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The Effect of Make A Match Cooperative Learning Model on Mathematics Learning Result and Interest at SMAN 1 Maron

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Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh model pembelajaran kooperatif Make a Match terhadap hasil pembelajaran matematika siswa dan minat mereka pada subjek di SMAN 1 Maron. Sampel penelitian ini terdiri dari 72 siswa dari dua kelas X di SMAN 1 Maron. Penelitian ini menggunakan metode kuantitatif bersama dengan desain kuasi-eksperimental. Analisis data dilakukan dengan menggunakan uji N-Gain, dan penilaian normalitas menggunakan uji Shapiro-Wilk mengungkapkan nilai Asymp. Sig. (2-tailed) untuk kedua kelas lebih besar dari 0,05, menunjukkan distribusi normal. Hasil dari uji N-Gain pada kelompok eksperimen dicatat pada 48,96, menempatkannya dalam kategori efektif. Temuan dari Paired Sample T-Test yang membandingkan skor pretest dan posttest pada kelompok eksperimen menunjukkan nilai Asymp. Sig. (2-tailed) dari 0,00, yang kurang dari 0,05, menunjukkan dampak signifikan pada hasil dan minat dalam pembelajaran matematika. Hasilnya menunjukkan bahwa menerapkan model pembelajaran kooperatif Make a Match dalam kelompok eksperimen secara positif mempengaruhi hasil pembelajaran matematika siswa dan minat mereka pada subjek.

Abstract

This study aims to assess the effect of cooperative learning model Make a Match cooperative learning model on students' math learning outcomes and their interest in the subject at SMAN 1 Maron. the subject at SMAN 1 Maron. The participants of this study consisted of 72 students from two classes at SMAN 1 Maron. This research used quantitative method along with quasi-experimental design. Data analysis was conducted using N-Gain test, and normality assessment using the Shapiro-Wilk test revealing the value of Asymp. Sig. (2-tailed) for both classes were greater than 0.05, indicating a normal distribution. The results of the N-Gain test on the experimental group recorded at 48.96, placing it in the effective category. Findings from the Paired Sample T-Test comparing the pretest and posttest scores on the experimental group showed an Asymp. Sig. (2-tailed) of 0.00, which is less than 0.05, indicating a significant impact on outcomes and interest in math math learning. The results show that applying the Make a Match cooperative learning model in the experimental group positively affected students' mathematics learning outcomes and their interest in the subject.

INTRODUCTION

Mathematics is one of the fields of study taught in educational institutions, and is very important in efforts to improve educational standards (Saputra, 2024). In the broad field of education, mathematics involves a wide range of complex and abstract concepts that enable the categorization of objects into exemplary or non-exemplary contexts based on specific criteria. It is of paramount importance to acknowledge that all mathematical concepts are interrelated and interconnected with one another in a myriad of ways, thereby necessitating that students thoroughly comprehend the foundational elements of mathematics before they embark on the study of more complex material; in other words, the acquisition of basic competencies is essential and must be prioritized prior to delving into subsequent, more advanced topics.

The overarching purpose of engaging in the study of mathematics within educational institutions is to guarantee that students attain a high level of proficiency in the effective application of mathematical principles, cultivate sound reasoning abilities when employing mathematical concepts, and gain a comprehensive understanding of the fundamental principles

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underlying various mathematical ideas (Ginanjar, 2019). For this goal of mathematics education to be realized, it requires an important role for teachers in the context of mathematics learning. Teachers not only channel their knowledge but also foster an engaging learning environment, thus enabling students to actively participate in the learning process and maximize their capacity for effective learning, thus ultimately facilitating the achievement of students' full potential.

Mathematics learning should be created and designed in a way that captivates and engages students in such a way as to keep them interested and stimulated, thus minimizing the possibility of their attention fading. Teachers should be able to adapt learning to students' development so that they can understand the mathematical concepts and principles being taught (M. Ardiansyah & Nugraha, 2022). Teachers hold an important position in ensuring the effectiveness of learning in the classroom, so it is important for teachers to master and have a comprehensive understanding of the objectives of mathematics education. Thus, it is expected that teachers can have a positive impact on student learning outcomes (Mulyati & Evendi, 2020). Based on observations and interviews at SMAN 1 Maron with the math teacher, it was found that math is a very boring subject. This perception comes from a lack of interest in learning math, which in turn results in a lack of interest in learning and being fully involved in learning math, thus affecting their low learning outcomes.

