THE EFFECTIVENESS OF TEAM ASSISTED INDIVIDUALIZATION OF COOPERATIVE LEARNING ON MATHEMATICS LEARNING OUTCOMES

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ABSTRACT

The direct learning method's use affects students' passive participation in classroom activities, resulting in poor mathematics learning outcomes. This study aims to know the effectiveness of team assisted individualization on mathematics learning outcomes of grade VII students of State Junior High School (SMPN) 1 Ngemplak, Sleman Regency in the even semester of the academic year 2017/2018. This study belongs to quantitative research. This study's populations were six classes of grade VII SMPN 1 Ngemplak, Sleman Regency in the even semester of the academic year of 2017/2018. Random sampling technique was applied to take the sample of this research: grade VII students class B in the treatment class; class E in the experiment class using team assisted individualization cooperative learning; and class C in the control class using direct learning model. The research instruments used in this study were multiple-choice tests. The research instruments were tested using a validity test, differential test, and reliability test. The data were analyzed using a normality test, homogeneity test, and hypothesis test for the prerequisite analysis, including t-test. From two-party t-test with 5% of significance level and 62 degrees of freedom resulted in $t_{count} = 3,8379 > t_{table} = 1,9607$. Thus H_0 is rejected. This means that students' mathematics learning outcomes between those taught using team assisted individualization cooperative learning and direct learning. A one-party t-test with a 5% significance level and 62 degrees of freedom resulted in $t_{count} = 3,8379 > t_{table} = 1,6707$. Thus H_0 is rejected; it means that team assisted individualization cooperative learning is more effective than direct learning towards students' mathematics learning outcomes.

Keywords: Effectiveness, team assisted individualization (TAI), learning outcomes

INTRODUCTION

According to the Law of the Republic of Indonesia of 2003 No.20 Article 1 concerning the National Education System says that Education is a conscious and planned effort to create an atmosphere of learning and learning process so that students actively develop their potential to have spiritual, religious, intelligence, noble morals, as well as the skills needed by himself, society, nation, and country. According to the law above, it is found that in a learning process, a student must be able to develop his potential and be active when participating in the learning process.

A fair learning process is a learning process that can deliver students to get good learning outcomes. According to Hamzah, Ali, and Muhlisrarini (2014: 42), learning is said to be an effort for students in the form of activities to choose, define and develop optimal methods and strategies to achieve desired learning outcomes. In this case, teachers must choose, set, and develop learning models that are used so that the ongoing learning process can achieve the expected learning outcomes.

To know how the learning process is happening at school, then on September 18, 2017, an interview was conducted with Mrs. Siti Suhrah S. Pd, a mathematics teacher at SMPN 1 Ngemplak. The teacher said that mathematics learning in schools still uses the direct learning model. The teacher delivers material in the form of lectures, questions and answers, assignments, and discussions. Student collaboration in completing assignments or problems is also lacking. Students are more likely to be individualistic and do not care about other friends when the learning process occurs. Student mathematics learning outcomes are low. The team-assisted individualization (TAI) type of cooperative learning model has not been used in the school's learning process.

Based on the results of documentation of the students' daily test scores on March 21, 2018, it was found that many students received grades below the Minimum Completeness Criteria (MCC) of 71 as shown in Table 1.

Table 1. Daily Results of SMPN 1 Ngemplak Mathematics Subjects for 2017/2018 Academic Year

Class	Average	Number of students		Percentage (%)	
		Complete	No Complete	Complete	No Complete
VII A	70,84	13	19	40,63	59,37
VII B	75,17	19	11	63,33	36,67
VII C	80,06	26	6	81,25	18,75
VII D	66,03	14	18	43,75	56,25
VII E	69,34	11	21	34,37	65,63
VII F	70,23	17	14	51,84	45,16

Source: SMPN 1 Ngemplak

Based on the interviews and documentation above, the teacher must find and apply an attractive learning model so that mathematics is easier to understand. Mathematics learning should also support students to interact with other students to enhance collaboration through discussion activities.

Various types of learning models can be applied. One of them is the Team Assisted Individualization type of cooperative learning model. According to Shoimin, Aris (2014: 200) said that Team Assisted Individualization (TAI) as a rationale to adapt learning to individual differences related to student achievement. So in the team assisted individualization learning model, students are grouped in one team with several members of 4-5 students who are heterogeneous. This aims to exchange opinions or arguments about concepts and solve mathematical problems they have thought of. Moreover, by applying this model, students can learn responsibly with groups during the learning process to solve mathematical problems.

