

**THE EFFECT OF JIGSAW IN THE COOPERATIVE LEARNING  
MODEL ON THE STUDENTS' ABILITY TO SOLVE  
MATHEMATICAL PROBLEMS OF STATISTICS MATERIALS AT  
GRADE IV OF ELEMENTARY PUBLIC SCHOOL MOJOSARI 01 IN  
JEMBER-INDONESIA**

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**ABSTRACT**

The purpose of this research was to find out whether there was an effect of applying the Jigsaw cooperative learning model to the ability to solve math problems on the subject of Statistics for fourth-grade students at Elementary Public School Mojosari 01 Jember? To achieve this research purpose, a quasi-experimental study was carried out using the non-equivalent control group design pattern. The research subjects were taken from 40 students of class Iva and IVb at Grade IV of Elementary Public School Mojosari 01 Jember Regency using a purposive sampling technique. Test data collection techniques are used to collect the required data. After the data is collected completely, then the data is analyzed using t-test techniques and relative effectiveness tests. The results of data analysis can be concluded that there is an effect of applying the Jigsaw cooperative learning model to the ability to solve mathematical problems on the subject of Statistics in class IV students at Grade IV of Elementary Public School Mojosari 01 Jember. Furthermore, based on the results of the relative effectiveness test, the relative effectiveness level of the Jigsaw learning model is 33.3% for the ability to solve mathematical problems on the subject of statistics in fourth-grade students at Grade IV of Elementary Public School Mojosari 01 Jember.

**Keywords:** Jigsaw Type Cooperative learning method, math problem-solving ability.

**1.0 INTRODUCTION**

Mathematics is considered by most people as a difficult and tedious subject, therefore special attention is needed for learning this subject. Along with the development of science and technology in the 21st century, mathematics has an important role as one of the basic sciences that can be applied in various fields of life. In order for mathematics learning to be more effective and achieve optimal success, it is hoped that all students can play a more active role in the learning process and the learning process must take place satisfactorily. In addition, students must also have the ability to argue and communicate systematically to solve problems. Thus it will be able to form the attitude of students who always think rationally, logically, critically, and scientifically, have broad views in solving problems, and can develop

mathematics well. To be able to achieve good problem-solving skills, students need to get special attention in the learning process, starting from the most basic level of formal education, namely elementary school. Problem-solving is a major theme in research and curricula around the world, including in Indonesia. The cooperative learning model is one of the learning models that is expected to help solve mathematics learning problems in elementary schools, this learning model can involve students in interacting and working together with friends maximally in the learning process.

The implementation of the jigsaw-type cooperative learning model demands that students are divided into groups whose members have various characteristics so that in the learning process there will be maximum collaboration (Salvin in Murwati, 2017; Masyhud and Zakiyah, 2023)). In Jigsaw-type cooperative learning In this way, each student can be responsible for learning the assigned topic and teaching it to their group members, so that students can interact optimally and can help each other. Jigsaw is a type of cooperative learning that accompanies students to be active and interact with each other and help each other in mastering learning material to achieve maximum performance. so the use of the Jigsaw cooperative learning model is expected to be able to improve the problem-solving abilities faced by students (Masyhud and Zakiyah, 2023).

Some relevant previous research results have been proven in accordance with this study. This research, among other things, has been carried out by Hani Handayani (2020). He argued that there was an increase in the mathematical critical thinking abilities of elementary school students by using the jigsaw-type cooperative learning model. The results of the study were two differences in the mean pretest and posttest of the experimental class and the control class. The average pretest for the experimental and control classes was the same, namely 0.067, while the average posttest for the experimental class was better than the control class, namely 0.190. So it can be concluded that for the average pretest mathematical critical thinking abilities of the experimental class and the control class, there is no significant difference. As for the post-test, the average post-test of the experimental class was better than the control class. The results of data analysis using the t-test at a significance level of 0.05 from the results of the t-test obtained results of 0.192 so it can be concluded that jigsaw-type cooperative learning has a significant influence on students' mathematical critical thinking abilities.

Another study conducted by Hanna and Khaerul Ummah (2021) which aimed to determine the effect of implementing the Jigsaw type cooperative learning model on mathematics learning outcomes showed that there were positive and significant differences in student mathematics learning outcomes after implementing the Jigsaw type cooperative learning model in learning mathematics for fifth-grade students of SD Inpres Kassi-Kassi Makassar.

