The effect of make a match cooperative learning model on student learning outcomes in grade IV Mathematic subjects

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Abstract. The purpose of this research is to find out the effect of cooperative learning make a match type on mathematics learning outcomes in elementary school. This research used method of quasi experiment with Nonequivalent Control Group Design and also used Total Sampling technique, the sample are IVA class with 20 students as experiment’s group and IVB class with 20 students as control’s group. This research shows that cooperative learning make a match type have significant effect toward mathematics students achievement in elementary school. It’s based on the result of calculate data from both of group class, there are different value of tresult and ttable which tresult > ttable or 3.03 > 2.02.

1. Introduction
The development of information technology in the world of education requires Indonesia to have creative, innovative, and skilled human resources to support the quality of education. According to Lestari [1] to form a dignified national civilization, education must be the first and foremost priority. The success or failure of education depends on all components involved in education.

The quality of education is reflected in the quality of teachers or educators in managing an active, creative, and enjoyable learning process. Shoimin [2] stated that to have an enjoyable learning, teaching methods needs to change from traditional learning models to modern and innovative learning models. The learning process will go well and obtain results that are in accordance with the required learning objectives. According to Joyce & Weil 1980, in Rusman [3] a learning model is a plan or pattern that can be used to form a curriculum (long-term learning plans), design learning materials, and guide learning in class or other uses.

The implementation of the education system in Indonesia generally leads to a mass and classical learning model, with a quantity orientation to serve as many students as possible [2] In addition. In line with the above opinions, based on observations made at IIES PERSIS (Islamic Integrated Elementary School of Islamic Union) 99 Rancabango, so far, the learning carried out has been done using conventional learning models, which demand more teacher activity than the students’, hence the students feel bored. Additionally, there was no interaction between the teacher and the students or between the students when the teacher explained the learning material. Based on preliminary research, the implementation of mathematic studies learning especially at IIES PERSIS 99 Rancabango indicates that the learning patterns developed by the teachers tended to be text book-oriented and also teach quickly. This had an impact on bad habits such as talking with friends, not paying attention, and not
understanding the material presented, resulting in low student learning outcomes. Active learning is always accompanied by activeness and students’ critical thinking ability on the material taught by the teacher [4].

Therefore, an appropriate learning model is needed so that the teaching and learning process can produce an active atmosphere between teachers and students or students and students and so that the mathematic studies learning process can develop in appropriate to the nature of mathematic. One of the efforts to resolve the problem is the ‘make a match’ cooperative learning model. The learning model is one of the types of cooperative learning models, which was developed by Leorna Curran in 1994 [3]. Broadly speaking, the make a match method is a learning technique in which a student looks for a partner while studying. Using the method, there are no students who are not involved in learning because they are required to find pairs of the answers or questions that they have. Based on the background, the authors try to investigate “Does the make a match cooperative learning model affect student learning outcomes in grade IV mathematic subject at IIES PERSIS 99 Rancabango?”

2. Research methods
The objective of this research is to obtain a real picture of the effect of learning using the make a match cooperative learning model on mathematic learning outcomes in grade IV IIES PERSIS 99 Rancabango. Hence, the data needed are in the form of mathematic learning outcomes acquisition scores. In line with the objective, the method used to test the hypothesis proposed in this study is the experimental method. Sugiyono [5] stated that the experimental method is part of the quantitative method which has its own characteristics, namely the presence of a control group. The type of experimental method chosen in this research is the quasi-experimental method with a Nonequivalent Control Group Design. According to Creswell [6] in this design, the experimental class and control class are selected without a random assignment.

The sample in this study was grade IV (A, B) students of IIES PERSIS 99 Rancabango totaling 40 students, which consisted of 20 students from class A, 20 students from class B. Class IVA was assigned as the experimental class that received treatment using the make a match cooperative model while class IVB was assigned as the control class that received treatment using conventional learning models. The data analysis technique in this study is the t test.

3. Research results and discussion

3.1. Research results

3.1.1. Calculation of mean and standard deviation. The calculation results of the mean and standard deviation can be seen in the following table.

| Table 1. Calculation results of mean and standard deviation. |
|-------------------------------------------------------------|
| **Group** | **Test period** | **Mean** | **Std. Deviation** |
|-----------|----------------|----------|------------------|
| Experimental | Pretest       | 50.25    | 14.81            |
|           | Post-test     | 78.75    | 13.55            |
| Control   | Pretest       | 50.75    | 10.46            |
|           | Post-test     | 75.25    | 14.35            |