Learning outcomes serve as the evaluative frameworks and assessment methodologies that educators employ to gauge the academic progress of their students, thereby effectively illustrating and elucidating the intricate and multifaceted relationship that exists between the educational journey undertaken by the student and the pedagogical strategies implemented by the teacher throughout the instructional process (Zaifullah et al., 2021). In the domain of mathematics, the learning outcomes specifically pertain to the evolving capabilities and competencies demonstrated by students in areas such as numerical understanding, geometric reasoning, conceptual interrelations, and the application of interconnected logical reasoning skills (Annisa & Marlina, 2019). Furthermore, these learning outcomes are capable of being systematically measured or meticulously observed, serving as reliable indicators of the overall success and efficacy of the educational process being implemented..

Learning outcomes, which can be understood as a comprehensive evaluation of a complex teaching-learning process, are clearly manifested in observable and measurable changes that occur in the cognitive, affective, and psychomotor domains of student development and understanding. These three basic abilities are acquired by students through experiences that are actively involved in the learning process with the teacher. Teachers specifically consider mathematics learning outcomes that aim to describe students' overall level of mastery and understanding of mathematical material or concepts, particularly emphasizing the importance of progress made in the cognitive domain of their intellectual abilities. The level of proficiency in mathematical concepts is reflected in the scores achieved by students after their learning, which students obtain after taking part in the evaluation of mathematics learning outcomes (Gosachi & Japa, 2020). Student learning outcomes can be influenced by various determining factors, one of which includes the level of interest in learning shown by students in the discipline they are currently pursuing.

Interest in learning is a drive or interest in learning, which can provide benefits in the form of great experience and knowledge (Kurniasari et al., 2021). Maintaining interest in learning is very important especially in the field of mathematics which is often seen as a complicated and abstract discipline. Mathematics acts as a foundation for developing logical reasoning skills in an individual's mind. As an abstract and concrete science, mathematics directly guides one towards goals and fosters discipline to think (Erni et al., 2022). A strong interest in learning has a positive effect on student learning outcomes in mathematics. Therefore, if math is taught with the right method, it can develop the ability to think and reason. With a high interest in learning, students will be able to learn and practice math well. This will train students in thinking creatively, critically, carefully, and logically, so that they can excel in the field of mathematics. In the context of learning, interest can be measured through several indicators (Ndraha et al., 2022), i.e:

1) Feelings of pleasure: Students experience excitement and satisfaction during their learning journey.
2) Interest: Students show curiosity and desire to delve deeper into the subject matter.
3) Attention: Students engage and concentrate attentively on the learning process.
4) Diligent in learning and doing assignments: Students are proactive and committed to keeping up with learning and completing assigned work.
5) Diligence and discipline in learning: Students show commitment and perseverance in learning activities and follow applicable rules.
6) Having a study schedule: Students maintain a consistent routine and study schedule.

One of the numerous efforts that educators can undertake to enhance the educational outcomes of students and foster a heightened interest in the field of mathematics within the academic environment is by implementing appropriately designed and pedagogically sound learning models that are conducive to effective knowledge transmission (Fitri, 2023). The strategic application of suitable learning models possesses the capacity to significantly assist educators in conveying complex mathematical concepts with a higher degree of clarity and effectiveness, thereby promoting a deeper understanding among students. Furthermore, the careful implementation of a well-structured and contextually relevant learning model has the potential to not only bolster students' enthusiasm for engaging with mathematics but also has far-reaching implications for the overall academic achievements that students can attain in the subject of mathematics

Among the various pedagogical frameworks available, one particularly effective learning model that educators might consider employing to enhance both the academic performance and the interest levels of students in mathematics is the Make a Match cooperative learning model, which has garnered attention for its engaging and interactive nature. This innovative model actively encourages and facilitates a greater degree of student participation and involvement in the learning process, thereby transforming the educational experience into a more collaborative and dynamic endeavor (Ferdiana & Mulyatna, 2020). hrough the utilization of the Make a Match model, students are tasked with the critical responsibility of acquiring knowledge through systematic observation, aligning questions with information obtained from cards that encompass a diverse range of mathematical topics, engaging in collaborative team efforts, and adeptly articulating the outcomes of their discussions by sharing their viewpoints, posing pertinent questions, and thoughtfully considering the opinions of other groups involved in the learning activity. Engaging in collaborative work allows students to achieve a deeper understanding of concepts previously deemed difficult (Gosachi & Japa, 2020).