While the research conducted by Made Suardani; Marheini, and Lasmanawan (In Rosyidah, 2016), which aims to find out the effect of the jigsaw cooperative learning model on social studies learning outcomes, shows the results, that the jigsaw cooperative learning model provides better social studies learning outcomes compared to conventional learning models in fifth-grade students at SDN 1 Semarapura Tengah.

Based on the description and the results of previous relevant research, it can be stated that the application of Jigsaw cooperative learning can affect student learning outcomes. However, to what extent the application of Jigsaw cooperative learning can affect the results of learning

mathematics in elementary schools, especially related to problem-solving abilities in Statistics material, needs further research. Therefore a study entitled "The Effect of the Jigsaw Cooperative Learning Model on the Ability to Solve Mathematical Problems in the Subject of Statistics in Grade IV students at Grade IV of Elementary Public School Mojosari 01 Jember" was conducted. Clearly, this research was conducted to answer the research problem, is there any influence of the jigsaw cooperative learning model on the ability to solve mathematical problems on the subject of Statistics in fourth-grade students at Grade IV of Elementary Public School Mojosari 01 Jember?

## **2.0 LITERATURE REVIEW**

### **2.1 Jigsaw in Cooperative Learning Model**

The meaning of Jigsaw in English is a Jigsaw and there are also those who call it a puzzle, which is a puzzle that arranges pieces of a picture. Cooperative learning of the Jigsaw model takes the work of a saw (zigzag), that is, students carry out a learning activity by working with other students to achieve a common goal.

Muliawan (in Murwati, 2017) states that Jigsaw learning, or what is called the Expert Team Model is a learning technique that focuses attention on the ability to master the specific subject matter. The Jigsaw-type cooperative learning model focuses on group work in the form of small groups. This Jigsaw model is a cooperative learning model in which students study in small groups consisting of 3-5 people heterogeneously (Salvin, in Masyhud and Zakiyah. 2023). Students help each other and are positively interdependent besides being able to be responsible independently. According to Masyhud and Zakiyah (2023), in the Jigsaw learning model, students have many opportunities to express opinions and process the information obtained and besides that, they can improve communication skills..

In line with the description above, Shoim (2021) states that group members are responsible for the success of their group and the completeness of the material being studied and can convey it to their group. The Jigsaw-type cooperative learning model provides opportunities for students to work together with group members in dealing with all the problems they face. Jigsaw cooperative learning is an interesting learning to use if the material to be studied can be divided into several parts and the material does not require a sequence of delivery.

According to Eliot (in Masyhud and Zakiyah, 2023), in general, the application of the Jigsaw model in class is as follows: (a) the class is divided into several groups, (b) each group consists of 4-6 people who are heterogeneous, both in terms of abilities, culture, gender, and so on, (c) each group is given teaching materials and learning tasks that must be done, (d) from each group a member is taken to help the new group (expert group) by discussing the same task, (e) members of the expert group then return to the original group, to teach the group members. In this group discussions are held between group members, (f) during the group learning process the teacher acts as a facilitator and moderator, and (g) every week or two weeks the teacher carries out evaluations, both individually and in groups to find out which group gets the highest learning outcomes. Perfect then it should be rewarded.

Meanwhile, the functions of Jigsaw-type cooperative learning according to Nurhadi, (2004) are as follows: (a). motivating students and conveying the goals in learning to be achieved and

conveyed to students as well as motivating students to learn, (b) organizing students in groups, and (c) providing information, the information to be conveyed can be presented to students by means of demonstrations or through reading.

The activities in Jigsaw Type cooperative learning according to Rosyidah (2016) consist of: (a) reading, that is, students receive expert topics and read the requested material to find information, (b) expert group discussions, meaning students with the same expertise the group meets to discuss it in expert groups, (c) team report, in this activity, experts return to their respective groups to teach the topics they have studied to their group mates, (d) Test. Here students take individual quizzes covering all topics, and (e) team recognition. After the quiz, as soon as possible to calculate individual progress scores and team scores. Then the team with the highest score is awarded.

