THE IMPLEMENTATION OF THE MAKE-A-MATCH MODEL AND KAHOOT MEDIA ON STUDENTS' MATHEMATICAL UNDERSTANDING ABILITIES

Riski[1], Soraya Djamilah[2*], Rahmatya Nurmeidina[3]

[1,2*,3]Mathematics Education, Muhammadiyah University of Banjarmasin, Indonesia

Corresponding Author: sorayadjamilah@umbjm.ac.id

Abstract: Low mathematics understanding among students is a prevalent problem in education. An innovative approach involves the integration of the Make-a-Match cooperative learning model with Kahoot. The Make-a-Match model promotes an active engagement where students find pairs of questions and answers, facilitating a direct practice of their understanding of the material. Meanwhile, Kahoot, as a technology-based learning platform, provides an interactive approach that has the potential to enhance student engagement. The integration of these two approaches can effectively address the issue of poor mathematical understanding. This quantitative study utilizing a quasi-experimental design aims to determine if the implementation of the Make-a-Match model in together with Kahoot leads to a greater enhancement in mathematical understanding when contrasted with conventional approaches. The participants consisted of eighth-grade students from SMP Negeri 2 Alalak during the even semester of 2024/2025. The findings indicated that participants in the experimental group utilizing the Make-a-Match cooperative learning model alongside Kahoot media demonstrated a significant enhancement in their mathematical understanding, with the majority falling within the moderate to high range. In contrast, the control class that employed conventional learning techniques showed not optimal progress, with some students getting hit with a decrease in their scores. The significant difference resulted in the null hypothesis being rejected and the alternative hypothesis being accepted. The research findings indicate that students who engaged in the cooperative learning model of the Make-a-Match type, complemented by Kahoot media, demonstrated a greater enhancement in their mathematical understanding compared to those who were taught through conventional approaches.

Keywords: make a match, kahoot, mathematical understanding.

INTRODUCTION

Mathematics is fundamental. Through the mastery of mathematics, students cultivate strong numeracy skills while honing their critical, logical, and systematic thinking abilities. These basics of mathematical skills are essential in daily life and play an important part in supporting technological advancement(Afsari et al., 2021; Komariyah & Laili, 2018). According to Farida et al, (2019) a thorough understanding of mathematical concepts is essential for students to keep moving forward in their mathematics education and reach higher levels. A solid understanding of basic mathematics is essential before progressing to more complex concepts. The only way to achieve it is to master the basic concept first. Similar to constructing a house, one cannot simply place the roof without building a solid foundation first. Similar to that, in mathematics, understanding more complex material can prove challenging if basic concepts have not been thoroughly understood. To advance to more complex levels of learning, it is essential for students to possess a solid understanding of mathematical concepts (Syarifah, 2017). Math is a basic science, and learning it develops the logical thinking, numeracy, and critical thinking abilities needed for daily living and the development of technology. A solid foundational understanding is essential for facilitating students' advancement to more complex material.

The persistent challenge of students' low mathematical understanding is a significant barrier encountered across multiple educational levels. Putra et al., (2018) conducted a study at a junior high school in West Bandung Regency, revealing that a significant portion of students, specifically 41.67%, demonstrated a low level of mathematical understanding. In contrast, 30.56% fell into the moderate category, while merely 27.72% reached a high level of understanding. This poor degree of understanding certainly impedes students' mathematical learning. Observations of the School Field Practice (PLP) at SMP Negeri 2 Alalak indicated that students' understanding of mathematics, especially regarding linear equations, is in particular low. This material serves as a crucial base for algebra, especially in the context of linear equations. This finding highlights the challenges students face in restating concepts, identifying examples, and applying those

concepts while dealing with problems. This situation arises from many students perceiving mathematics as a challenging subject to understand, leading to many experiencing unsatisfactory learning outcomes. This is a result of their inability to understand mathematical concepts (Nurmeidina & Djamilah, 2019). Thus, efforts must be made to increase students' mathematical understanding.

