



# The Comparison of Numbered Head Together Learning Models and Think Pair Share in terms of Elementary School Mathematics Learning Outcomes

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## ABSTRAK

Penelitian ini yang akan dilakukan adalah kajian meta-analisis, dilakukan dengan menggabungkan dua atau lebih penelitian yang telah terjadi dengan variabel terikat yang digabungkan menjadi satu. Desain Penelitian Meta-Analisis yang digunakan adalah dengan cara merangkum, mereview dan menganalisis penelitian menggunakan artikel yang telah terdahulu meneliti model pembelajaran Numbered Heads Together dan Think Pair Share. Variabel penelitian merupakan segala sesuatu yang dibentuk menjadi apa saja yang diterapkan oleh peneliti sebagai pelajaran sehingga dapat diperoleh informasi tentang hal tersebut, kemudian akan ditarik kesimpulannya. Dalam penelitian ini terdapat dua variabel yaitu variabel bebas (X : Numbered Head Together dan Think Pair Share) dan Variabel terikat (Y: Ditinjau dari hasil belajar matematika SD). Pengumpulan data dilakukan oleh penelitian dengan mencari artikel yang relevan atau berkaitan dengan topik yang akan diteliti dalam situasi jaringan internet. Teknik analisis data yang digunakan dalam penelitian ini adalah teknik analisis besar pengaruh atau effect size. Rumus effect size yang digunakan adalah formula pengaruh (effect size) dengan rumus eta kuadrat ( $\eta^2$ ). Pembelajaran kooperatif secara keseluruhan mampu meningkatkan hasil belajar matematika peserta didik pada kelompok eksperimen dari kelompok kontrol. Aspek pada jenjang pendidikan dalam analisis penerapan idik. Nilai besar pengaruh jenjang SD. Hasil ini menunjukkan bahwa model pembelajaran kooperatif pada seluruh wilayah yang diteliti mampu meningkatkan hasil belajar matematika peserta didik pada kelompok eksperimen.

## ABSTRACT

This research that will be conducted is a meta-analysis study carried out by combining two or more studies with the dependent variable, which is combined into one. The Meta-Analysis Research Design summarises, reviews, and analyses research using articles that have previously examined the Numbered Heads Together and Think Pair Share learning models. Research variables are formed into whatever is applied by the researcher as a lesson. Information can be obtained about it. Then conclusions will be drawn. This study has two variables: the independent variable (X: Numbered Head Together and Think Pair Share) and the dependent variable (Y: Judging from elementary school mathematics learning). Data collection is carried out by research by searching for relevant articles or related to the topic studied in an internet network situation. The data analysis technique used in this study is the effect size analysis technique. The effect size formula used is the effect size formula with the eta squared formula ( $\eta^2$ ). Overall, cooperative learning can improve students' mathematics learning outcomes in the control group's experimental group. Aspects at the level of education in the analysis of the application of idik. The score of the influence of the elementary school level. These results indicate that the cooperative learning model in all areas studied improved students' mathematics learning outcomes in the experimental group.

## 1. Introduction

Mathematics is one of the most important subjects for students. Mathematics cannot be separated from the daily life of students (Kurniawati et al., 2017). Mathematics is also a tool to improve thinking processes. The reason is that mathematics is very much needed in everyday life so that students need to be equipped with mathematics since elementary school or starting kindergarten (Anggraini et al., 2019; Anwar & Anis, 2020). Even though mathematics is very important in students' lives, Mathematics is considered difficult, complicated, and frightening for students (Irwanto et al., 2019), which causes students to feel mathematics is boring learning (Rahmawati et al., 2019). These students also perceive

mathematics as a subject that makes stress time-consuming and tends to mess with useless formulas in life. (Dewi, 2018; Ikshaum et al., 2014; Theresia, 2018). It makes the teachers challenged to provide the teaching and learning process by looking for an appropriate model to free themselves from fear and boredom in mathematics. Success in learning is inseparable from the teacher's role, who provides the best learning for students who can make learning methods fully acceptable to students in the school (Suparni, 2017). Teaching is largely determined by the teacher who can change students' behavior and mindset in learning. Change can be interpreted as the development of potential that students have to benefit directly from their development. All forms of change experienced by students after the learning process are known as learning outcomes.