The objectives of this research are 1) To find out whether or not there is a difference between student learning outcomes in mathematics using the cooperative learning model team assisted individualization model with direct learning models on mathematics learning outcomes for students of class VII Semester II SMPN 1 Ngemplak Sleman Regency in the academic year 2017/2018. 2) To determine the effectiveness of mathematics learning using the team assisted individualization type of cooperative learning model compared to the direct learning model of mathematics learning outcomes for Grade VII Semester II students of SMPN 1 Ngemplak Sleman Regency in the academic year 2017/2018.

METHODS

This type of research is quantitative research by applying cooperative learning model with team assisted individualization type. By the type, data from this study are in the form of numbers and analysis using statistics. This research was conducted at SMPN 1 Ngemplak, Sleman, Yogyakarta. Data collection was carried out in semester II of the 2017/2018 school year. This study's population were all students of class VII in the even semester of SMPN 1 Ngemplak consisting of 6 classes, namely classes VII A, VII B, VII C, VII D, VII E, and VII F, with a total of 189 students. In this study, the sample was taken by simple random sampling technique for the class. After random sampling, 32 VII E classes were obtained as an Experiment class by applying Team Assisted Individualization (TAI) cooperative learning models, 32 D Class VII D students as a Control class by applying the direct learning model, and Class VII B 30 students as a pilot class. The type of design used is the posttest-only control design, which can be seen in Table 2.

Table 2. Research Design

Group	Treatment	Learning Outcomes Test (Post-test)
Experiment	X	O_1
Control		O_2

(Sugiyono, 2016:112)

This study's variables were suitable assisted individualization type of cooperative learning model, direct learning model, and mathematics learning outcomes of Grade VII Semester II students of SMPN 1 Ngemplak Sleman Regency in 2017/2018. The method used to collect data is test and documentation. The test conducted in this study is the final test to calculate student learning outcomes after being given teaching with a team assisted individualization model and the learning outcomes of students who have been taught with a direct learning model. The documentation carried out in this study is the data of students' names and the results of the Daily Examination Assessment for seventh-grade students even in mathematics. Data collection techniques in this study were tests. Tests to determine student mathematics learning outcomes are used to multiple-choice questions. The research instrument tests conducted were validity tests, different power tests, and reliability tests. Analysis prerequisite tests include tests for normality and homogeneity tests. Hypothesis testing uses the two-party t-test and the one-party t-test.

While this research hypothesis is: 1) There is a difference in learning outcomes between mathematics learning using the team assisted individualization (TAI) cooperative learning model and mathematics learning using the direct learning model. 2) Mathematics learning that uses a team assisted individualization (TAI) type cooperative model is more effective than mathematics learning that uses a direct learning model.

RESULTS AND DISCUSSION

The data used in the initial stage of analysis are the results of daily tests of mathematics subjects for grade VII students, and a description of the initial ability scores can be seen in Table 3.

Table 3. Description of students' initial ability scores

Class	Highest score	Lowest Value	$\overline{X}$	S	S^2
Experiment	99	47	69,3438	13,9506	194,619
Control	98	34	66,0313	19,1117	365,257

Based on the data above, normality and homogeneity tests are performed as an initial analysis.

A normality test is performed to determine whether the data obtained is normally distributed or not. The normality test is done using the chi-square test (χ^2). The summary of the initial ability normality test of the control class and experimental class students can be seen in Table 4.

Table 4. Summary of normality tests for initial ability values

Class	χ^2_{count}	χ^2_{table}	Info.
Experiment	0,5130	5,9915	Normal
Control	4,4903	7,8147	Normal

The data table above shows that in the experimental class with a significant level of 5% and degrees of freedom, two obtained $\chi^2{}_{count} = 0,5130 < \chi^2{}_{table} = 5,9915$, so it can be concluded that the data are normally distributed. The control class with a significant level of 5% and degrees of freedom 3 obtained $\chi^2{}_{count} = 4,4903 < \chi^2{}_{table} = 7,8147$, so it can be concluded that the data are normally distributed.

A homogeneity test is performed to determine whether the two classes of samples have the same variance or not. If the variance is the same, it means that the sample is from a homogeneous population. The homogeneity test is performed using the chi-square test (χ^2). A summary of the homogeneity test of the initial ability value of the control class and the experimental class can be seen in Table 5.

