

Experimentation of NHT And TPS Learning Model Using CTL Approach Towards Mathematics Learning Outcomes Viewed from Student Learning Styles

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ABSTRACT

This study aims to find out (1) which NHT cooperative learning model with the CTL approach provides better learning outcomes than the TPS learning model with the CTL approach, (2) which ones provide better learning outcomes for each learning style, (3) in each model with which learning approach provides better learning outcomes in each learning style, (4) in each learning style, which provides better learning outcomes for each model with a learning approach. This study is a quasi-experimental research. The population in this study were all eighth grade students of Sukoharjo Middle School 2 with a sampling technique using random sampling clusters. The data analysis technique uses two-way variance analysis with cells not the same as the normality test prerequisite test and data homogeneity test. The results of this study are (1) The NHT learning model with the CTL approach has better learning outcomes than the TPS learning model with the CTL approach, (2) Students with learning styles on the kinesthetic type provide higher learning outcomes than students with learning styles of the type audio, students' mathematical learning outcomes with learning styles on kinesthetic types as well as students with learning styles in the visual type and student mathematics learning outcomes with learning styles in the visual type as well as students with learning styles on the audio type, (3) for each learning model, consistent with the results of the learning style type, (4) for each learning style type, it applies consistently to the results of the learning model.

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1. INTRODUCTION.

Based on the results of observations at Sukoharjo Middle School 2 with mathematics teachers, it was found that mathematics learning outcomes were still very low for statistical subjects. This is evidenced by the daily test value data in the 2017/2018 school year, namely 76% of students scored below the Minimum Completion Criteria, which is 65 and 72% of students who scored below the Minimum Completion Criteria, namely 70. Besides that, it was also strengthened by the results of interviews with mathematics teachers of class VIII saying that students' learning motivation was still very low when studying on the subject matter of statistics and the teacher still used conventional learning models that were not in accordance with the K13 curriculum so that students were increasingly unable to follow lesson. Students become passive in learning so the class atmosphere becomes tense. In the learning process there is less interaction between the teacher and students and between students. Students are not given the opportunity to find their own concepts during independent learning and during group discussions and monotonous learning is only given by the teacher. Teaching and learning activities in the classroom only receive material through lectures, discussions and assignments. Based on these problems researchers will try to apply cooperative learning models to improve student activity in learning and make students more active. This is also based on the results of a study conducted by Ajaja and Eravwoke (2010) that cooperative learning provides

higher learning outcomes than traditional learning models and specifically in cooperative learning mathematics learning gives positive results (Sedat Turgut, 2018). In the cooperative learning process students are given the opportunity to collaborate in groups and help each other between group members with heterogeneous abilities (Woods and Chen, 2010) and students use social skills by becoming active listeners and participating in the learning process (Artut, 2009).

The cooperative learning model applied in this study is Numbered Head Together (NHT) learning model and learning model Think Pair Share (TPS). The selection of the NHT learning model based on the results of research conducted by Nasrun (2016) and Marda Sari and E dy Surya (2017) concluded that the application of the NHT learning model had a role in improving student learning outcomes. There is an application of the NHT learning model with students on heterogeneous abilities able to increase learning activities and provide a significant influence on improving student learning achievement (Haydon, Mahedy, and Hunter, 2010). While the selection of TPS learning models is reinforced by the results of research conducted by Rahmatun Nisa et al (2014) the application of TPS cooperative learning provides better learning outcomes compared to conventional learning models. According to Miftahul Huda (2014: 206) revealed that TPS is a simple method, but it is very useful and can train and develop

students' thinking abilities and activities, because students build knowledge through their own exploration and student knowledge can also develop through the transfer of mindset with students others (Trianto, 2010). According to Maria Yashinta Afoan, et al. (2016), TPS learning model is a type of cooperative learning that is designed to influence student interaction patterns.

To improve the learning process in this study also used a learning approach that is the Contextual Teaching and Learning (CTL) approach, with the application of the CTL approach to build a cooperative attitude between teachers and students, can improve students' responses to learning, creative in expressing opinions, improve skills a n communication, responsibility, confidence and can increase student interest in learning (Ch. Krisnandari Ekowati et al., 2015) and CTL approaches also help students to be effective in learning (Maneerat Pinwanna, 2015). Application of the approach CTL is a learning concept that helps teachers associate material taught with students' real-world situations and encourages students to make connections between their knowledge and application in daily life (Karunia and Ridwan, 2015). This is in agreement with Kokom Komalasari (2011: 7) which states that CTL is a learning approach that links material that is learned with students' real life everyday, both within the family, school, community, and citizens, with the aim of finding meaning the material for his life.

