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DESCRIPTION OF *THE JIGSAW* TYPE *COOPERATIVE* LEARNINGMODEL IN CLASS X MAN 2 PHYSICS LEARNING NORTH LABUHANBATU

Nurhalimah Sipahutar[1], Karya Sinulingga[2]
[1,2]Department of Physics, State University of Medan, Indonesia
E-mail:nurhalimah21220@gmail.com

ABSTRACT
The type of research used in this study is a quasi-experiment which aims to determine the effect of the Jigsaw type Cooperative learning model on the learning outcomes of grade X MAN 2 North Labuhanbatu students on learning vector subject physics. The subject matter of vectors is characterized by a Jigsaw-type cooperative learning model. The research design used was Pretest-Possttest Control Group Design. The population in this study was all 6 class X MAN 2 North Labuhanbatu students. The average number of students in each class is 36 people. The sample was selected as many as 2 classes using simple random sampling techniques. The samples in this study are class X Mipa 3 as a control class and class X Mipa 2 as an experimental class. The data collection method used was a test instrument (pretest and posttest) which was distributed to two sample classes then data analysis was carried out using Ms. Excel. Based on the calculation results of the hypothesis test using a one-party t test at the level of significance of 5% and dk = 36, a calculated value of 3.27 and a ttable value of 1.99 or tcalculate>ttable, so that it can be declared Ha accepted and H0 rejected. So based on the results of reflection on planned actions and discussion of research results, it can be concluded that physics learning carried out by applying the jigsaw type cooperative learning model affects student learning outcomes on vector material. The implementation of the Jigsaw tpecooperative learning model can significantly increase student activity in the teaching and learning process in physics learning.

Keywords: Cooperative Jigsaw type, Learning Outcomes, Vector

INTRODUCTION

Education is the most important thing in a sphere of life. Not only for life, but education is also the most important part of national development. The identity of a nation depends on education itself. Education plays an important role in creating a more qualified nation. Along with the times and influenced by the flow of globalization, the quality of learning needs to be improved.

Increasing the quality of education aims to be able to compete with the times and technology. The development of information technology today is growing rapidly. This is characterized by the increasing use of computers, smartphones, and internet networks. Various things can be done easily and quickly using these facilities, including in the world of education. Various learning models can also be developed using information technology, the jigsaw type cooperative learning model is one of them (Sukriadi, 2021).

Given the low learning outcomes of students and students' mastery of physics material caused by the learning model used by teachers is still traditional

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(conventional). Because students feel that this physics subject is difficult to learn, both in terms of a lot of material coverage and a lot of formulation. So that students first think negatively which results in a decrease in students' interest in learning and enthusiasm for learning in physics subjects. The conventional learning model used by teachers is only oriented to the target of mastering the material, learning like this is only successful in remembering the short term.

To synergize the modernization process and the quality of learning, it is necessary to change the paradigm carried out by teachers in carrying out the learning process in schools. Teachers are also required to be able to master and operate information technology and apply it in face-to-face learning. This aims to improve the quality of learning and the quality of graduates who can compete in this modern era.

Based on the identification of the above problems, it is necessary to improve the learning process. The solution to overcome these problems is a learning strategy that can stimulate or motivate students such as forming expert groups with their original groups to obtain good learning outcomes. Based on this description, one of the alternatives offered to be able to improve student learning outcomes is apply the Jigsaw-type cooperative learning model.

According to Agus Suprijono, "Cooperative learning is a broader concept, covering all types of group work, including forms that are more teacher-led or teacher-directed". The term cooperative in this case has a broader meaning, which describes the entire social process in learning and includes a collaborative sense. According to Shaw in Agus Suprijono (2012: 57) in cooperative learning, a group is not just a group of people. is structured, groupness. as simply learning in a group.

The correct implementation of the procedures of the cooperative learning model will allow the teacher to manage the classroom more effectively.

Cooperative learning is a learning model with a small team grouping system, which is between four to six people who have different academic ability backgrounds, genders, races, or ethnicities. According to Anita, cooperative learning is mutual aid learning or a learning system that provides opportunities for students to work together with other students in structured tasks. This strategy is now a concern and recommended by education experts to be used (Sanjaya, 2010).

According to Agus Suprijono, Jigsaw learning is cooperative learning where teachers divide classes into smaller groups. The number of groups depends on the concepts contained in the topic studied. If one class has 40 students, then each group has 10 people. The four groups are called origin groups, after the origin group is formed, the teacher distributes textual materials to each group. Next form an expert group, give it an opportunity to discuss. After that, go back to the original group and explain the results of the discussion to their respective groups.