Table 5. Summary of homogeneity tests of initial capability values

χ^2_{count}	χ^2_{table}	Info.
3,0422	3,8415	Homogeneous

The above table data obtained $\chi^2{}_{count} = 3,0422 < \chi^2{}_{table} = 3,8415$ with a significant level of 5% and degrees of freedom $(n-1) = 1$. So the experimental class (VII E) and the control class (VII D) have the same or homogeneous variance.

Data on mathematics learning outcomes for Grade VII students were obtained from tests given after the learning process by applying the direct learning model to the control class (VII D). The cooperative learning model type of team assisted individualization in the experimental class (VII E). In applying cooperative learning models in the experimental class (VII E), the teacher applies a suitable learning type of team assisted individualization. In the process of learning mathematics, students participate actively through group discussions consisting of 4 students. Students are given LKS as discussion material and work on the questions in LKS in groups. When working on the worksheet questions, some students find it difficult and ask for help from friends in a group or with the teacher. Learning takes place; the teacher continues to monitor the course of the discussion. The teacher gives small indirect test questions or questions to students in a group, and students can answer them. The teacher will score the results of group work. The brilliantly successful group in completing the assignment will be given a degree award, for example, a group of extraordinary, OK, and steady. Students become happy and encouraged to learn mathematics and become better than before.

The learning model's application to the control class (VII D) is a direct learning model. In the learning process in class, the teacher explains the material to students. The teacher on the board will directly carry out examples of questions given by the teacher. Students observe and record the steps of the question. During the learning process, if students experience difficulties, they ask questions directly to the teacher about material or questions considered problematic. The results of the analysis were obtained from the learning achievement test given by the teacher at the last meeting to the two sample classes, namely the experimental class (VII E), which was taught using the cooperative learning model of the type of team assisted individualization and the control class (VII D) which was taught using the direct learning model. The test given was in the form of multiple-choice questions totaling 14 questions. If the correct answer is given a score of 1 and the wrong answer is given 0. Description data from the mathematics learning achievement test of the experimental class (VII E) and the control class (VII D) can be seen in Table 6.

Table 6. Description of student mathematics learning achievement tests

Class	Highest score	Lowest Value	$\overline{X}$	S	S^2
Experiment	100,00	42,86	80,13	14,5973	213,0822
Control	92,86	21,43	65,85	20,0176	400,7056

Based on the mathematics learning achievement test's data description above, the analysis prerequisite test will be conducted, namely the normality and homogeneity tests. The hypothesis test is then conducted, consisting of the first hypothesis test and the second hypothesis test.

A normality test is conducted to find out whether the mathematics learning outcomes of the experimental class (VII E) and the control class (VII D) are normally distributed or not. The test used is the chi-square test (χ^2). A summary of the calculation of normality test scores for students' mathematics learning outcomes can be seen in Table 7.

Table 7. Summary of normality test scores of mathematics learning achievement tests

Class	χ^2_{count}	χ^2_{table}	Info.
Eksperimen	8,3955	9,4877	Normal
Kontrol	5,3201	9,4877	Normal

The data table above shows that in the experimental class with a significant level of 5% and degrees of freedom, four obtained $\chi^2{}_{count} = 8,3955 < \chi^2{}_{table} = 9,4877$, so it can be concluded that the data are normally distributed. The control class with a significant level of 5% and the degree of freedom 4

obtained $\chi^2{}_{count} = 5{,}3201 < \chi^2{}_{table} = 9{,}4877$, so it can be concluded that the data are normally distributed.

A homogeneity test was conducted to find out whether the mathematics learning outcomes of the experimental class (VII E) and the control class (VII D) had the same variance or not. If the variance is the same, it means the sample is from a homogeneous population. The test used is the chi-square test (χ^2). A summary of the homogeneity test of student mathematics learning outcomes can be seen in Table 8.

