The Learning Outcomes Of Students That Experience The Cooperative Learning Model Make A Match Offline And Online

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Abstract

This research aims to determine the differences in the learning outcomes of students who experience the Make a Match (MAM) type of cooperative learning model offline and students who experience the online MAM type cooperative learning model in terms of their academic abilities. This research was conducted at the Tombatu Christian Vocational School in the even semester of the 2020/2021 academic year. The research method used is quasi-experimental, and the research design used is a two-factor analysis of variance. The research object was 18 students in class X of the Nursing Department using the MAM-type cooperative learning model offline and 20 students in class X of the Computer and Network Engineering Department (TKJ) using the MAM-type cooperative learning model online. The research instrument used was a test of learning outcomes through an essay. The study results show that: (1) There are significant differences in the learning outcomes of students with high academic ability in classes that experience the offline MAM-type cooperative learning model and online MAM. The learning outcomes of students with high academic abilities who study offline are better than those who study online. (2) There is a significant difference in the learning outcomes of students with low academic ability in classes that experience the MAM-type cooperative learning model offline and online. The learning outcomes of students with low academic ability who study offline are better than those who study online. (3) Significant differences exist in student learning outcomes in classes that experience the offline and online MAM-type cooperative learning model. The learning outcomes of students who study offline are better than those of online students.

Keywords: cooperative learning model, Make a Match (MAM), academic ability, student learning outcomes, two-factor analysis of variance (two-way ANOVA).

Abstrak

Penelitian ini bertujuan untuk mengetahui Perbedaan hasil belajar siswa yang mengalami model pembelajaran kooperatif tipe Make a Match (MAM) secara luring dengan siswa yang mengalami model pembelajaran kooperatif tipe MAM secara daring ditinjau dari kemampuan akademik siswa. Penelitian ini dilaksanakan di SMK Kristen Tombatu pada semester genap tahun ajaran 2020/2021. Metode penelitian yang digunakan adalah metode penelitian eksperimen semu dan desain penelitian yang digunakan adalah analisis varians dua faktor. Sebjek penelitian yaitu 18 siswa kelas X Jurusan Keperawatan menggunakan model pembelajaran kooperatif tipe MAM secara luring dan 20 siswa kelas X Jurusan Teknik Komputer dan Jaringan (TKJ) menggunakan model pembelajaran kooperatif tipe MAM secara daring. Instrumen penelitian yang digunakan adalah tes hasil belajar berbentuk essay. Hasil penelitian menunjukkan bahwa: (1) Terdapat perbedaan yang signifikan hasil belajar siswa dengan kemampuan akademik tinggi pada kelas yang mengalami model pembelajaran kooperatif tipe MAM secara luring dan MAM secara daring. Hasil belajar siswa dengan kemampuan akademik tinggi yang belajar secara luring lebih daripada siswa yang belajar secara daring. (2) Terdapat perbedaan yang signifikan hasil belajar siswa dengan kemampuan akademik rendah pada kelas yang mengalami model pembelajaran kooperatif tipe MAM secara luring dan MAM secara daring. Hasil belajar siswa dengan kemampuan akademik rendah yang belajar secara luring lebih daripada siswa yang belajar secara daring. (3) Terdapat perbedaan yang signifikan hasil belajar siswa pada kelas yang mengalami model pembelajaran kooperatif tipe MAM secara luring dan MAM secara daring. Hasil belajar siswa yang belajar secara luring lebih daripada siswa yang belajar secara daring.

Kata Kunci: Model pembelajaran kooperatif, Make A Match (MAM), kemampuan akademik, hasil belajar siswa, analisis varians dua faktor (two-way anova)

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INTRODUCTION

Mathematics is a basic science that is important in developing science and technology. Mathematics is also necessary for everyday life, meaning that mathematics is needed anywhere and anytime (Anifa et al., 2021). The key to learning mathematics is a good understanding of concepts (Rikin, 2019). To explore a new concept, students first understand the concept in previous learning (Suprijono, 2015). This is a requirement for students to easily accept and understand new concepts (Susanto, 2013). With a lack of students' understanding of the material presented, learning outcomes are not optimal and do not achieve learning mastery (Kamarianto, Noviana, & Alpusari, 2018). One way to improve mathematics learning outcomes is to improve the factors that affect learning outcomes (Mangelep, 2017). These factors can come from within and from outside the student. One of the factors that come from outside the student's self is the teaching given by the teacher and the way they interact with other students during the mathematics learning process (Mangelep, 2017; Tiwow., 2023).