In the cooperative learning model known as Make a Match, every individual student is provided with a card that prominently features either a question or an answer, thereby facilitating a structured interaction among peers. The students are then entrusted with the responsibility of locating the individual answers or questions that correspond with the cards they possess, which requires a significant level of critical thinking and collaboration. Subsequently, each student actively seeks out a partner who holds a card that is compatible with their own, all within a designated time frame that adds an element of urgency to the exercise. Once the allotted time concludes, the cards are collected, shuffled, and redistributed among the students, thus ensuring a fresh set of pairings that enhances the learning experience. The Make a Match learning model fundamentally necessitates active participation from students, as it motivates them to diligently search for and articulate the answers to the questions posed by their fellow classmates, thereby fostering a dynamic and interactive educational environment (Gosachi & Japa, 2020). Students are also required to be active in learning and determine the correct answer.

Through the implementation of this specific educational model, students are afforded the opportunity to engage in an exercise wherein they are instructed to identify and subsequently articulate responses to inquiries or questions that can be derived from the various cards that

have been meticulously provided for this purpose, which will ultimately serve as the basis for an in-depth discussion within a collaborative group forum setting. This particular pedagogical approach is designed to effectively equip students with the necessary skills to navigate and confront the myriad challenges or obstacles that they may encounter throughout the course of their academic learning journey. The Make a Match learning model is also exceedingly advantageous as it systematically prepares students to proficiently manage and respond to an array of questions or complex problems that may arise in their educational endeavors. Nonetheless, it is pertinent to acknowledge that this learning model is not without its drawbacks, as it demands a significant investment of time and resources to be properly implemented and executed in an effective manner (Fauhah & Rosy, 2020).

Previous studies have indicated that the Make a Match type cooperative learning model has a profound and statistically significant effect on enhancing student learning outcomes within the domain of mathematics, thereby suggesting its efficacy in educational contexts. This assertion is further corroborated by the observation of improved academic performance, specifically reflected in the grades obtained in the course focusing on the Derivative of Algebraic Functions, alongside a notable increase in student interest and engagement in the learning process, as documented (Kurnia & Septera, 2019). Furthermore, prior research endeavors have also posited that the implementation of the Make a Match cooperative learning model not only markedly enhances students' interest in the subject matter but also substantially elevates their overall learning outcomes in the field of mathematics. This assertion is consistent with the findings of additional research studies that demonstrate the potential of the Make a Match type learning model to significantly boost student engagement and involvement in the study of mathematics. Such enhancements in engagement can be attributed to the model's effectiveness in cultivating enthusiasm and fostering active participation among students within various educational settings (Hasni & Amelia, 2024).

Many previous studies have used classroom action research to investigate the impact of Make a Match cooperative learning on students' learning outcomes and interest. However, it is rare to find research that uses a quasi-experimental research design in the study of Make a Match type cooperative learning. Based on the explanation above, the purpose of this study is to determine whether there is a statistically significant effect in the application of Make a Match type of learning model on students' mathematics learning outcomes and interest at SMAN 1 Maron. This research is expected to offer an interesting and dynamic learning alternative for students.

METHOD

This research is a quantitative study that uses Quasy Experimental Design with a research design of Nonequivalent Group Pretest Posttest Design.

Class		*Pretest*		*Treatment*		*Posttest*
Eksperimen	:	O_1	→	X	→	O_2
Kontrol	:	O_1	→		→	O_2

Figure 1. Research design.