One approach for addressing students' low comprehension is to implement the "make-a-match" cooperative learning model alongside Kahoot media. As noted by Aliputri, (2018) and Wijanarko, (2017) the "make-a-match" cooperative learning model involves the teacher preparing cards with questions alongside cards with corresponding answers. Participants engage in a timed challenge to identify corresponding pairs of cards (questions and answers), earning points for each accurate match. The "make-a-match" cooperative learning model promotes collaboration among students and promotes interactive learning through engaging, game-like activities. This approach facilitates a deeper understanding of concepts, ensuring they are retained effectively in cognitive structures (Rahmayanti & Koeswanti, 2017; Wulandari et al., 2018). Zulkarnain & Djamilah, (2016) highlighted the critical need for the implementation of suitable learning models, given their substantial potential to enhance students' mathematical abilities.

Kahoot is an online media platform in the form of a website designed like a quiz game for learning (Anggraeni et al., 2023). Kahoot serves not just as a quiz game; it has evolved to function as a platform for presenting material through its new presentation feature. This is consistent with the statement stated by Fazriyah et al. (2020) who noted that in addition to quizzes, there are also polls and games, with the presentation feature being Kahoot's most recent development. Kahoot is thought to improve students' understanding of mathematics. This is consistent with findings from Marwa et al., (2023), which indicated that fifth-grade students at Mujahidin Elementary School in Pontianak showed improved understanding of mathematical concepts when engaged in a problem-based learning model facilitated by Kahoot digital media. This study will utilize Kahoot to deliver instructional content. The material will be presented in a PowerPoint-like format, but with interactive quizzes

designed to help students learn mathematics. Learning media can also help students learn more effectively (Baihaki et al., 2022).

The combined use of the make a match cooperative learning model with Kahoot media results in the following learning steps: 1) The teacher greets the students and initiates a prayer before leadning led by one of the students. 2) The teacher checks the student's readiness for learning by observing the tidiness of the classroom and the organization of the seating before starting the lesson. 3) The teacher checks student attendance. 4) The teacher initiates apperception by asking an opening question. 5) The teacher provides information about the learning objectives of linear equations in daily activities. 6) The teacher directs students to access the Kahoot website, then inputs the code. 7) Students engage with the content presented through the Kahoot platform. 8) Each material delivery using Kahoot will feature questions, including quizzes or true-false inquiries, that students can respond to based on the previous material delivery. 9) At the end of the material delivery session, the students' rankings based on their quiz responses will be displayed. 10) Following the delivery of materials, the class will be divided into two separate groups. The first group will receive the questions, while the second group will be provided with the answers. 11) Following group division, each student is asked to step forward and draw a card that matches the group to which they belong. 12) Students are given time to calculate and find the answer to the given question and vice versa. 13) Students will have two chances to check the correctness of the question and answer. 14) This activity will continue until all students have their respective response pairs and questions. 15) The teacher and students draw conclusions together. 16) The teacher informs the class about the upcoming lesson. 17) The teacher and students pray together.

In light of the previous explanation, it is essential to undertake a study titled "The Application of the Make a Match Model and Kahoot Media to Students' Mathematical Understanding Ability." This study focuses on improving students' understanding of mathematical concepts related with the Straight Line Equation, using the make a match cooperative learning model augmented by Kahoot media. Thus, the study's novel value lies in the integration of the make-a-match cooperative

learning model and the use of Kahoot media to improve students' mathematical understanding ability. The main objective of this study is to determine if improvements in mathematical understanding among students using the cooperative learning model of the make a match type with Kahoot media is higher than that of students engaged in conventional learning methods.