Jigsaw-type cooperative learning is learning where students are responsible for learning the material and teaching it to other students. Jigsaw-type cooperative learning can improve various learning and teaching experiences and can improve students' social skills (Ministry of Education and Culture, 2017)

Based on this description, it is considered necessary to carry out further research to obtain data that shows the influence of the learning model applied by teachers on student motivation and learning outcomes. Therefore, a study was proposed entitled: "The Effect of Google Classroom-Assisted Jigsaw Type Cooperative Learning Model on Student Learning Outcomes on Vector Material)

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RESEARCH METHODS

Viewed from the point of view of students who are less active during the teaching and learning process, researchers plan to increase student enthusiasm and activity by applying a jigsaw-type cooperative learning model. To find out which model the researcher plans to have an effect, it is done by comparing between the experimental class and the control class.

The research design used in this study was pretest-postest control group design. In this design, students are given two tests, namely pretest and posttest tests. The research conducted involved two classes, namely the experimental class and the control class, both classes were given different treatment (Sugiyono, 2017). The experimental class was given a jigsaw-type cooperative learning model assisted by Google Classroom, while the control class was given a conventional learning model. Research design using the pretest-postest control group design model can be seen in the table 1 below:

Table-1. Pretest-Postest Control Group Design

Class	*Pretest*	Treatment	*Postest*
Ex	Y1	X	Y2
Control	Y1		Y2

Information:
Y1:*Pretest* in experimental class
Y2:*Postest*in experimental class
X: Treatment (Learning with *jigsaw-type* cooperative *model*assisted by *google classroom*)
Y1:*Pretest on control class*
Y2:*Postest*in control class

The research procedure in this study is as follows:

1. Prepare research instruments in the form of initial tests (pretest) to test student understanding and final tests (posttest) to see student development after receiving treatment.
2. Provide a pretest of vector material in the control class and experimental class.
3. Provide treatment to classes that are used as research subjects in the discussion of vector material.
4. Apply learning with conventional models in control classes and learning jigsaw-type cooperative models assisted by Google Classroom in experimental classes.
5. Provide posttest of vector material in both classes (experimental and control) with the same questions.
6. Assess the test results obtained from both classes by testing data analysis requirements, namely normality tests, homogeneity tests, and hypothesis tests (two-party t tests and one-party t tests).
7. Discussion of research results.
8. Conclusions and suggestions.

The results of measuring student learning outcomes were analyzed using Ms. Excel. The analysis used in the study for the data obtained during this study was analyzed with statistical formulas. To test the effect of the jigsaw-type

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cooperative learning model on student learning outcomes, it was analyzed using pretest and posttest scores as a result of experiments using the help of Ms. Excel.

1. Data homogeneity test
   a. The homogeneity test aims to determine whether a variance (diversity) of data from two more groups is homogeneous (the same) or heterogeneous (not the same).
   b. Homogeneous data is one of the requirements (not absolute requirements) in the independent sample t test.
   c. In this study, the homogeneity test was used to determine whether the variance of experimental class posttest data (jigsaw type cooperative) and control class posttest data (conventional) was homogeneous or not.
2. Data Normality Test

The normality test aims to find out whether the distribution of the two populations is normally distributed or not, to find out then the researcher uses the Ms. Excel data processing program.

3. Hypothesis Testing

Hypothesis testing in this study uses a t-test and is carried out in two ways, namely:

1) The initial ability test of students (two-party t test), two-party uji t is used to determine the similarity of students' initial abilities in both sample groups. This test is carried out at the time of collection of initial test data (pretest).
2) The student's final ability test (one-party t-test). One party t test is used to determine the effect of a treatment, namely the application of a jigsaw-type cooperative learning model assisted by Google Classroom on student learning outcomes on vector material. This test is carried out at the time of collection of final test data (posttest).

RESULTS AND DISCUSSION

Learning is done to strive for behavior change in individuals who learn. This aspect of change refers to the taxonomy of teaching objectives developed by Bloom, Simpson, and Harrow covering cognitive, affective, and psychomotor aspects. Based on this explanation, it can be concluded that learning outcomes are the abilities that students have after receiving their learning experience. These abilities include cognitive, affective, and psychomotor aspects. In cognitive processes, the process results in changes in aspects of thinking skills (cognitive), in affective learning results in changes in aspects of the ability to feel (affective), while psychomotor learning provides learning results in the form of skills (psychomotor). Learning outcomes can be seen through evaluation activities that aim to obtain evidentiary data that will show the level of student ability in achieving learning objectives. Based on relevant research, it was concluded that the Jigsaw learning model affects learning outcomes, this makes researchers interested in conducting similar research. Researchers argue that problems in thematic learning will be interesting if solved using the Jigsaw model.