Activities as described above can be described in diagram 1 as follows:

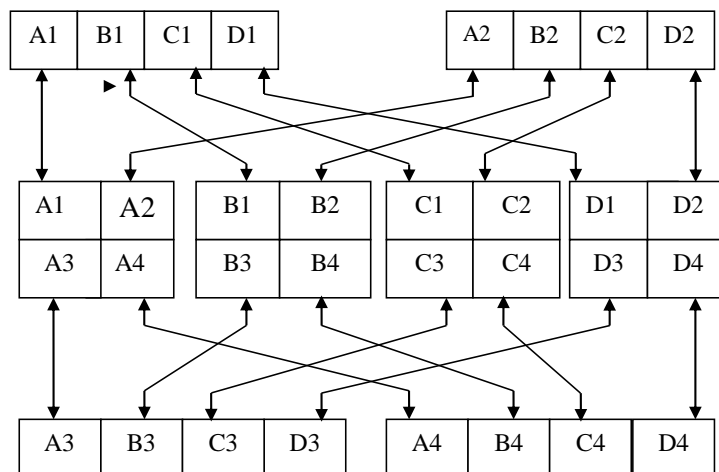


Figure 1: Student's Position in the Jigsaw Model

(Roshidah, 2016)

### 2.2 Problem-Solving Skills

In connection with the ability to solve mathematical problems which is the main theme in this study, it does have an important role in the success of mathematics education in elementary schools. Mathematics is one of the lessons that must be given in elementary school. Learning Mathematics has an important position, especially in elementary schools as an effort to realize predetermined educational goals, namely understanding mathematical concepts, using reasoning on patterns and properties, solving problems, and communicating ideas with symbols, tables, diagrams, or other media to clarify circumstances or problems. However, in reality, learning mathematics in elementary schools which play a role in developing problem-solving abilities has not received much attention from teachers. Teachers often place more emphasis on delivering content or subject matter and algorithms for solving problems rather than providing situations that emphasize mastery of problem-solving skills (Kodariyati, 2016; Masyhud and Zakiyah, 2023).

Based on the descriptions and views of the experts above, it can be argued that it is necessary to conduct research on the role of the Jigsaw cooperative learning model in learning mathematics in elementary schools, especially with the ability to solve mathematical problems on the subject of Statistics in Class IV Students at MMOjosari 01 Elementary School Jember

Based on the results of the literature review and previous relevant research, the research hypothesis can be formulated as follows: There is an effect of applying the Jigsaw cooperative learning model on the ability to solve mathematical problems on the subject of Statistics in Grade IV Students at Elementary School Mojosaari 01 Jember

### **3.0 RESEARCH METHODS**

This research was conducted using a quasi-experimental research design with a non-equivalent control group pattern. The quasi-experimental research design was applied because it was not possible for the researcher to fully control the research subjects, because the research subjects were already in permanent groups and did not randomize the research subjects (Masyhud, 2021). The research subjects were taken from students in classes IV-A and IB-B at Mojosaari 01 Public Elementary School, Puger District, Jember Regency using the Purposive Sampling technique (Masyhud, 2021). To determine the experimental and control groups, was carried out using a simple random technique using a lottery. Before the lottery was carried out, a homogeneity test was first carried out and the results showed that the two groups of subjects were declared homogeneous because the results of the F test showed a score of 3.459 and greater than the 0.05 significance level ( $F > 0.05$ ). Based on the results of the homogeneity test, it was determined that class IA-A was the experimental class and class IV-B was the control group.

Furthermore, data collection was carried out using a data collection instrument for the learning outcomes test. The test instrument used for data collection had previously been tested in schools and showed that it met the requirements for validity, reliability, level of difficulty, and differential index. After data collection was carried out, then the collected data was analyzed using 2 types of data analysis techniques, namely: (1) separate sample t (t-test) data analysis techniques, and (2) data analysis techniques Relative effectiveness test Masyhud, 2016; Masyhud and Zakiyah, 2021). A separate sample t-test analysis technique was used to find out whether there were significant differences in learning achievement between classes taught using the Jigsaw cooperative learning technique and classes taught without using the Jigsaw cooperative learning technique. While the relative effectiveness test is used to determine how much the level of relative effectiveness between class learning outcomes taught with the Jigsaw cooperative learning technique compared to learning outcomes in classes without using the Jigsaw cooperative learning technique.

The research process from the beginning to the writing of this article was carried out for 6 months, namely from January 2022 to July 2022.

