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Influence of Approach *Cooperatif Learning* Type *Jigsaw* on the Mathematical Problem-Solving Ability of PGSD Students at STKIP HAMAZAR

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Abstract

This research aims to describe the influence of the Jigsaw Type Cooperative learning approach, in terms of the problem-solving ability aspect of STKIP Hamzar Semester I Students for the 2024/2025 academic year. This research is a quasi-experimental research with a pre-posttest control group design. This research used two groups, namely the experimental group and the control group. The research population included all Semester I students of the PGSD STKIP Hamzar study program in three classes. From the existing population, two classes I A and Class I) were randomly taken as research samples. Learning basic mathematics concepts in class I A uses a Jigsaw Cooperative learning approach and learning in class I B uses a conventional approach. The instrument of this research is a test of mathematical problem solving abilities. To determine the difference in influence between the Jigsaw Type Cooperative learning approach group and the conventional approach used, an independent sample T-test was carried out to see which variables contributed to the difference. The results of the research show that there is a difference in the influence of the Jigsaw Type Cooperative learning approach and the conventional approach on aspects of the mathematical problem solving abilities of Semester I STKIP Hamzar students.From the research results, it was found that the Jigsaw Type Cooperative learning approach had a more positive effect on the mathematical problem solving abilities of first semester STKIP Hamzar students.

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1. INTRODUCTION

The times and technological advances have brought changes in various fields. This is important because to be able to live and develop in a modern era full of global competition, knowledge that supports teaching and learning is required, including the ability to think logically, critically, innovatively, creatively and being able to collect and process information and use it in solving problems. problem. In connection with problem solving, in Ministerial Regulation no. 22 of 2006 concerning content standards explains in detail that mathematics lessons in secondary schools aim to solve problems which include the ability to understand problems, design mathematical models, complete models and interpret the solutions obtained. This means that the focus of mathematics learning in schools is to develop students' abilities to solve problems and ultimately achieve competencies that can be used to compete in this global era. Conventional learning methods are found at STKIP Hamzar. From the information obtained through initial observations carried out through

direct observation during the learning process in class, it can be seen that the teacher is dominant in the mathematics learning process. During the lesson the lecturer presents the material by combining several methods, namely lectures, assignments/exercises and questions and answers, while the students are silent, passive in their seats listening to the teacher's delivery of the material and if there are difficulties, students tend to be embarrassed and afraid to ask the lecturer. Moreover, students with low abilities are embarrassed to express their questions or opinions. The average mid semester scores of students for classes IA, IB, IC are low, this can be seen in the results of student tests on Quiz, Mid, and semester which are presented in Table 1 as follows:

Rate-rate mark	**Seed I A**	**Semester I B**	**Semester I C**
Quiz	50	45	40
MID	50	55	52
Semester	50,5	40	50

Table 1. Student Grade Data

From the table above, there are several problems faced by first semester students, namely that students do not have good mathematical problem-solving skills, including; (1) students prioritize questions that can be solved using routine procedures and according to the examples given, (2) students give up very easily when given non-routine problems, and (3) students are not able to use appropriate strategies in solving problems. This shows that Semester I PGSD STKIP Hamzar students have good mathematical problem-solving abilities. Considering the importance of learning mathematics in education from primary education to higher education, an appropriate approach is needed so that students learn mathematics meaningfully which will train students to think creatively, analytically and be able to solve mathematical problems. Therefore, lecturers' abilities in the learning process are required in the form of managing the mathematics learning process. The existence of differences between students requires varied learning models that can utilize these differences to improve mathematical problem-solving abilities. This is as Kennedy stated, et al (2008) as follows "Each instructional approach invites children to construct mathematical knowledge and to develop skills" which means that every learning approach provides opportunities for every child to build their knowledge and develop their skills. Learning experiences can be realized through varied and centered learning models.