METHOD

This study used a quantitative approach. Azhari et al. (2023) describe quantitative research as an empirical study that produces numerical data. A quasi-experimental study design was used. (H. Nugraha, 2018) states that this design serves to address research questions through the comparison of experimental and control groups, with each group receiving a designated treatment to evaluate the treatment's effectiveness. Various research designs are present in quasi-experimental studies. The present study used a nonequivalent control group design. A. W. Nugraha, (2024) points out that this design uses a non-randomized assignment of treatments to each research group, with the objective of evaluating the impact of an intervention while considering potential bias arising from differences between treatments. The selection of the nonequivalent control group design for this study was influenced by the pre-existing nature of the classes involved, with the main aim being to assess advancements in students' understanding of mathematics.

This study took place at SMP Negeri 2 Alalak. The participants in this study involved all eighth-grade students at SMP Negeri 2 Alalak, including five classes with a total of 144 students. The study sample comprised two classes: class VIII E, with 22 students, designated as the experimental group using the make-a-match cooperative learning model by using Kahoot media, and class VIII B, consisting of 15 students, serving as the control group employing conventional learning via the lecture method. The selection of these classes was conducted through a purposive sampling method, ensuring that the experimental class comprised an even number of students, in accordance with the teacher's recommendations.

In this study, data were collected using a test instrument that tested students' mathematical understanding ability. The test instrument comprised five essay

questions. Questions 1 and 2 covered the first indicator of mathematical understanding, question 3 covered the second indicator of mathematical understanding, question 4 covered the third indicator of mathematical understanding, and question 5 covered the fourth indicator of mathematical comprehension. This study selected the following indicators of mathematical comprehension ability: 1) reformulating concepts, 2) classifying concepts, 3) presenting examples and non-examples, and 4) applying, utilizing, and selecting specific procedures or operations. Prior to initiating any research, it is essential to ensure that the instruments used are thoroughly evaluated for both validity and reliability. The purpose of this testing is to verify that the instrument employed is both reliable and valid for determining the intended abilities. The technique employed involves processing, analyzing, and interpreting collected data. The analytical techniques employed consist of N-Gain, normality tests, homogeneity tests, and t-tests.

RESULT AND DICSUSSION

This section outlines the results obtained from the data analysis, which includes the measurement of improvements in students' mathematical understanding abilities via N-Gain, the testing of statistical assumptions such as normality and homogeneity, and the testing of hypotheses to compare the effectiveness of learning between the experimental and control groups. The results are subsequently analyzed thoroughly to offer insights and implications for this study.

1. Analysis of Improvement in Mathematical Understanding Skills (N-Gain)

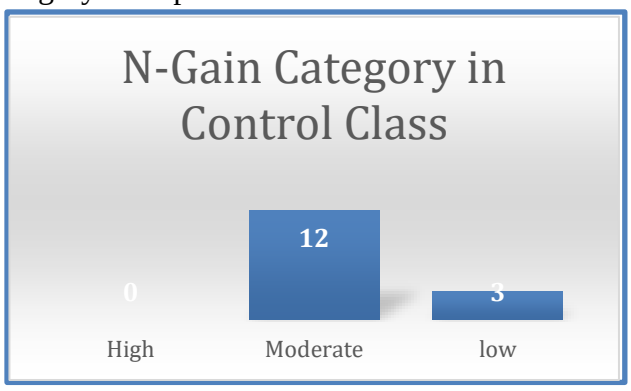
N-Gain measurements were performed to assess the improvement in student learning outcomes from pre-test to post-test following the implementation of the learning treatment.

a. N-Gain Results in Experimental Class

The N-Gain calculation for the experimental class that used the make-a-match cooperative learning model with Kahoot indicated a significant improvement in students' mathematical comprehension skills. Among the 22 students, the average

N-Gain calculated was 0.533, placing it within the moderate range. The categorization of ability improvements is detailed below.