Factors that influence student learning success include teaching methods, curriculum, teacher-student relations, student-student relations, lessons, school time, rules, or discipline set at school. In this learning activity, it is often because many teachers still use conventional learning when the mathematics learning process takes place (Mangelep, 2013). In the process, the teacher only explains, and students record what is considered important so that the source of knowledge here is only found in the teacher so that students are less active in learning activities (Sulistyaningsih & Mangelep, 2019). Inappropriate learning can cause student boredom in participating in the learning process. The material needs to be understood, making learning monotonous, so students are less motivated to learn (Tiwow et al., 2022).

In learning mathematics, selecting a model to achieve active and enjoyable learning is a demand that the teacher must meet. Teachers need to develop and carry out teaching and learning activities in which students can actively build their knowledge in a fun way (Mangelep, 2015; Domu et al., 2023). The Make a Match (MAM) cooperative learning model is a learning model that can be applied because, in this learning process, students can learn material actively and happily (Runtu et al., 2023). This is because the MAM-type cooperative learning model is closely related to the characteristics of students who like to play (Shoimin, 2017).

Based on observations made at Tombatu Christian Vocational School, most students still have difficulty learning mathematics. This can be seen when the teacher gives learning material about Arithmetic Sequences and Series material to class X students majoring in Computer and Network Engineering (TKJ). In ongoing learning, the teacher explains the subject matter orally, writes on the blackboard, gives examples on the blackboard, and gives questions and homework. However, their ability to understand the material still needs to improve. When the teacher explained, many students did not pay attention, just told stories, fell asleep, and even daydreamed. This impacts students' abilities in that student who have a good understanding of the material have good grades, while students who have a poor understanding also have poor grades.

From the interviews with mathematics teachers, he said that many students needed help understanding the material provided. Due to the current pandemic, the learning process is carried out online. While carrying out the online learning process, several obstacles were experienced by students and teachers, one of which was that the network connection needed to be better. This causes low student learning outcomes. In a class of 20 people, only 4 to 5 students score more than 70 or meet the Minimum Completeness Criteria (KKM) score. At the same time, only about 4 students are active when learning mathematics. In the interviews with one student, the student said that mathematics was very difficult because it was only concerned with formulas, and the teacher's way of teaching could have been more interesting. Hence, the student felt bored and needed to notice the teacher's explanation.

With these problems, various learning models are needed to overcome teaching and learning activities difficulties. It is not good for the teacher if he only delivers lessons by continuing to lecture in front of the class because overcoming learning difficulties for students is not easy, especially regarding their learning outcomes (Mangelep et al., 2020; Domu et al., 2023). For this reason, teachers must be good at choosing learning models that are appropriate to their learning conditions so that later the provision of the learning model is not misguided (Rompas et al., 2023).

METHOD

By formulating the problem and research objectives, this research is quasi-experimental, and the research design used is a two-factor factorial design. Factor A implements the MAM-type cooperative learning model (offline and online), while Factor B is students' academic ability (high and low).

This research was conducted at the Tombatu Christian Vocational School in April, even the semester of the 2020/2021 school year. The research object was students of class X in the Nursing Department using the MAM-type cooperative learning model offline and class X students in the Computer and Network Engineering Department (TKJ) using the MAM-type cooperative learning model online. The research instrument used was a test of learning outcomes through an essay.

RESULT AND DISCUSSION
Data Description

This research was conducted at the Tombatu Christian Vocational School in April, even during the 2020/2021 academic year semester. The subjects in this study took 2 classes, namely class X majoring in Nursing, with a total of 18 students, and class X, majoring in Computer and Network Engineering (TKJ), with 20 students. In class X, the Nursing department learns to use the MAM learning model offline, and class X majors (TKJ) learn to use the MAM learning model online. The number of meetings in this study is 1 meeting.