According to Slavin (2007), cooperative learning encourages students to interact actively and positively in groups. This allows the exchange of ideas and examination of one's own ideas in a non-threatening atmosphere, in keeping with the philosophy of constructivism. Thus, education should be able to condition and provide encouragement to optimize and awaken students' potential, foster activity and creativity so that it will ensure dynamics in the learning process. In this theory, constructivism prioritizes learning for students who are faced with complex problems to find solutions, then find simpler parts and the desired skills.

Cooperative Learning is a learning model with a small team grouping system, namely between four and six people who have different academic backgrounds, gender, race or ethnicity. This strategy is now receiving attention and is recommended by education experts for use (Sanjaya, 2013: 242). Cooperative Learning refers to a learning method in which students work together in small groups and help each other in learning (Huda, 2012: 32). The Jigsaw Type Cooperative Learning Model divides students into small groups of 4-6 people who are heterogeneous and have positive interdependence and are independently

responsible for completing the teaching material that must be studied and conveying it to members of the original group (Isjoni, 2010: 79).

Gorman (1974), states that a problem is basically a situation that contains difficulties for someone or requires something more to bridge the difference between the problem itself and its solution. In this case the situation will encourage someone to overcome these difficulties. The process of overcoming these difficulties is seen as problem solving process. NCTM (2000), explains that problem solving includes self-confidence and a willingness to solve new or difficult problems. Problem solving requires the ability to see all the information that can be used and use the knowledge possessed as well as possible. His knowledge of problem-solving strategies provides many options in determining the steps to be used to solve problems. NCTM (2000), states that problem solving is an inseparable part of all mathematics learning processes. Problem solving begins when students are faced with a situation that shows difficulty in achieving a predetermined goal. Polya (1973), defines problem-solving as a conscious effort to find a way out of a difficulty, but this goal cannot be achieved immediately.

2. RESEARCH METHOD

This research uses It's like a design experiment. Researchers use groups for treatment because researchers cannot select individuals randomly. The groups given treatment were PGSD STKIP Hamzar Semester I students. The design used in this research was pretest-posttest control group design by giving pre-test before treatment and post-test after treatment and in the experimental and control groups., Semester Learning Plan (RPS), Student Activity Sheets (LKS) and Tests for problem solving abilities.

In this study, data was obtained directly by researchers by providing treatment to the two experimental classes. Data collection techniques using tests to measure problem solving abilities. For test instruments, the validity used is content validity, while for questionnaire instruments content and construct validity are used. The content validity of an instrument refers to the extent to which the instrument covers the entire situation it is intended to measure. The content validity of the test instrument can be determined from the conformity of the test instrument with competency standards and basic competencies. The content validity of a non-test instrument can be determined from the suitability of the instrument that has been developed to its grid. To obtain evidence of content validity for both test instruments, this is done by asking for expert advice (expert judgement).

Content validity (content validity) instrument refers to the extent to which the instrument items cover the entire situation that is intended to be measured. The content validity of the test instrument can be determined from the suitability of the test instrument with the indicators. Validation by experts aims to obtain evidence of content validity. To estimate the instrument reliability coefficient, a formula is used Alpha Cronbach (Ebel and Frisbie, 1986) with the following formula:

$$r_{xx'} = \frac{k}{k-1}\left[1 - \frac{\sum s_i^2}{s_t^2}\right]$$

Information:

$r_{xx'}$: coefficient reliability instrument
k : many items
s_i^2 : variance in student scores on a test item
s_t^2 : variance shoes total

The groups obtained significant differences, so the next test is the t test to test the following hypothesis:
H_0 :$\mu_1 \leq \mu_2$ and H_a : $\mu_1 > \mu_2$

With a level of significance α/p with p=2, so for α=5% for each *t-test* the criterion 0.05/2=0.025 is used. The test statistics used are:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{S^2(\frac{1}{n_1}+\frac{1}{n_2})}}$$

Where $s^2 = \frac{(n_1-1)s_1^2+(n_2-1)s_2^2}{n_1+n_2-2}$

The decision criterion is rejected H_0 if t count > t Table

$$(t > t_{\frac{\alpha}{2},\ n1+n2-2})$$

Assumptions that must be met before carrying out analysis with one sample t-test, Multivariate two- group test (Hotelling's T^2) are the assumptions of normality and homogeneity.

