data has the same variance (Homogeneous)
2. If the value <0.05 then the data has a different variance (not homogeneous).

Based on the results of the table above, it shows that the sig or significant value in the pre-test test both in the learning motivation questionnaire test and in the learning outcomes question test is > 0.05 or more than 0.05, which means that both data in the PBL and PjBL learning model groups are homogeneous or the same.

Table 6. Post-Test "Levene" Variance Homogeneity Test

Levene's Test of Equality of Error Variances[a]
Post Test

		Levene Statistic	df1	df2	Sig.
Post-Test Learning Motivation	Based on Mean	0,516	1	69	0,475
	Based on Median	0,517	1	69	0,474
	Based on the Median and with adjusted df	0,517	1	68,825	0,474
	Based on trimmed mean	0,525	1	69	0,471

Based on the results of the table above, it shows that the sig or significant value in the post-test test both in the learning motivation questionnaire test and in the learning outcomes test is> 0.05 or more than 0.05, which means that both data in the PBL and PjBL learning model groups are homogeneous or the same.

Table 7. Box's M Test

Box's Test of Equality of Covariance Matrices[a]

Box's M	5,032
F	1,625
df1	3
df2	880158,282
Sig.	0,181

The first requirement for the MANOVA test is the Box's M test, the Box's M test is used to determine whether or not the variant/covariance matrix of a dependent variable is homogeneous. The following are the test criteria:

1. If the Sig value> 0.05 then the dependent variable covariance matrix has the same variant (Homogeneous)
2. If the sig value <0.05 then the covariance matrix does not have the same variance (not homogeneous).

Based on Box's M output, the gig value obtained is 0.181> 0.05. This means that the dependent variable covariance matrix has the same variance (homogeneous) so that the MANOVA test analysis can be continued.

After both hypothesis requirement tests are fulfilled, the next rule is to conduct a MANOVA hypothesis test. The decision on the MANOVA test was taken by analyzing Pillae Trace, Wilk Lamda, Hotelling trace, and Largest Root. Test criteria:

1. If the sig value <0.05 then H0 is rejected. This means that there is a significant influence between learning models on learning motivation and learning outcomes.
2. If the sig value > 0.05 then H0 is accepted. This means that there is no significant influence between the learning model on learning motivation and learning outcomes.

Table 8. MANOVA Test

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	0,995	7355.804[b]	2,000	68,000	0,000	0,995
	Wilks' Lambda	0,005	7355.804[b]	2,000	68,000	0,000	0,995
	Hotelling's Trace	216,347	7355.804[b]	2,000	68,000	0,000	0,995
	Roy's Largest Root	216,347	7355.804[b]	2,000	68,000	0,000	0,995
Class	Pillai's Trace	0,143	5.650[b]	2,000	68,000	0,005	0,143
	Wilks' Lambda	0,857	5.650[b]	2,000	68,000	0,005	0,143
	Hotelling's Trace	0,166	5.650[b]	2,000	68,000	0,005	0,143
	Roy's Largest Root	0,166	5.650[b]	2,000	68,000	0,005	0,143

Based on the post-test results output above, it can be seen that the relationship between the learning model and learning outcomes has a value of 5.650 with a sig value of 0.005. With a test criterion of 0.005 <0.05, H0 is rejected. This means that "there is a significant influence between PBL and PjBL learning models on the learning motivation of students in class XI IPS".

IV. CONCLUSION

Based on the results obtained it can be concluded that (1) The use of the PBL learning model in the second experimental class, namely XI IPS 3 class is effective, which can be seen from the increase in learning motivation, (2) The use of PjBL learning model in the first experimental class, namely XI IPS 2 is effective, where it can be seen from the increase in learning motivation.

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