The data obtained in this study is data on student learning outcomes (Post-Test scores) on

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Arithmetic Sequences and Series. A summary of the learning outcomes data for TKJ and Nursing class students can be seen in Table 1 below.

Table 1. Data Summary of Offline MAM Classes and Online MAM Classes

Academic Ability	Learning Model	Mean	Std. Deviation	N
High	MAM offline	82.09	7.217	11
	MAM online	76.83	6.118	12
	Total	79.35	7.043	23
Low	MAM offline	65.14	4.488	7
	MAM online	49.38	8.634	8
	Total	56.73	10.593	15
Total	MAM offline	75.50	10.489	18
	MAM online	65.85	15.479	20
	Total	70.42	14.051	38

Prerequisite Analysis Testing

Terdapat dua prasyarat analisis, yaitu Uji Normalitas Data dan Uji Homogenitas Varians. Uji Normalitas Data menggunakan uji Kolmogorof-Smirnof. Dari hasil pengujian, baik untuk Kelas MAM Luring dan Kelas MAM Daring diperoleh nilai signifikan lebih dari taraf signifikan yang diambil, yaitu $\alpha = 0{,}05$. Hal ini berarti data kedua kelas berasal dari dua populasi yang berdistribusi normal. Selanjutnya, Uji Homogenitas Varians kedua kelas menggunakan uji Levene's. Dari hasil pengujian, diperoleh nilai signifikan lebih dari taraf signifikan yang diambil, yaitu $\alpha = 0{,}05$. Hal ini berarti varians data kedua kelas adalah homogen.

There are two prerequisites for analysis: the Data Normality Test and the Variance Homogeneity Test. The data normality test uses the Kolmogorof-Smirnof test. From the test results, both Offline MAM Class and Online MAM Class obtained significant values more than the significant level taken, namely $\alpha = 0.05$. This means that the data for both classes come from two normally distributed populations. Furthermore, the Homogeneity Test of Variance of the two classes uses Levene's test. From the test results, a significant value that is more than the significant level taken is obtained, namely $\alpha = 0.05$. This means that the variance of the two-class data is

homogeneous.

Hypothesis Testing

There are three hypotheses tested, namely.

1. There are differences in student learning outcomes in Arithmetic Sequences and Series material in terms of Factor A (implementation of the MAM type cooperative learning model offline and online), with statistical hypotheses:

$$H_0 : \quad \alpha_1 = \cdots = \alpha_a = 0$$
$$H_1 : \quad \exists \alpha_i \neq 0 , i = 1, \dots, a$$

2. There are differences in student learning outcomes in the material for Arithmetic Sequences and Series in terms of Factor B (students' academic abilities), with statistical hypotheses:

$$H_0 : \quad \beta_1 = \cdots = \beta_b = 0$$
$$H_1 : \quad \exists \beta_j \neq 0 , j = 1,2, \dots, b$$

3. There are differences in student learning outcomes in the material for Arithmetic Sequences and Series in terms of the interaction of Factor A and Factor B, with statistical hypotheses

$$H_0 : \quad \alpha\beta_{11} = \alpha\beta_{12} = \cdots = \alpha\beta_{ab} = 0$$
$$H_1 : \quad \exists (\alpha\beta)_{ij} \neq 0 , i = 1, \dots, a, j = 1,2, \dots, b$$

Table 2 below shows the results of the two-factor analysis of variance.

Table 2. Two-Factor Analysis of Variance Test Results

Source of Diversity	JK	Db	KT	F_{count}	F_{table}
Treatment	5729,955[a]	3	1909,985	41,223	2,88
Factor_A	4460,369	1	4460,369	96,269	4,13
Factor_B	999,930	1	999,930	21,582	4,13
Factor_A * Factor_B	249,867	1	249,867	5,393	4,13
Error	1575,308	34	46,333	45,902	
Total	195752,000	37			

Based on Table 2, it can be said that:

1. There are differences in student learning outcomes in Arithmetic Sequences and Series material regarding Factor A (implementation of the MAM-type cooperative learning model offline and online). This is indicated by the value of Fcount = 96.269, which is more than the value of Ftable = 4.13.