In addition to learning models and learning style learning approaches are also very influential on learning outcomes. Learning styles consist of kinesthetic learning styles, audio learning styles and visual learning styles. Because the results of Rahayu and Istiani's (2017) study of mathematics with a contextual approach to learning styles provide learning outcomes that are better than conventional learning models. The purpose of this study is to find out (1) which NHT cooperative learning model with the CTL approach provides better learning outcomes than the TPS learning model with the CTL approach, (2) which ones provide better learning outcomes for each learning styles, (3) in each model with a learning approach which gives better learning outcomes for each learning style, (4) in each learning style, which gives better learning outcomes for each model with a learning approach.

2. RESEARCH METHOD

This research is a quasi-experimental research (quasi experimental research) with a 2x3 research design to determine the effect of two independent variables on the dependent variable. The first factor was the NHT learning model with the CTL approach and the TPS learning model with the CTL approach while the second factor was the student learning style including kinesthetic, audio and visual types. The population in this study were even semester VIII students of SMP N 2 Sukoharjo Academic Year 2018/2019 which amounted to 160 students divided into 5 classes with sampling techniques using cluster random sampling. The sample in this study was class VI II A as an experimental class subjected to the NHT learning model with the CTL and VI C approaches as the control class subject to the TPS learning model with the CTL approach. In this study researchers used the method of documentation, questionnaire methods and test methods. Documentation method that is by taking the test value data from even semester VI class II 2017-2018 Academic Year. The questionnaire method is to retrieve information from each student by filling out a questionnaire containing indicators of learning style and then classifying it according to the type of student learning style. While the test method used to determine student learning outcomes with multiple choice tests with 4 alternative answers on

the subject of statistics. The instruments used in this study were student learning outcomes and student learning style questionnaires. Student learning instrument test in the form of content validity test, distinguishing test, difficulty level test and reliability test. While the student learning style questionnaire instrument in the form of content validity test, internal consistency test and reliability test. After the data is obtained then the research hypothesis will be tested using Analysis of Variance (ANOVA) two paths with unequal cells. Before using the ANOVA test, the ANOVA prerequisite test was carried out, namely data normality test and homogeneity test. Next, if the anova test rejected, then a double comparative test with the Scheffe method was carried out.

3. RESULTS AND DISCUSSION

Based on data analysis using statistics, it was obtained that the test of learning outcomes test instruments and learning style questionnaires was in the test of the test instrument after going through the validity test, the level of difficulty of the different power and reliability of the 25 questions obtained 20 questions that were worth using. Whereas in the learning style questionnaire test with each type of learning style with questionnaire instruments each of 26 items after going through the validity test, internal consistency and reliability of each type of learning style, 13 questionnaires were feasible to be used. Further learning will be carried out by testing hypotheses using two-way ANOVA with unequal cells that have previously met the data normality and homogeneity test requirements. Based on the calculation of the normality test data using the reliability test, it is obtained that the sample comes from a population that is normally distributed. Whereas in homogeneity test using method Bartlett obtained that the sample came from a homogeneous population.

Based on the results of the data analysis, a two-way ANOVA test with unequal cells can be tested. The calculation results of hypothesis testing using variance analysis with two paths with unequal cells are shown in Table 1 below.

Table 1. Summary of Analysis of Two Path Variants with Unequal Cells.

	K	JK	RK	F _{obs}	F _{tab}	Decision
A		1353,388	1353,388	4,424	4,04	H _{0A} rejected
B		2684,112	1342,056	4,387	3.16	H _{0B} rejected
AB		150,705	75,353	0.246	3.16	H _{0AB} not rejected
Error	8	17743,526	305,923			-
Total	3	21931,730				-

Based on Table 1, it can be concluded that (a) the learning model influences students' mathematics learning achievement, (b) learning styles influence student mathematics learning achievement, (c) there is no interaction between learning models and student learning styles. students.

Based on data analysis using ANOVA two roads with unequal cells were obtained H_{0A} and H_{0B} rejected. For H_{0B} then it is necessary to continue the analysis of data using the Scheffe method while H_{0A} because only comparing the two learning

models does not need to do a Scheffe test and decision making only sees the marginal mean. The following is the average value of each cell and the marginal mean in Table 2 below.

Table 2 . Average of each cell and marginal mean.

Learning model	Learning Style			Marginal mean
	Kinesthetic	Audio	Visual	
NHT with CTL	88,846	70	85	81,282
TPS with CTL	76,667	65	74,167	71,944
Marginal mean	82,760	67.5	79,585	

Based on the table it can be concluded that

- H_{0A} rejected then that the mathematics learning outcomes of students who were subjected to the NHT learning model with the CTL approach had better learning outcomes than the TPS learning model with the CTL approach.
- H_{0B} rejected, will be followed by a double comparison test between columns. The results of the scheffe test calculation can be seen in Table 3 below.