The normality test aims to find out whether the sample comes from a normally distributed population. Normality tests were carried out on data obtained both before and after treatment includes test result data (students' mathematical problem-solving abilities) in the group that applies the approach Jigsaw as well as conventional approaches.

For knowing the homogeneity of the variance covariance matrix of two groups with two dependent variables simultaneously is done through tests using assistance software SPSS 20.0. Homogeneity tests and conclusions drawn for hypothesis testing were carried out at a significance level of 0.05. Guidelines for decision making for the homogeneity test are as follows: 1) if the significance value or probability value is less than 0.05 then it can be concluded that the data does not come from populations that have a homogeneous variance covariance matrix.

The stages of hypothesis testing are as follows: (1) Testing the normality of the data obtained from the pretest before doing its treatment, (2) After the normality test analysis was carried out, the analysis continued with the homogeneity test of the two groups. Normality assumption test analysis and homogeneity is fulfilled, then a similarity test is then carried out with the mean experimental group with the control group. Data obtained from pretest, (4) Analysis is carried out to determine whether they are the same or not as an experimental group with control before treatment. This analysis was carried out simultaneously on the variable mathematical problem-solving ability, on mathematics with assistance software SPSS 20.0 for windows, (5) Carry out multivariate normality testing of data obtained from posttest and questionnaire after treatment, (6) Next, analyze the data obtained from posttest and questionnaire after treatment for homogeneity testing with assistance software SPSS 20.0 for windows. Testing the homogeneity of the variance-covariance matrix was carried out using SPSS 20.0 (7) If the data obtained from posttest after treatment If the assumption of normality is met, analysis is carried out using one sample t-test with manual or with excel. Analyze with one sample t- test This was done to test research hypothesis point 1 which had been formulated. This analysis aims to determine

the effect of each approach in terms of each dependent variable, namely mathematical problem-solving ability. (8) After the assumptions of multivariate normality and homogeneity are met, then based on the objectives of the next research the data obtained from posttest, after treatment analyzed using t test statistics. This analysis is to test the research hypothesis in point 2.

This analysis aims to investigate the influence of the Jigsaw type cooperative learning approach with the conventional approach simultaneously in terms of the mathematical problem-solving ability variable. This analysis was carried out with the help of software SPSS 20.0 for windows. If the null hypothesis is rejected then proceed with the univariate test with the t test to determine which approach is more influential when viewed from each aspect, namely mathematical problem-solving ability.

3. RESEARCH RESULTS AND DISCUSSION

Data description is a description of the data obtained to support discussion of research results. Data description was carried out on research variables on students' mathematical problem-solving abilities. From this picture you will see the initial and final conditions of each variable studied. The experimental group was PGSD semester IA students who applied the Jigsaw type cooperative learning approach and the control group was the class of PGSD Semester IB students who applied the conventional approach. The number of subjects who took part in the study was 30 people in the experimental group and 30 people in the control group. In general, data is divided into two, namely previous data treatment and after treatment.

The data from the test results of students' mathematical problem-solving abilities which will be described consists of data pretest and posttest (Table 2). Pretest is a test given to two groups before it is given treatment. This test aims to determine the initial abilities of experimental class students. Posttest carried out after treatment was implemented. This test aims to determine students' mathematical problem-solving abilities after being given it treatment.