Learning outcomes result from one's learning process related to changes in someone who learns, the form of change resulting from learning in the form of changes in understanding knowledge, understanding, attitudes and behavior, skills and skills. Mathematics learning outcomes are a benchmark, an assessment that determines students' success in their learning process, especially in mathematics (Wassahua, 2016). Students' mathematics learning outcomes are successful if the students' mathematics learning outcomes tend to be good. Of course, it gives the understanding that the teaching and learning process has gone very well. And vice versa, if students' mathematics learning outcomes tend to decline, of course, the teaching and learning process experiences obstacles. Learning outcomes always involve changes in individuals, such as maturity to think, behave, and maturity in making decisions and choices (Hiryanto, 2017; I. Lestari, 2014).

To improve learning, it is necessary to use a learning model that can make learning more qualified. One of them is using the Numbered Heads Together learning model. NHT emphasizes that students work together to understand their group work results and is responsible for this work's results (Fiteriani & Baharudin, 2017). Learning with the NHT model involves collaborative students, which will impact learning outcomes (Muliandari, 2019). NHT learning develops a more enjoyable learning atmosphere so that students are no longer bored in participating in learning (Fitrianti, 2020). The Numbered Head Together cooperative learning model is a learning model based on constructivist theory (Daeka et al., 2014). NHT creates positive interdependence and individual accountability in the group (Kurniawati et al., 2017). Although it has many similarities with other approaches, this approach emphasizes using certain structures to influence students' interaction patterns. Besides the NHT, the learning model used is Think Pair Share. The TPS learning model is a problem-oriented learning model that students solve directly using the discussion method (Dharmayanti et al., 2017; Kurniasari & Setyaningtyas, 2017). Think Pair Share model prioritizes cooperative learning that allows students to help each other and interact with each other (Febrianto, 2016; Lestari & Diyah, 2016). Think Pair Share (TPS) allows all students' involvement in the learning process to positively impact the development of students' mathematical reasoning skills and problem-solving (Nataliasari, 2014; Solikhin & Mustakim, 2015). In its application, Think Pair Share is a model whose type of learning is designed for active students, providing free time for students to think deeply about what is explained by the teacher to think and answer simultaneously.

Several studies related to the two models, including research conducted by Nasrulloh, (2017) states that the cooperative learning model types TPS and NHT are each effective in terms of mathematics learning achievement of students. There is no difference between the TPS and NHT cooperative learning models in mathematics learning outcomes compared to their effectiveness. Research conducted by Maryoto, (2018) states that there is a significant effect of using the TPS type of cooperative learning model on students' mathematics learning outcomes. The use of the NHT type cooperative learning model also positively affects students' mathematics learning outcomes. However, there is no significant difference in mathematics learning outcomes using the TPS-type cooperative learning model with the NHT-type cooperative learning model. Iswiwiyanti shows no difference between the learning outcomes taught by the TPS cooperative learning model and students. They learn using the NHT learning model in mathematics learning materials. Research conducted by (Mariana & Riwayati, 2016) stated that the results of studying biology using the NHT model are better than TPS on ecosystem material. Research conducted by Andika et al., (2016) states that students' learning achievement in the NHT learning model is better than the TPS learning model using the scientific approach and the classical model with the scientific approach.

Every year, the research results in education that take samples on the theme of cooperative learning models are carried out through research reports and published through the media in journals that have been carried out since the twentieth century until now. This research can be in the form of experimental, descriptive, correlation and so on. Data from the research results of the cooperative learning model are very abundant. However, not much further research on these data has been done. In cooperative learning research data, further research is needed to assess how the research results get a

score and strengthen the research results. On this basis, a meta-analysis study using a cooperative learning model was conducted to assess and evaluate previous studies. Other things might cause research obstacles using cooperative methods in which there are not many students in certain schools. There are also different numbers of teachers in schools in Indonesia. Some teachers do not master cooperative models or methods that might make students feel bored. A big influence to make research can produce results. That is why this research was conducted to analyze the comparative effect of the numbered head together and think pair share learning models in terms of elementary mathematics learning outcomes. This research will become a clearer learning level following students' learning level and the research's location.

## 2. Method

### Types of research

This type of research to be conducted is a Meta-Analysis study. The research is carried out by combining two or more studies with the dependent variable combined into one. Meta-analysis research used is by summarizing, review, and analyze research using articles that have previously examined the Numbered Heads Together and Think Pair Share learning models. Research variables are formed into whatever is applied by the researcher as a lesson. Information can be obtained about it, and then conclusions will be drawn. In this study, there are two variables: the independent variable Numbered Head Together and Think Pair Share, the dependent variable in terms of elementary mathematics learning outcomes.