Table 3 . The results of the calculation of multiple comparison tests between columns

Comparison	F_{hit}	$2F_{0.05;2,58}$	Test Decision
$\mu_1 = \mu_2$	7,797	6.32	H_0 rejected
$\mu_1 = \mu_3$	0.585	6.32	H_0 not rejected
$\mu_2 = \mu_3$	4,105	6.32	H_0 not rejected

Based on the table, it can be concluded that students' learning outcomes with learning styles on the kinesthetic type provide higher learning outcomes than students with learning styles on audio types, students' learning outcomes with learning styles on kinesthetic types as well as students with learning styles in the visual type and student mathematics learning outcomes with learning styles in the visual type as well as students with learning styles on the audio type.

- H_{0AB} not rejected, then there is no interaction between the learning model and student learning styles towards students' mathematics learning outcomes, so there is no need to do a scheffe test .

At the first conclusion based on the first hypothesis, it was found that the NHT learning model with the CTL approach and the TPS learning model with the CTL approach had different effects on student learning outcomes. This is in accordance with the results of a study conducted by Rahayu and Suningsih (2018) that the mathematics learning outcomes of students subjected to the NHT learning model provide better learning outcomes compared to the TPS learning model and Flora Astyna et al (2017) concluded that the NHT learning model is better rather than the T PS learning model of reasoning abilities even though in this study in terms of learning styles . Strengthened also by the research results of Rahmat winata et al (2014) and Lingga Nico Pradana et al (2014) that the cooperative learning model of the NHT type with the CTL approach can improve learning achievement better . Based on the results of the study Nasrun (2016) Marda Sari and Edy Surya (2107) and this is because the application of the NHT learning model has a role in improving student learning outcomes. To improve the

learning process in this study also combined with the CTL approach because the application of the CTL approach can build a cooperative attitude between teachers and students, can improve students' response to learning, be creative in expressing opinions, improve skills and communication, responsibility, confidence and can increase students' interest in learning (Ch. Krisnandari Ekowati et al, 2015) . At the second conclusion based on the second hypothesis there are differences in learning styles in students on kinesthetic, audio, and visual types towards student mathematics learning outcomes. The calculation results show that students' mathematics learning outcomes with learning styles on the type of students' learning outcomes with learning styles on the kinesthetic type give learning outcomes better than students with learning styles on audio types, students' learning outcomes with learning styles on kinesthetic types as well as students with learning styles in the visual type and student mathematics learning outcomes with learning styles in the visual type as well as students with learning styles on the audio type . based on the theory put forward by Bobbi Deporter and Mike Hernacki (2013) Learning styles are also a combination of how a person absorbs and then regulates and processes information and also the tendency of students to adapt certain strategies in their learning as a form of responsibility to get a suitable learning approach with the demands of studying in class or school as well as guidance from subjects (Flening and Mills, 2009). At the third conclusion based on the third hypothesis each learning model provides the same learning outcomes for each type of learning style. The conclusion of this data analysis can be taken from the marginal characteristics or the main effects between columns, namely There are every learning model of student students with learning styles on kinesthetic types giving learning outcomes better than students with learning styles on audio types, student learning outcomes with learning styles on kinesthetic types as well as students with learning styles in the visual type and student mathematics learning outcomes with learning styles in the visual type as well as students with learning styles on the audio type . at the fourth conclusion based on the fourth hypothesis , each type of learning style mathematics learning outcomes applies equally to each mathematical learning model. The conclusion of this data analysis can be taken from its marginal characteristics or the main effects between lines. Thus it can be concluded that the NHT learning model with the CTL approach has better learning outcomes than the TPS learning model with the CTL approach.

4. CONCLUSION

Based on the formulation of the problem, the study of theory and data analysis can be concluded that (1) the NHT learning model with the CTL approach has better learning outcomes than the TPS learning model with the CTL approach, (2) Students with learning styles on the kinesthetic type provide higher learning outcomes rather than students with learning styles on audio types, students' learning outcomes with learning styles on kinesthetic types as well as students with learning styles in the visual type and student learning outcomes with learning styles in the visual type as well as students with learning styles on the audio type, (3) for each learning model applies consistently, mathematics learning outcomes of students who have learning styles with kinesthetic types give higher learning outcomes than students with learning styles on audio types, student learning outcomes with learning styles on kinesthetic types as well as students with learning styles in the visual type and students' mathematical learning outcomes with a visual style

learning style as well as students with learning styles on audio types,
 (4) For each category learning styles apply consistently namely the
 NHT learning model with the CTL approach has better learning
 outcomes than the TPS learning model with the CTL approach.

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