Based on the table above, it can be inferred that in the experimental group (make a match), the mean of the pretest result was 50.25 and the mean of the post-test was 78.75. Meanwhile, the standard deviation of the pretest results was 14.81 and the standard deviation of the post-test was 13.55. In the control group (conventional), the mean of the pretest results was 50.75 and the mean of the post-test was 75.25. While the standard deviation of the pretest results was 10.46 and the standard deviation of the post-test was 14.35.
3.1.2. Normality test. From the results of the normality test using the Liliefors formula, the following data were obtained:

Table 2. The calculation results of the normality test for the pretest and post-test scores of the experimental group and the control group.

| Group   | Test period | Lo count | L table | Result |
|---------|-------------|----------|---------|--------|
| Experimental | Pretest     | 50.25    | 14.81   | Normal |
|          | Post-test   | 78.75    | 13.55   | Normal |
| Control  | Pretest     | 50.75    | 10.46   | Normal |
|          | Post-test   | 75.25    | 14.35   | Normal |

Table 2 above describes that in the experimental group (make a match), the Lo count of the pretest was 0.145 and the Lo count of the post-test was 0.082. It can be concluded that the pretest and post-test data of the experimental group were normally distributed.

In the control group (conventional), the Lo count of the pretest was 0.132 and the Lo count of the post-test was 0.144. From the calculation, it was seen that the Lo count for the pretest and the post-test were smaller than L table of 0.195. Therefore, it can be concluded that the pre-test and final-test data of the control group are normally distributed.

3.1.3. Homogeneity test. After testing for normality, the homogeneity of each variable was tested. The results are presented in Table 3 and 4 as follows.

Table 3. Calculation of the homogeneity test of the pretest results of the experimental group and the control group.

| Group    | f-count | f-table | Result |
|----------|---------|---------|--------|
| Experimental | 2.00459 | 2.17    | Homogenous |
| Control  |         |         |        |

Table 3 shows that the calculated F value in the pretest results of the experimental group and the control group = 2.0, which was smaller than F table 0.05 (19:19), which was = 2.17. Thus, the hypothesis can be accepted, in other words, the distribution of the pretest data of the experimental group and the control group has homogeneous variance.

Table 4. Calculation of the homogeneity test of the post-test results for the experimental group and the control group.

| Group    | f-count | f-table | Result |
|----------|---------|---------|--------|
| Experimental | 1.12157 | 2.17    | Homogenous |
| Control  |         |         |        |

Table 4 shows that the calculated F value in the post-test results of the experimental group and the control group = 1.12 which was smaller than F table 0.05 (19:19), which as = 2.17. Thus, the hypothesis can be accepted, in other words, the distribution of the post-test data of the experimental group and the control group had homogeneous variance.

3.1.4. Hypothesis testing. After testing the data requirements, the research hypothesis was then tested. The independent t-test or two-sample t-test was used to determine how much influence the make a
match cooperative learning model has on the mathematic learning outcomes at IIES PERSIS 99 Rancabango. After that, the results of the post-test were tested to determine the effect of the make a match model on student learning outcomes. The calculation results can be seen in the following table.

| Group       | t-count | t-table | Result    |
|-------------|---------|---------|-----------|
| Experimental| 3.03    | 2.02    | Significant |
| Control     |         |         |           |

Based on the table, at the 95% significance level and the real level $\alpha = 0.05$ and $dk = n1+n2-2 = 20+20-2=38$, the results of the calculation show that $t\text{-count} = 3.03$ and $t\text{-table} = 2.02$. Thus comparing the two values, it was found that $t\text{-count}>t\text{-table}$, $3.03>2.02$. This means that the alternative hypothesis was accepted, which states that there is a significant effect of using the make a match cooperative learning model on the mathematic learning outcomes of grade IV students of IIES PERSIS 99 Rancabango.

3.2. Discussion of results

3.2.1. Make a match cooperative learning model influences student learning outcomes. This study aims at determining whether the make a match cooperative learning model has an influence and how much influence does it have on the mathematic learning outcomes of students in grade IV IIES PERSIS 99 Rancabango especially on the topic Fraction. Based on the analysis results, there was a significant difference in the means of the fourth students’ mastery score between the experimental and the control group as seen from the results of the pretest and post-test.

The difference between the experimental and control groups can be seen from the average scores of the pretest and post-test of the two groups. The pretest results of the experimental group $x = 50.25$ and the control group $x = 50.75$, and from the mean of pretest score of the experimental group and the control group, it can be concluded that the two groups had the same initial ability or that the groups were not significantly different.