### Research subject

Research subjects in this study are used to obtain the information needed clearly and in-depth. Meta-analysis research is used by summarizing, reviewing, and analyzing research using articles that have previously examined the Numbered Heads Together and Think Pair Share learning models. Furthermore, knowing the effect of the two learning models on elementary mathematics learning outcomes. The journals studied were 20 journals, and the publication year span was 2010-2020.

### Method of collecting data

Data collection tools or research instruments used by sorting articles found in online journals contained in Google Scholar or Google Scholar. The research instrument used in the study was the coding data sheet in capturing data or information about the effect size. Data collection is carried out by research by searching for relevant articles or related to the topic studied in an internet network situation. The data taken are research data following the required variables, as written in the coding sheet. The data results are then divided according to the data group based on data on the average of the sub-studies of each experimental group and control group and the standard deviation of each sub-study.

### Data analysis

The data analysis technique used in this study is the effect size analysis technique. The effect size formula used is the effect size formula with the eta squared formula ( $\eta^2$ ). Experimental research involving two groups. The researchers analyzed consisted of twenty journals. There are three effects of grouping the effect size data based on categories. Nine articles were reaching the number 0.32 in the large effect. In the moderate effect, eight articles were reaching 0.14, and in the small effect, three articles were reaching the number 0.03. Effect size data grouping based on education level. There are high and low classes at the primary school level of education in the high class (grade 12 junior high school) and the low class (grade 3 elementary school). The summarized data findings obtained the large average effect size category data resulting from grouping Effect size by region. Research results on articles or journals in Java are conducted more research than in other regions. However, there are only a few articles or journals in Sumatra, Sulawesi, and Bali's islands and have considerable research results on its effects.

## 3. Result and Discussion

Data analysis results were carried out to determine the Numbered Heads Together and Think Pair Share learning models' effectiveness from the participants' learning outcomes. The research results were grouped and found sixty sub-units of analysis as in Table 1

**Table 1.** Article Analysis Unit Grouping

Analysis Group	Unit of Analysis	Number of Journals
Educational stage		
	Junior High School	5
Dependent variable	Hasil Belajar	20
Types of Cooperative	<i>Numbered Heads Together</i> (NHT)	5
Methods	<i>Think Pair Share</i> (TPS)	5
	<i>Numbered Heads Together</i> (NHT) + <i>Think Pair Share</i> (TPS)	10
<b>Total Journal</b>		<b>20</b>

### Effect Size Grouping Results by Category

In the research results taken from twenty journals, there is an analysis group, the level of education, which has a unit of analysis for primary schools and junior high schools; the dependent variable is the unit of analysis, learning outcomes; and types of cooperative methods numbered heads together, think pair share, and numbered heads together think pair share collaboration. The analysis of articles listed in Appendix 1 is then calculated on their Effect Size scores, then grouped into large, medium, and small effect categories. From the results of the effect size grouping analysis, three effects influenced the study. There are nine articles on the big effect on the moderate effect. There are eight articles, and on the small effect, there are three articles. The overall average effect size is 0.32 using the formula  $\eta^2 = r^2 = \frac{r^2}{r^2 + db}$ . The analysis results reveal that the overall average effect size of the cooperative learning model associated with experimental studies of the twenty articles analyzed reaches 0.32 and falls into the large effect category. This average indicates that cooperative learning has a significant effect on the mathematics learning of elementary school students.

### Effect Size Grouping Results Based on Education Level

The articles analyzed are articles whose research uses a cooperative learning model in Mathematics and Natural Sciences subjects. Based on these limitations, the education level used as a research location is elementary and junior high school. The results showed high and low classes at the elementary school level, found articles or journals in the high class (twelfth grade) and the low class (third class). Meanwhile, at the junior high school level, including the high class, amounting to 5. The average effect size is in a large category. The data summarized reveals that the cooperative learning model's largest average effect size is elementary. There is data on the influence on primary education, which is more consistent than junior high school education.

Educational stage	Statistic	
	N	Rerata $\eta^2$
Elementary School	15	0,33
Junior High School	5	0,31
<b>Mean</b>		<b>0,32</b>

### Effect Size Grouping Results by Region

The journals' analysis shows that the distribution of provinces in Indonesia that uses the cooperative learning model as the independent variable in the study shows that the average size of influence and standard deviation based on regions in Indonesia is quite large. The cooperative learning model's influence is based on the largest to the smallest area: Sumatra, Sulawesi, and Java. Meanwhile, when viewed from each province, the average size of the influence from the highest to the lowest in Central Java, North Sumatra, Bali, East Java, Lampung, West Java, Makassar, Bengkulu, and Banda Aceh, respectively. In line with the average size of influence, the regions with the highest standard deviation scores are Central Java, followed by North Sumatra, and Bali. More research is done on articles or journals

in Java than in other regions. However, there are only a few articles or journals in Sumatra, Sulawesi, and Bali's islands and have considerable research results on its effects.