Table 8. Summary of homogeneity tests of mathematics learning outcomes

χ^2_{count}	χ^2_{table}	Info.
2,0434	3,8415	Homogeneous

The above table data obtained $\chi^2{}_{count} = 2{,}0434 < \chi^2{}_{table} = 3{,}8415$ with a significant level of 5% and degrees of freedom $(n - 1) = 1$. So it can be concluded that the experimental class (VII E) and the control class (VII D) have the same or homogeneous variance.

a. First Hypothesis

The first test was conducted to determine whether there is a difference between student learning outcomes in mathematics taught using cooperative learning models of the team assisted individualization types and student learning outcomes in mathematics taught using direct learning models. The hypothesis used is as follows:

H_0: $\mu_1 = \mu_2$

H_1: $\mu_1 \neq \mu_2$

with:

H_0: There is no difference in the mathematics learning outcomes of students taught using the cooperative learning model of the type of team assisted individualization with the results of learning mathematics students taught using the direct learning model.

H_1: There is a difference in students' learning outcomes using the cooperative learning model team assisted individualization type with the learning mathematics students taught using the direct learning model.

The summary of the results of the first hypothesis test of the mathematics learning outcomes of the quadrilateral and triangle material in the experimental class students (VII E) and the control class (VII D) can be seen in Table 9.

Table 9. Summary of the first hypothesis test the value of student mathematics learning outcomes

t_{count}	t_{table}	Info.
3,8379	1,9607	H_0 rejected

Based on the results of calculations that have been done in the first hypothesis test with a significant level of 5% and a degree of freedom 62, obtained $t_{count} = 3{,}8379$ and $t_{table} = 1{,}9607$. Because $t_{count} = 3{,}8379 > t_{table} = 1{,}9607$, H_0 is rejected and H_1 is accepted. So it can be concluded that there are differences in student learning outcomes in mathematics taught using the cooperative learning model of the type of team assisted individualization with student learning outcomes in mathematics taught using direct learning models in class VII even semester of SMPN 1 Ngemplak Sleman Regency in the academic year 2017/2018.

b. Second Hypothesis

The second test was conducted to determine which learning model was more effective between the team assisted the individualization type of cooperative learning models with the direct learning model of student mathematics learning outcomes.

The hypothesis used is as follows:

H_0: $\mu_1 \leq \mu_2$

H_1: $\mu_1 > \mu_2$

With:

H_0: The team assisted individualization type of cooperative learning model is no more effective than the direct learning model of mathematics learning outcomes in seventh-grade students of the even semester of SMPN 1 Ngemplak Sleman Regency in the academic year 2017/2018

H_1: The team assisted individualization type of cooperative learning model is more effective than the direct learning model of mathematics learning outcomes for seventh-grade students of the even semester of SMPN 1 Ngemplak Sleman Regency academic year 2017/2018.

The summary of the second hypothesis test results of the mathematics learning outcomes of the quadrilateral and triangle material in the experimental class (VII E) and the control class (VII D) can be seen in table 10.

Table 10. Summary of the second hypothesis test the value of student mathematics learning outcomes

t_{count}	t_{table}	Info.
3,8379	1,6707	H_0 rejected

Based on the results of calculations that have been done in the second hypothesis test with a significant level of 5% and degrees of freedom, 62, obtained $t_{count} = 3,8379$ and $t_{table} = 1,6707$. Because $t_{count} = 3,8379 > t_{table} = 1,6707$, H_0 is rejected and H_1 is accepted. So it can be concluded that the team assisted individualization type of cooperative learning model is more effective than the direct learning model of mathematics learning outcomes for seventh-grade students of the even semester of SMPN 1 Ngempak Sleman Regency in the academic year 2017/2018.

CONCLUSION

Based on the research that has been done as described previously, the following conclusions can be drawn:

1. There is a difference between students taught using the cooperative learning model team assisted individualization type and the mathematics learning outcomes of students who use direct learning models in class VII Semester II of SMPN 1 Ngemplak, Sleman Regency in the academic year 2017/2018. This is evidenced by the first hypothesis test results with a significant level of 5% and a degree of freedom 62, the value of value $t_{count} = 3,8379$ and $t_{table} = 1,9607$ where $t_{count} = 3,8379 > t_{table} = 1,9607$, so H_0 is rejected.

2. The team assisted individualization type of cooperative learning model is more effective than the direct learning model of the mathematics learning outcomes of Grade VII Semester II students of SMPN 1 Ngemplak, Sleman Regency in the academic year 2017/2018. This is evidenced by the second hypothesis test results with a significant level of 5% and degrees of freedom 62 obtained $t_{count} = 3,8379$ and $t_{table} = 1,6707$ where $t_{count} = 3,8379 > t_{table} = 1,6707$, so H_0 is rejected.

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