The Jigsaw learning model is one of the learning models that can increase the learning success of students. The advantages of learning the Jigsaw model include activating the whole brain, focusing on the subject, helping to show the

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relationship between separate pieces of information. So that it will affect learning outcomes.

In this study, the data taken were the results of student learning on vector subjects.From this study, differences in student learning outcomes were obtained using a jigsaw-type cooperative learning model based on blended learning by utilizing Google Classroom with student learning outcomes using conventional learning models on vector material. The difference can be seen from the learning outcomes of students in the experimental class higher than the learning outcomes of control class students.

The following are the results of pretest and posttest calculations in the aspect of knowledge obtained from the results of research implementation in classes X MIPA-2 and X MIPA-3 MAN 2 North Labuhanbatu.

1. Pretest results of experimental class and control class

From the results of the study, the average initial ability (pretest) of the experimental class is 49.611 and the control class is 46.22 where in each class consists of 36 students. At the time of carrying out the pretest, there was the highest score from the experimental class, which was 73 and the lowest score was 33. While in the control class, the highest score was 67 and the lowest score was 33. Where the variance in the experimental class amounted to 128.42 and the variance in the control class amounted to 102.98. And the standard deviation in the experimental class amounted to 11.332 and the standard deviation in the control class amounted to 10.148. Data on pretest results in experimental classes and control classes can be seen in table 2 below:

Table 2. Pretestresult data in experimentalandcontrolclasses

Pretest *Data*	**Class**	
	Experiment	Control
Average (Mean)	49,61	46,22
Top Rated	73	67
Lowest Value	33	33
Standard deviation (S)	11,33	10,14
Variance (S^2)	128,41	102,97

2. Posttest*results of* experimental class and control class

The resultsofthecalculationof*posttestscores*, theaverageexperimentalclassamountedto 77.75 andthecontrolclasswas 69. At thetimeofcarryingout*theposttest, therewasthe*highestscorefromtheexperimentalclass, whichwas 93 andthelowestscorewas 53. While in thecontrolclass, thehighestscorewas 93 andthelowestscorewas 46. Wherethevariance in theexperimentalclassamountedto 119.16 andthevariance in thecontrolclassamountedto 137.08. Andthestandarddeviationorstandarddeviation in theexperimentalclassamountedto 10.91 andthestandarddeviation in thecontrolclassamountedto 11.70. Data on*posttest*results in experimentalclassesandcontrolmethodscanbeseen in table 3 below:

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Table-3. Posttestresult data in experimentalandcontrolclasses

Posttest *Data*	**Class**	
	Experiment	Control
Average (Mean)	77,75	69
Top Rated	93	93
Lowest Value	53	46
Standard deviation (S)	10,91	11,70
Variance (S^2)	119,16	137,08

*Fromthecalculationofthepretest-posttestvalueabove, theaveragevalueofthe*experimentalclasspretest*was 49.61 afterreceivingtreatmentusing* a jigsaw-type*cooperative*learning model based*onblendedlearning*byutilizing*Google Classroom*Learningachievementonvector material became 77.75. Fromthesecalculations, itcanbeseenthatthelearningoutcomesofstudentsafterapplyingthejigsaw-type*cooperative*learning model based*onblendedlearning*byutilizing*Google Classroom*increasedby 28.14%. Andtheaveragecalculationofinitialability in thecontrolclasswas 46.22 andafterreceivingtreatmentusingconventionallearningmodelsbecame 69. Fromthesecalculations, itcanbeseenthatthelearningoutcomesofstudentsafterapplyingconventionallearningmodelsincreasedby 22.78%.