Province	N	Region	$\eta^2$	Rerata $\eta^2$	SD
Jawa Barat	1		0,48		
Jawa Tengah	6	Jawa	0,25	0,33	0,11
Jawa Timur	2		0,27		
Sumatra utara	3		0,36		
Lampung	2		0,13		
Bengkulu	1	Sumatra	0,23	0,24	0,12
Aceh	1		0,27		
Makassar	1	Sulawesi	0,02	0,02	0
Bali	3	Bali	0,35	0,11	0,03
<b>Mean</b>				<b>0,26</b>	<b>0,07</b>

## Discussion

Based on the research results that have been explained, several findings were obtained. These findings are: First, there is an experimental research report in a journal that discusses cooperative learning models in vulnerable research times in 2011-2020. Research data can be generated from searches in various accredited national journals. After a thorough analysis, there were only twenty journals that met the criteria in this study. It shows that twenty journals have been analyzed, nine journals have an effect size in the large category, eight journals have a medium effect, and 3 journals have small effects. The largest effect size comes from research using the Numbered Heads Together (NHT) cooperative learning method. The smallest effect size is obtained from the research results using the Think Pair Share (TPS) type of cooperative learning method. However, these results cannot be concluded about which cooperative method is the best because each research sub-unit has a different calculation of the effect size score. The research findings show that the overall average effect size score of the cooperative learning model is 0.32. This figure means that the treatment of cooperative learning models in mathematics learning and science learning has a major influence on students. Cooperative learning provides opportunities for students to learn more actively and develop students' interest in learning. With learning that is fun, students will learn without feeling anxious because using cooperative learning models will foster a sense of cooperation between peers. This finding is in line with the meta-analysis results conducted by [Astutik et al., \(2016\)](#). The large average effect of applying the NHT learning model using the scientific method is better than students' learning outcomes in the TPS learning model with the scientific approach and the classical learning model with the scientific approach. Second, cooperative learning provides students with many opportunities to communicate and interact with other students from different backgrounds. That is, social learning and conveying increased cognitive abilities also increase students' social abilities. Judging from Jean Piaget's cognitive stage development, students at the elementary to junior high school level fall into the category of formal-concrete stages. Students must sort, identify, consider, understand, and see other people's point of view. Subsequent developments acquire the ability to think abstractly, reason logically, and conclude from the information.

The analysis results show that the cooperative learning model applied at the primary school level has a slightly higher average effect level than its application at the junior high school level. On average, the cooperative learning model's effect in the experimental class, when viewed from its application at the junior high school level, does not change much in the control class. In contrast, the experimental class's mean results at the junior high school level showed a significant change compared to the control class. Even though the primary school level has a great average influence, the data distribution has a greater overall effect than at the junior secondary level. This means that the cooperative learning model produces one by one treatment to the experimental group at the elementary school level, with a large influence at the primary school level having high scores but less effective use. A student's social thinking ability is influenced by his cognitive. Based on the theory, it can be linked between cooperative learning results with the level of education. That the higher the level of education of a student, the more effective the learning outcomes will be. Because the cognitive abilities of a student who is already at a higher level of education are likely to have higher cognitive abilities. Even though junior high school students on average tend to be selfish because the effect of continuous learning is higher than elementary school.

Third, the average magnitude of influence on the use of regional perspective cooperative learning models is in a large category because it reaches a score of 0.25. Although 80% of the articles analyzed are

located on the island of Java, Sumatra's island has the highest average magnitude of influence than Java and Bali's islands. However, Sumatra Island is the region with the lowest average standard deviation score. Until 2019, provinces in Indonesia have experienced an expansion of up to thirty-four provinces. Overall, the research results show that all the journals analyzed were carried out in nine provinces. The study data were reproduced from Central Java's province because reports in research journals that met the criteria were mostly found in Central Java province. It can be seen from the types of cooperative methods used in each region in Indonesia. The type of learning method applied in Sumatra is simpler than the cooperative learning method applied in Java. It allows the large score of influence in Sumatra to be higher than in Java because the learning method's difficulty affects the influence score.