The subjects in this study consisted of class X students at SMAN 1 Maron. The sampling method used in this study was purposive sampling. Among the four available classes, class X B, consisting of 30 students, was designated as the experimental group, while class X A, also consisting of 30 students, was designated as the control group. The experimental class received treatment in the form of cooperative learning type make a match and the control class conventional learning, both underwent the same pretest and posttest, namely a test and questionnaire of interest in learning mathematics. The steps of applying the Make a Match method used in this study are as follows:

1) The teacher prepares some cards containing questions that although the questions are different but the answers are a pair.
2) Each bench gets one card containing a question.
3) Each bench thinks the answer matches the card held.
4) Each student looks for a pair of cards whose answers match the answers of his card as well.
5) Each student who can match his card before the time limit gets points.
6) After one round, the cards will be shuffled again so that each student gets a different card from before.

The teacher together with the students discusses the material that is considered difficult or cards that are difficult to find their partner. The instruments used for data collection in this study included a series of questions and a math learning interest questionnaire, which included pretest and posttest items. In the data analysis process, the researcher used a prerequisite test first to determine how much influence occurred after the application of treatment in the study, so a normality test using Shapiro-Wilk was conducted. The homogeneity test is not needed here because the paired sample t-test only requires the assumption that the difference between the two measures is normally distributed, not the variance between groups

Data analysis was conducted using SPSS version 22, noted for its extensive data examination capabilities. The analytical procedure entailed the systematic input of the mean scores obtained from both the pretest and the posttest assessments, thereby ensuring a thorough evaluation of the results. The methodology employed for data analysis incorporated the utilization of the N-gain test, which was specifically designed to evaluate the effectiveness of the Make a Match learning model; furthermore, it also included the implementation of the Paired Sample T-Test, which serves to compare the average scores recorded prior to and subsequent to the treatment administered within the experimental group. The following delineates the specific criteria that were established for the N-Gain Score, which was utilized in the context of this particular study:

Table 1. N-Gain effectiveness criteria

N-Gain Score (%)	Criteria
≤ 40	Not Effective
$40 - 75$	Effective
≥ 76	Very Effective

The basis for making a decision on the Paired Sample T-Test is, if the significance value <0.05, then H0 is rejected, which means there is a significant difference. Conversely, if the significance value > 0.05, then H0 is accepted, which means there is no significant difference.

RESULTS AND DISCUSSION

Based on field research, data was collected from the pretest and posttest results of 30 students from class X B (experimental group) and 30 students from class X A (control group) at SMAN 1 Maron. From the results of the study, the following data were obtained:

Table 2. Data statistics of experimental class and control class

Class	Variable	Data	$\bar{x}$	Std. Dev
Experiment	Learning Outcome	Pretest	55,66	11.576
		Posttest	79,08	11.862
	Learning Interest	Pretest	64,5	8.140
		Posttest	82	10.034

Class	Variable	Data	$\bar{x}$	Std. Dev
Control	Learning Outcome	Pretest	56,5	11.075
		Posttest	65,25	9.612
	Learning Interest	Pretest	63,4	3.460
		Posttest	72	5.753

According to Table 2, it can be seen that before the application of the Make a Match type cooperative learning model, the average score of students in the experimental class on the initial assessment (pretest) was only 55.66, while the average score on the mathematics learning interest questionnaire was 64.5, indicating their relatively low mathematics learning results and interest. After the treatment, the average score on the students' final assessment (posttest) rose to 79.08, and the average score on the math learning interest questionnaire also showed an increase to 82. This increase implies that the Make a Match cooperative learning model was successful in improving students' learning outcomes and interest in mathematics.

The statistical analysis in Table 2 shows that the average student interest in learning in the experimental class surpassed the control class. The average increase in interest in mathematics for the experimental group reached 17.5, while the control group only reached 8.6. This indicates that the instructional model used in the experimental class was more effective in improving students' learning outcomes and interest in mathematics compared to the instructional model applied in the control class.