From the hypothesis testing using parametric statistics, namely using the two-sample independent t-test of the two groups, there was a significant influence on student learning outcomes between the group receiving the make a match cooperative learning model and the group receiving the conventional learning model using image aid. The results of the hypothesis test showed that the application of the make a match cooperative learning model had a significant effect on the mathematic learning outcomes of grade IV students at IIES PERSIS 99 Rancabango on the main topics of work and economic activities. This is based on the calculation results that there was a difference between the value of $t\text{-count}$ and $t\text{-table}$. At the 95% significance level and the real level $\alpha = 0.05$ and $dk=n1+n2-2=20+20-2=38$, the results of the calculation showed that $t\text{-count}=3.03$ and $t\text{-table}=2.02$. Thus, comparing the two values, it was found that $t\text{-count}>t\text{-table}$, namely $3.03>2.02$. This means that the alternative hypothesis was accepted which states that there is a positive and significant effect of the use of the make a match cooperative learning model on the mathematic learning outcomes of grade IV students of IIES PERSIS 99 Rancabango.

This is reinforced and in accordance with the research conducted by Nissa [7] stating that the results of the hypothesis test showed that the application of the make a match cooperative learning model had a significant effect on the mathematic learning outcomes of students in grade V MIT (Madrasah Ibtidaiyah Terpadu/Integrated Islamic Elementary School) Nurul Iman Depok on the topic of diversity in natural and artificial objects and time division in Indonesia. This was based on the calculation results that there was a difference between the value of $t\text{-count}$ and $t\text{-table}$, namely $t\text{-count}>t\text{-table}$ or $2.134>2.004$.

The increase in student learning outcomes after the application of the make a match model was because in the learning, the teacher invited students to answer questions or even find new concepts by
looking for pairs that match the answers or questions. The students were required to be more careful in sorting out the correct information cards. When compared to conventional learning, learning using making a match provided new experiences and the students could move actively so that the learning process does not become boring. Previously, using the conventional model, students only listened and sat at their desks. Moreover, according to Harianja [8] one of the advantages of this model is that students look for partners while learning about a concept or topic in a pleasant atmosphere.

In the application of the make a match model, there were several other findings. First, the model could foster student cooperation in answering questions by matching the cards in their hands. Second, the learning process was more interesting and it seemed that most students were more enthusiastic about the learning process. Third, students’ activeness was clearly visible when the students were looking for their respective pairs of cards. Cooperative learning focuses on mutual cooperation and group cooperation. According to Kurniasih and Sani [9] the advantages and disadvantage are as follows.

The advantages of the make a match model are that it is able to create an active and fun learning atmosphere, the learning material presented is more attractive to students' attention, it can improve student learning outcomes to achieve a classical level of learning completeness of 87.50%, and it grows an atmosphere of joy in the learning process (let them move). Cooperation among fellow students is manifested in a dynamic manner and it is evenly distributed throughout the students. In addition, by seeing and reading information cards, students get important information from the topic so that it is easily digested or recorded in the students’ memories and they can easily express it.

Learning using make a match certainly also has disadvantages. One disadvantage is if there is a difference in the number of students who get the question and answer cards due to, for example, the absence of some students. Then, there will be students who get questions but will not find the answer pairs, and vice versa. In this case, the teacher can work it around by giving one student two questions or two answer cards, or the teacher can replace the student holding the question or answer card. Other disadvantages are that guidance from the teacher is needed to carry out the activity; the available time needs to be limited so that students do not play too much in the learning process; and the teacher needs to prepare adequate materials and tools. In a large class (>30 students), if the teacher is not wise, an uncontrolled crowded atmosphere will emerge.

Therefore, based on teaching and learning activities using the make a match model, the students seemed to be more active in looking for pairs of cards of answers and questions. With this pair search model, the students could identify the problems contained in the cards they find and tell the problems simply and clearly together.

4. Conclusions
Based on the research results, the conclusions are as follows:

- Student learning outcomes before using the make a match cooperative learning model were still unsatisfactory with a mean of 50.25 in the experimental class and 50.75 in the control class.
- With the implementation of the make a match learning model in the learning process in the classroom, the teacher’s activity and student learning activities were increased. This was evident from the results of the calculation in treatment 1 showing that the teacher's activity obtained a score of 79 which was in the “good” category. While the results of the calculation on treatment 2 showed that the teacher’s activity obtained a score of 91 which was in the "very good" category.
- The results of the calculation showed that t-count=3.03 and t-table=2.02, thus, t-count>t-table, namely 3.03>2.02. This means that the alternative hypothesis was accepted, which states that there is a positive and significant effect of the use of the make a match cooperative learning model on the mathematic learning outcomes of the grade IV students of IIES PERSIS 99 Rancabango.
Acknowledgments
Thanks to, Eko, Widdy, and Nabella for the cooperation in this research, and gratefully acknowledge funding provided by Mr. Lutfy and Mr. Nizar. We also would like to thank to anonymous reviewers for their valuable comments to revise the paper.

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