The methods used in Java are varied and complex. One of which is Numbered Heads Together (NHT). NHT learning is a good technique to stimulate students to be more active and think critically because they can solve problems with cooperation to understand the material more easily. The structure of cooperative learning is more supportive of effective communication than the structure of the competition and individual effort. Exchange of information among students, helping each other achieve good learning outcomes, more individual guidance, sharing resources among students, greater feelings of involvement, reduced fear of failure, and the development of mutual trust among students. In line with Astuti et al., (2016) research, they are applying the NHT learning model that can improve mathematics learning outcomes in third-grade elementary school students in Pekanbaru.

In TPS learning designed to fulfill the interaction patterns of students. Frang and his colleague developed the strategy used. They stated that TPS was an effective way to vary the atmosphere of class discussion patterns. The TPS method gives students time to think about answers to questions or problems given by the teacher. Students help each other to solve these problems with the abilities possessed by each student. In research conducted by (2017), getting good results from using the TPS learning method is stated in mathematics learning to improve fourth-grade students' learning outcomes, teacher activities, and student activities. This analysis's findings indicate that overall the cooperative learning model has a great influence in several regions in Indonesia, so it can be concluded that the cooperative learning model effectively teaches mathematics in several regions in Indonesia. This analysis's findings indicate that overall the cooperative learning model has a great influence in several regions in Indonesia, so it can be concluded that the cooperative learning model effectively teaches mathematics in several regions in Indonesia.

Fourth, the dependent variable, also known as the dependent variable, is the variable or object that is affected in a study. There is a dependent variable from the data obtained from 20 research journals that have been conducted. The related variable is learning outcomes. The data analysis results state that the average in all journals based on the average size of the related variables' influence is 0.32. The analysis results show that the cooperative learning model effectively improves social skills, critical thinking skills, cognitive abilities, activeness, and students' learning outcomes. The average score affects the cooperative model on these variables into the large category, 0.25. The results occur because the cooperative model emphasizes the learning process in heterogeneous groups. Each member of the group is responsible for improving or getting the learning outcomes achieved. Other results show that the teaching and learning process that applies a cooperative model positively improves analytical thinking skills and shapes students' character.

Cooperative learning models that have high social skills are very good for use in learning. Social skills provide one of the aspects of emotional intelligence needed for social interaction by connecting the moral scores of culture and society, including in sharpening interactions with older people, younger people, and peers at school. Discussions about starting a conversation, giving good praise, being a good listener, sharing personal information appropriately, and being self-confident are ways to improve social skills (Nugraini & Ramdhani, 2017). Social skills are the main skills that students must have to interact with their surroundings. The ability to work together with understanding, empathy, and the ability to communicate both ways are part of the social skills needed to build good relationships. Ni (Awi et al., 2016; Mayasari, 2014). Social skills that develop during the learning process are ongoing. One of the learning models that support the formation of social skills is cooperative learning. Because at the implementation stage, the cooperative model shares learning outcomes in heterogeneous groups. In addition to the cooperative learning model, you can also work together to achieve the desired results or scores. It can greatly affect the learning skills of students through the demands of cooperation.

Learning outcomes are the dependent variable that is examined in the articles analyzed. Learning outcomes are an important part of learning. They are the result of an interaction carried out in the teaching and learning process. The teacher's learning process ends with an assessment of learning outcomes. From the aspect of students learning outcomes are the results obtained at the end of the learning process (Aqib, 2013; Kustanto, 2015). The results of the analysis show that learning outcomes

have a high influence score of 0.32. Cooperative models improve student learning outcomes through learning activities. In its application, the cooperative model does not get a competency system but cooperation so that all members get the intended results. Through the learning process, students help each other to improve learning outcomes with one another. The cooperative learning model can be carried out with various easy and fun methods to make students' interest in learning easy to absorb the information conveyed. In research Erawati et al., (2017), There is an increase in student learning outcomes after applying the cooperative learning model.

#### 4. Conclusion

Overall, cooperative learning can improve students' mathematics learning outcomes in the experimental group from the control group, with an effect size of 0.32 which means the large effect category. It shows that cooperative learning has an effective effect that can be applied in mathematics learning. The cooperative learning model can be used as alternative learning to improve students' mathematics learning. Cooperative learning can improve the mathematics learning outcomes of participants. Both education levels have a large effect that falls into the large effect category. These results indicate that the cooperative learning model in all areas studied improved students' mathematics learning outcomes in the experimental group.

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