Table 3. N-Gain Score Test

Class	Variable	N-Gain Score (%)	Criteria
Experiment	Learning Outcome	48,96	Effective
	Learning Interest	56.45	Effective
Control	Learning Outcome	11,09	Not Effective
	Learning Interest	35.43	Not Effective

As can be clearly observed and delineated in the detailed presentation found in Table 3, the calculated N-Gain value, which serves as an indicator of the improvement in mathematics learning outcomes within the experimental class, was determined to be an impressive 48.96, a figure that significantly surpasses the N-Gain value of merely 11.09 that was recorded in the control class, thereby illustrating a stark contrast between the two groups. Furthermore, when evaluating the students' level of interest in the subject of mathematics, it is noteworthy to mention that the N-Gain value for the experimental class not only demonstrated a higher performance but also proved to be markedly superior to that of the control class, which yielded an N-Gain value of 56.45. In the context of analyzing the effectiveness indicators associated with the educational interventions implemented, it becomes apparent that both average N-Gain values derived from the experimental class distinctly fall within what is categorized as the effective range, thereby providing substantial evidence. This compelling data strongly suggests that the Make a Match type of cooperative learning model has proven to be quite effective in significantly enhancing both the learning outcomes of students and their overall interest in the study of mathematics.

Table 4. Shapiro-Wilk normality test

Class	Variable	Data	Sig*	Description
Experiment	Learning Outcome	Pretest	0,959	Normal
		Posttest	0,962	Normal
	Learning Interest	Pretest	0,103	Normal
		Posttest	0,408	Normal
Control	Learning	Pretest	0,954	Normal

Class	Variable	Data	Sig*	Description
	Outcome	Posttest	0,957	Normal
	Learning Interest	Pretest	0,112	Normal
		Posttest	0,382	Normal

*Sig level 0,05

According to Table 4, the Shapiro-Wilk test shows that the pretest and posttest score data of both classes are normally distributed, with respect to the results and interest in mathematics, all show Asymp. Sig. (2-tailed) scores greater than 0.05. This finding indicates that the data met the normality assumption required to conduct the Paired Sample T-Test.

Table 5. Correlation Paired Sample T-Test

Class	Pair pretest-posttest	Corelation	Sig*
Experiment	Learning Outcome	-0,014	0,941
	Learning Interest	-0,123	0,518
Control	Learning Outcome	-0,275	0,141
	Learning Interest	0,457	0,155

*Signifikan level 0,05

As is illustrated in the comprehensive data presented in Table 5, the meticulous analysis of correlation has unequivocally demonstrated that there exists an absence of any discernible relationship between the scores obtained during the pretest phase and those recorded during the subsequent posttest assessment. The Asymptotic Significance (two-tailed) values pertinent to the experimental cohort are calculated to be 0.941 and 0.518, both of which significantly surpass the established threshold of 0.05, thereby indicating a lack of statistical significance. Consequently, one can draw the logical conclusion that there is no substantial relationship to be found between the pretest and posttest variables within the context of the experimental class, particularly in relation to the students' levels of interest and their overall outcomes in mathematics learning.

Table 6. *Paired Sample T-Test*

Class	Pretest-posttest	Std. Dev	t	df	Sig*
Experiment	Learning Outcome	16,69	-7,68	29	0,00
	Learning Interest	5.18	-10.8	29	0,00
Control	Learning Outcome	16,54	-2,89	29	0,00
	Learning Interest	8.86	-9.08	29	0,00

*Signifikan level 0,05

The findings derived from the Paired Sample T-Test, as delineated in Table 6, indicated the presence of statistically significant variances between the pretest and posttest scores. Specifically, the t-values associated with the learning outcomes and interest levels of students within the experimental cohort were recorded as -7.68 and -10.8, alongside an Asymp. Sig. (2-tailed) value of 0.00, which significantly falls below the established significance threshold of 0.05, thereby necessitating the rejection of the null hypothesis (H0). This empirical evidence substantiates the existence of a discrepancy in learning outcomes and student interest prior to and subsequent to the application of the Make a Match cooperative learning model. Such results imply that the implementation of the Make a Match cooperative learning model exerts a discernible impact on students' mathematics learning outcomes as well as their engagement with the subject matter.

The results yielded by the Paired Sample T-Test demonstrated negative t-count values (-7.68 and -10.8). This phenomenon arises from the comparative analysis revealing that the mean pretest score was inferior to the mean posttest score. Notwithstanding the negativity of the t-

count, the interpretation remains affirmative, as it denotes a significant divergence between the pretest and posttest scores. Consequently, the t-count values are to be interpreted as 7.68 and 10.8, signifying a substantial difference between the two score metrics. Based on the findings obtained from the Paired Samples T-Test, which recorded a degree of freedom (df) of 29 and a significance value of 0.025, a t-table value of 2.04523 was established. The computed t-count values (7.68 and 10.8) surpassed the predetermined t-table value. Hence, the null hypothesis (H0) is dismissed, while the alternative hypothesis (Ha) is upheld. This conclusion indicates a significant distinction between the pretest and posttest scores, thereby suggesting that the adoption of the Make a Match cooperative learning model positively influences students' mathematics learning outcomes and their interest in the subject matter.