### **4.0 RESEARCH RESULTS AND DISCUSSION**

As stated in the previous section, the purpose of this research was to find out whether or not there was an effect of applying the Jigsaw cooperative learning model on the ability to solve

mathematical problems on the subject of Statistics in Class IV Students at Mojosari 01 Elementary School, Jember. Experimental research on 2 classes by applying a quasi-research design with a non-equivalent control group pattern

The general description of student achievement in the experimental class and control class related to the score of problem-solving ability on the subject of statistics can be drawn in table 1 as follows:

**Table 1: Pretest and Posttest Scores for Experimental Class and Control Class**

Variance Score	Pretest Score	Posttest Score
<b>Experimental Class (IVA)</b>		
<i>Means</i>	59,2	92,5
N	20	20
Standard Division	13,5	5,735
Median	62,5	92,5
Minimum Score	25	85
Maximum Score	75	100
<b>Control Class (IVB)</b>		
<i>Means</i>	46	62,7
N	20	20
Standard Division	14,7	18,6
Median	47,5	64
Minimum Score	25	40
Maximum Score	65	83

Based on the data obtained, it was further analyzed using a separate sample t-test analysis technique. The scores analyzed using the t-test analysis technique came from the difference between the pretest scores and posttest scores, both in the experimental group and the control group. From the results of this analysis, it can be seen that the t-empirical value obtained is 3.983. The t-table value for 38 degrees of freedom is 2.024.

Based on the results of this analysis, it can be stated that the alternative hypothesis which reads: There is an effect of applying the Jigsaw type cooperative learning model on the ability to solve mathematical problems on the subject of Statistics in Class IV Students at Mojosari 01 Elementary School Jember is accepted. Therefore it can be concluded that there is an effect of applying the Jigsaw cooperative learning model to the ability to solve mathematical problems on the subject of Statistics in Class IV Students at Mojosari 01 Elementary School Jember.



Subsequent analysis was carried out to find out how much influence the Jigsaw cooperative learning model had on the ability to solve mathematical problems on the subject of Statistics in Class IV Students at Mojosari 01 Elementary School Jember. The analysis was carried out using analysis techniques/relative effectiveness tests. The formula for the test is as follows:

$$ER = \frac{MX_2 - MX_1}{\left(\frac{MX_1 + MX_2}{2}\right)} \times 100\%$$

**Information:**

ER = Relative effectiveness level of experimental group treatment compared to the control group treatment

MX1 = Mean different control group

MX2 = Mean different experimental group (Masyhud, 2021)

The results of the relative effectiveness test carried out showed the acquisition of a relative effectiveness coefficient of 66.4% and included in the high effectiveness category. With the results of the relative effectiveness test obtained by a relative effectiveness coefficient of 66.4%, it can also be stated that the contribution of the Jigsaw-type cooperative learning model to the formation of mathematical problem-solving abilities on the subject of Statistics in Class IV Students at Mojosari 01 Elementary School Jember is as big as 66.4%. This means that there is still 33.6% of the problem-solving ability formed by other factors outside the Jigsaw cooperative learning model.

Other factors that contribute to the formation of mathematical problem-solving abilities on the subject of Statistics in Grade IV Students at Mojosari 01 Public Elementary School Jember can be sourced, both from internal factors and external students. Internal factors include, among other things, student IQ, student learning motivation, student learning crafts, student talents, and interests, as well as other factors. While external factors that can influence the formation of problem-solving abilities include: parental attention, teacher learning academic competence, and learning facilities, both at school and at home. However, how much each factor contributes to the formation of students' problem-solving abilities still needs further research.

**5.0 CONCLUSION**

Based on the results of the research and discussion conducted in the previous section, it can be concluded that there is a significant influence of the application of the jigsaw-type cooperative learning mode on the ability to solve mathematical problems in fourth-grade students at Mojosari 01 Elementary School Jember, because the results of the analysis t (t-test ) show the acquisition of a t coefficient of 3.983 and show that it is greater than the t0 table of 2.024 at a 95% confidence level with 38 degrees of freedom (3.983 > 2.024). Furthermore, the results of the analysis of the relative effectiveness test obtained a coefficient of 66.4%. This shows that the contribution of the jigsaw cooperative learning model can contribute as much as 66.4% to the formation of mathematical problem-solving abilities in fourth-grade students at Mojosari 1 Public Elementary School by 66.4%. This result also means that there is 33.6% part of the

problem-solving ability formed by other factors outside the Jigsaw cooperative learning model. These variables can be sourced from internal student factors such as IQ, learning motivation, learning skills, student talents, and interests. In addition, they can also be sourced from student external factors, such as parental attention, teacher academic competence, and learning facilities. the study, both at school and at home. However, how much each factor contributes to the formation of students' problem-solving abilities still needs further research.

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