Description	*Experiment*		*Control*	
	Pretest	*Posttest*	*Pretest*	*Posttest*
Rate-rate	20.9	90.3	21.7	78,8
Standard deviation	4.2	6.6	4.3	5,3
Variance	31.2	41.26	37.52	43.42
Shoes minimum	25	75	20	65
Maximum score	40	97	35	87

Table 2. Description of Student Grades

The normality test is carried out in order to find out whether the data is normally distributed, the normality test uses SPSS 20.0, from the data carried out the normality test it is known that the data or student grades are normally distributed, as can be seen in the normality test using SPSS 20.0 below:

Tests of Normality

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	**df**	**Say.**	**Statistic**	**df**	**Say.**
IA semester	.142	30	.125	.936	30	.069
Semester IB	.132	30	.194	.936	30	.069

Tabael 3. Normality Test Results

The homogeneity test was carried out using SPSS 20.0 from the data carried out. The homogeneity test showed that the data or student scores were homogeneous, as can be seen from the homogeneity test carried out using SPSS 20.0 below.

Test of Homogeneity of Variances

Levene Statistic	**df1**	**df2**	**Say.**
3.632	1	58	.062

Table 4. Mathematical Problem-Solving Ability

The t test was carried out to determine the effect of the Jigsaw type cooperative learning approach on the conventional learning approach. From the data processed using SPSS 20.0 it can be seen that there is a significant effect.

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Semester IA	131.162	29	.000	90.333	88.92	91.74
Semester IB	74.730	29	.000	78.833	76.68	80.99

Table 5. Effect Test Results

From the data above, there is an influence of learning with a cooperative learning approach on students' mathematical abilities, because the significance value is below 0.05 (0.00<0.05). Differences in the influence of mathematics learning approaches cooperative learning type Jigsaw and conventional approaches.

Based on the results of the analysis, the probability value obtained is smaller than the significance level and the value is 0.00<0.05. Thus, based on the results of the analysis using the t test, it was obtained: (H_0) which stated "mathematics learning with the Jigsaw type cooperative learning approach has no difference in effect compared to the conventional approach in terms of solving mathematical problems" was rejected. Means, approach cooperative learning Jigsaw type has an influence on students' mathematical problem-solving abilities compared to conventional approaches.

4. CONCLUSION

Based on data analysis and discussion, the research can be concluded as follows: (1) Application of the approach cooperative learning The Jigsaw type is influential in terms of mathematical problem-solving abilities.

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6. BIBLIOGRAPHY

Alimuddin. 2009. *Develop thinking skills students' creativity through problem solving tasks. Proceedings of the National Seminar on Educational Research and*

Application of Mathematics and Natural Sciences, Faculty of Mathematics and Natural Sciences, Yogyakarta state university, Yogyakarta.

Arends, R, L. dan Kilcher, A. 2010.*Teacing for student learning becoming an* accomplished*teacher*. Routledge: New York.

Cohen R.J, and Swedlik M.E. (2005). *Psychological testing and assesment "an introduction to tests and measurement" sixth edition*. McGraw Hill Published: New York.

Ministry of National Education. 2006. *Minister of National Education Regulation Number 22, concerning Content Standards for Primary and Secondary Education Units.*

Huda, M. (2012). Cooperative Learning Methods, Techniques, Structures, and Implementation Models. Yogyakarta: Learning Library.

Isjoni. (2010). Cooperative Learning Increases Communication Intelligence Between Students. Yogyakarta: Learning Library.

Sanjaya, W. (2013). Learning Strategies Oriented to Educational Process Standards. Jakarta: Prenada Media Group.

Slavin, Robert E. (2005). Cooperative Learning. Bandung: Nusa Medi.

Suherman, E., Turmudi and Suryadi, D. 2003. *Contemporary mathematics learning strategies.* Bandung: University Indonesian Education.

Ebel And Frisbie, D. 1986. *Essential of educational measurement*. (4th ed) New Jersey: Prentice-Hell, Inc.

Gunter, M. A., Estes, T. H., & Schwab, J. H. 1990. *Instruction: A model approach*. London, UK: Allyn and Bacon.

Gorman, R. M. 1974.*The psychology of classroom learning.* Ohio: A Bell & Howell.

Huberty, J.C. & Olejnik.S.2006. *Applied MANOVA and Discriminant Analysis*. Georgia. Wiley-interscience.

Kennedy, M L., Tipps, S., & Johnson, A. 2008.*Guiding children's learning of mathematics.*