Figure 1. N-Gain Category in Experimental Class

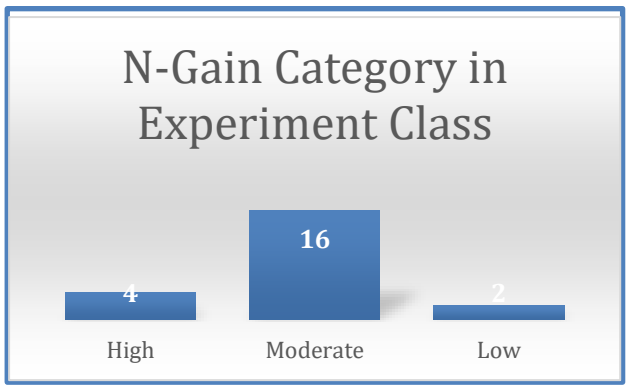


The high percentage of the moderate category indicates that a significant number of students demonstrated notable improvement, suggesting that the intervention implemented in the experimental class was largely effective in improving mathematical understanding abilities.

b. N-Gain Results in Control Class

In comparison, the N-Gain analysis for the control class, which used conventional learning techniques, indicated not optimal improvement in mathematical understanding. The average N-Gain score for the 15 students in the control class was 0.059, placing it in the low category. The categorization of ability improvements is detailed below.

Figure 2. N-Gain Category in Control Class



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This suggests that without additional learning interventions, student achievement is typically low, and conventional learning has barely significant effect on their mathematics understanding.

c. N-Gain Results between Classes

The analysis of N-Gain results between the two classes reveals a significant difference in effectiveness. The experimental class showed a notably higher number of students achieving moderate and high levels of improvement, whereas the control class was primarily characterized by students falling within the low improvement category. This serves as an early indicator that the cooperative learning approach using the make-a-match method with Kahoot media has a more significant positive impact on improving students' mathematical understanding compared to conventional learning methods.

2. Statistical Test

Before conducting hypothesis testing to compare the two groups, the data were checked to confirm that they met the basic assumptions of parametric statistical tests, which are normality and homogeneity.

a. Normality Test

The Shapiro-Wilk method was employed to conduct the normality test, given that the sample size was under 50. The findings indicated a significance value (Sig.) of 0.141 for the experimental group and 0.259 for the control group. Since both significance values exceed 0.05, it can be inferred that the data regarding students' mathematical comprehension abilities in both classes follows a normal distribution. This aligns with the assumption of normality required for subsequent parametric statistical analysis.

b. Homogeneity Test

A homogeneity test was performed utilizing Levene's Test to assess the equality of variance between the experimental and control groups. The test results indicated a significance value (Sig.) of 0.121 derived from the mean. The significance value exceeds 0.05, indicating that the data show homogeneous variance. Once the homogeneity assumption has been fulfilled, one can move forward with data analysis through the application of parametric statistical tests.

c. T-Test

Once the data fulfilled the criteria for normality and homogeneity, an independent sample t-test was used to determine if there was a significant difference in mathematical understanding abilities between the two classes of students. The findings from the independent sample t-test indicated a significance value (Sig. 2-tailed) of 0.000. This value is significantly below 0.05. Consequently, the null hypothesis (H_0), which states that there is no difference in the improvement of mathematical comprehension ability between the two groups, is rejected. On the other hand, the alternative hypothesis (H_1) states that students who engage in the cooperative learning model type make a match with Kahoot media demonstrate a greater improvement in mathematical understanding ability compared to those who experience conventional learning, and thus, this hypothesis is accepted. The findings indicate that the implementation of treatment in the experimental class significantly improves students' mathematical understanding ability.

CONCLUSION

The findings and data analysis show that the implementation of the make-a-match cooperative learning model, when paired with Kahoot media, results in higher quality results compared with conventional learning methods. The enhancement observed in the experimental group, primarily within the moderate to high range, indicates the effectiveness of integrating interactive cooperative learning techniques with digital platforms to promote an engaging and constructive learning environment. On the other hand, the improvement observed in the control group using conventional learning methods was poor, and in some cases, even decreased, highlighting the necessity for innovative approaches to learning. The integration of the make-a-match model with Kahoot media has demonstrated a more effective approach for enhancing mathematical understanding.

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