The results of this study are in accordance with the results of previous studies which show that the mathematics learning outcomes of students who are given the Make a Match learning model are higher than the mathematics learning outcomes of students who use conventional methods on the subject of tururnan material at Yaspen Tugu Ibu Depok High School (Widowati, 2023). This approach encourages students to be more active, build their own knowledge, strengthen interactions between peers, and develop self-confidence, which is relevant to aspects of learning interest so that this approach not only has an effect on learning outcomes but also on students' interest in learning mathematics (Hismalina Rahyu Khabdila, 2023).

The Make a Match cooperative learning model has been empirically validated as an effective pedagogical approach for enhancing the academic performance and intrinsic interest of students in the discipline of mathematics. The empirical findings indicated that the students who participated in the experimental class, which implemented this innovative model, demonstrated a significantly heightened level of interest in the learning process, exhibited considerable enthusiasm throughout the learning activities, and achieved noteworthy improvements in their overall academic outcomes. Within the framework of the Make a Match cooperative learning model, it is essential to note that students assume the central role in the learning experience, thereby positioning themselves as active participants rather than passive recipients of knowledge. Rather than monopolizing the instructional process, instructors are encouraged to relinquish control and instead provide students with ample opportunities to actively engage in exploration and to cultivate their own comprehension of the subject matter. This particular model has consistently demonstrated its efficacy in assisting mathematics educators in fostering the development of essential cognitive competencies among students, including critical thinking, adept problem-solving abilities, logical reasoning, and effective communication skills (Samosir, 2020).

The Make a Match cooperative learning model, which has been meticulously designed to foster an educational environment, encourages students to assume an active and participatory role in enhancing their comprehension and mastery of mathematical concepts. Through a dynamic and engaging pedagogical approach, this model provides students with the invaluable opportunity to delve into and thoroughly comprehend fundamental concepts while collaborating within their study groups. Moreover, the implementation of efficient time management strategies during the completion of group tasks not only motivates students to immerse themselves in the learning process but also significantly contributes to the attainment of favorable and commendable learning outcomes. The application of the Make a Match cooperative learning model within the mathematics classroom setting effectively transforms the learning experience, rendering it not only more comprehensible but also considerably more enjoyable and rewarding for the students involved (Haruna & Darwis, 2020). The findings of the research conducted in two classes at SMAN 1 Maron showed that the application of the Make a Match type cooperative learning model had a positive and effective effect in improving students' mathematics learning outcomes and interest.

CONCLUSIONS AND SUGGESTIONS

The results of the research conducted at SMAN 1 Maron showed that utilizing the Make a Match type cooperative learning model had a positive impact on students' mathematics learning

outcomes and interest. Statistical analysis of the results revealed an increase in the average score when comparing the data before and after the treatment. The results of the N-gain test which measured the scores before and after treatment, showed a value of 48.96 on students' learning outcomes and 56.45 on students' mathematics learning interest, placing it in the effective category. Therefore, it can be concluded from the N-gain test results that the application of the Make a Match type cooperative learning model effectively improves students' mathematics learning outcomes and interest.

The findings of the prerequisite test, specifically the Shapiro-Wilk normality test, showed that the data were normally distributed with Asymp. Sig (2-tailed) is greater than 0.05. The correlation test results show the value of Asymp. Sig (2-tailed) is greater than 0.05, leading to the conclusion that there is no significant relationship between the two variables. The results of the Paired Sample T-Test show the value of Asymp. Sig (2-tailed) is lower than 0.05, indicating that there is a significant difference in students' math learning outcomes and interest before and after treatment. Based on the findings of the research conducted in two classes at SMAN 1 Maron, it can be concluded that the application of Make a Match type cooperative learning model is effective in improving students' math learning outcomes and interest.

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