3. Normality Test

Normalitytest testing wascarriedoutontwopiecesof data, namelycontrolclasspretest-posttestvalue*data andexperimentalclass*pretest-posttest*value data* . To testthenormalityofthetwo data, the Chi Square*Test formula (chisquaretest)*isused. The resultsofthenormalitytest in bothclassescanbeseen in table 4 below:

Table-4. NormalityTestResultsofexperimentalclassandcontrolclass

Data	**Class**	X^2_{hitung}	X^2_{tabel}	**Conclusion**
Pre Test	Experiment	6,575	7,814	**Usual**
	Control	7,378		
Post Test	Experiment	4,249		
	Control	**5,245**		

Based on the table above, experimental class pretest data was obtained with a value = 6.575 and experimental class posttest data with a value = 4.249, and control class pretest data obtained a value = 7.378 and control class 〖X〗_hitung^2 〖X〗_hitung^2posttest data obtained X_hitung^2a value = 5.245. With a significant level = 0.05 and n = 36, it can be obtained = 7.814. Then it can be concluded that the calculation data is normally distributed.X_hitung^2 αX_tabel^2.

4. Homogeneity Test

The homogeneity test is carried out to determine whether the class sample comes from a homogeneous population or not. In other words, homogeneity tests can also reinforce the belief that the data used are not much different in diversity. The results of homogeneity tests in both classes can be seen in table 5 below:

Table-5. TestResultsHomogeneityofexperimentalclassandcontrolclass

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Data	Class	Variance	Fcalculate	Ftabel	Conclusion
Pre Test	Experiment	128,415	1,247	1,757	**Homogeneous**
	Control	102,977			
Post Ttest	Experiment	118,663	1,155	1,757	
	Control	**137,085**			

From the calculation of the data above, Fis calculated <Ftable where in the pretest data obtained values = 1.247 and = 1.757 and in the posttest, data obtained values = 1.155 F_hitungF_tabeland = 1.757. So, from these calculations it can be concluded that HF_hitung F_tabel0 is accepted, meaning that the sample used in the study is declared homogeneous or can represent the entire population.

5. Test the two-party hypothesis.

Fromthetableofhypotheticaltestresults, itcanbeseenthatthevalueof$-t_{tabel}$<< where the $t_{hitung}t_{tabel}$*pretest data* obtainedvalues = 1.336 and = 1.994. Sofromthesecalculationsitcanbeconcludedthatbetweentheexperimentalclassandthecontrolclasshavethesameinitialability. The resultsoftheresearch$t_{hitung}t_{tabel}$can be seen in table 6 below:

Table-6. Resultsofhypothesistestcalculationson*pretest data*

Class	Average	tcalculate	tTable	Conclusion
Ex	49,611	1,336	1,994	Both classes have the same initial ability.
Control	46,22			

6. Test the hypothesis of one party

Based on the results of these calculations, it was obtained that the calculated value was 3.272 and the ttable value at the 5% significance level was 1.994. Based on the acquisition of these scores, it appears that the value of tcal>ttable is that there is a significant difference between the learning outcomes of students who use the jigsaw type learning model and use conventional learning models. So it can be said that there is an influence of the jigsaw-type cooperative learning model based on blended learning by utilizing Google Classroom on student learning outcomes on vector material in MAN 2 North Labuhanbatu. The calculation results can be seen in table 7 below:

Table-7. Hypothesistestresultson*posttest data*

Class	Average	tcalculate	tTable	Conclusion
Experiment	77,722	3,272	1,994	There is a significant turbidity
Control	69			

CONCLUSION

Based on the results of research and discussion, it can be concluded that there are differences in student learning outcomes using the jigsaw type cooperative learning model with student learning outcomes using conventional learning models. This can be seen from the results of data analysis, hypothesis testing using a one-party t test on posttest data obtainedtcount value = 3.27 and ttable value at the significance level of 5% is 1.99. With a calculated t value of 3.27 which is greater than the table t value of 1.99 indicates that H0 is rejected, and Ha is accepted. Thus, it is concluded that the jigsaw-type cooperative learning model assisted by Google Classroom affects the learning outcomes of grade X MIPA MAN 2 North Labuhanbatu students.

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BIBLIOGRAPHY

Agus, S. (2012). *Cooperative Learning*. Yogyakarta: Student Library

Ministry of Education and Culture. (2017). Director General of Primary and Secondary Education on Core Competencies and Basic Competencies. Jakarta: Ministry of Education and Culture of the Republic of Indonesia

Sanjaya, W. (2010). *Classroom Action Research*. Jakarta: Bumi Aksara.

Sukriadi., et al. (2021). Application of the Jigsaw Type Cooperative Learning Model in Class X Physics Learning at SMKN 2 Pinran. *Charm Science Journal of Physics Education*. Vol: 2, No. 2, Pages: 99-105

Sugiyono. (2017). *Educational Research Methods*. Bandung:Alfabeta