2. There are differences in student learning outcomes in the Arithmetic Sequences and Series material regarding Factor B (students' academic abilities). This is indicated by the value of Fcount = 21.582, which is more than the value of Ftable = 4.13.

3. There are differences in student learning outcomes in the material for Arithmetic Sequences and Series regarding the interaction of Factor A and Factor B. This is indicated by the value of Fcount

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= 5.393, which is more than the value of Ftable = 4.13.
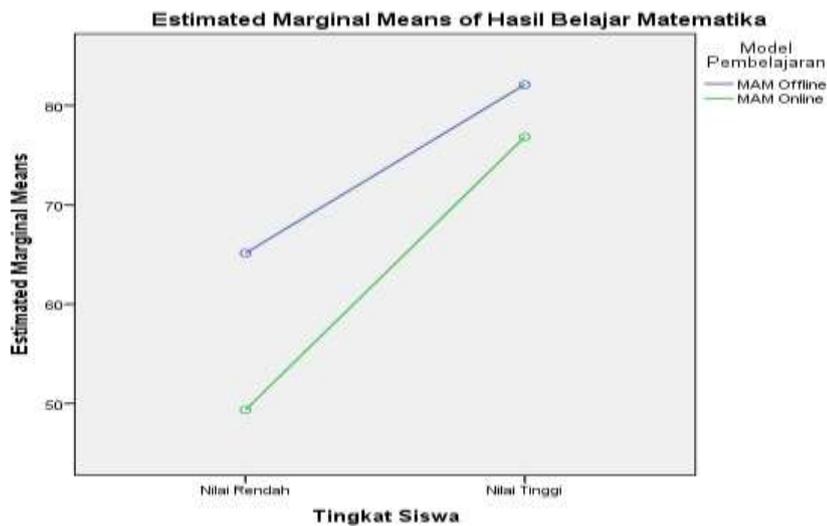

Figure 1. Interaction of Factor A and Factor B

Because there is the influence of the interaction of factors A and factor B, further testing is carried out with the Least Significant Difference (LSD) test. The test steps are as follows:

1. Testing the difference in the average learning outcomes of students with high academic ability in classes that experience cooperative learning models of offline and online MAM. The statistical hypothesis is written,

$$H_0 : \mu_1 = \mu_2$$
$$H_1 : \mu_1 > \mu_2$$

With criteria:

a. If $|\bar{x}_1 - \bar{x}_2| \geq$ BNT then reject H_0, meaning that it is significant that the average learning outcomes of students with high academic ability in classes that experience the learning model offline MAM-type cooperative learning more than students in classes that experience online MAM-type cooperative learning models.

b. If $|\bar{x}_1 - \bar{x}_2| <$ BNT then H_0 cannot be rejected, meaning that the average learning outcomes of students with high academic ability in classes that experience the offline MAM type cooperative learning model are the same as students in classes who experience the online MAM type cooperative learning model.

Based on the calculation results of $|\bar{x}_1 - \bar{x}_2| = 5,26$ and BNT = 1,20, it was decided to reject H_0. So, significantly the average learning outcomes of students with high academic ability in classes that experience the MAM-type cooperative learning model offline are more than students in classes that experience the online MAM-type cooperative learning model.

2. Testing the difference in the average learning outcomes of students with low academic ability in classes that experience cooperative learning models of offline and online MAM. The statistical hypothesis is written,

$$H_0 : \mu_3 = \mu_4$$
$$H_1 : \mu_3 > \mu_4$$

with criteria:

a. If $|\bar{x}_3 - \bar{x}_4| \geq$ BNT then cannot reject H_0, it means that the average learning outcomes of students with low academic ability in the class experiencing the learning model are significant offline MAM-type cooperative learning more than students in classes that experience online MAM-type cooperative learning models.

b. If $|\bar{x}_3 - \bar{x}_4| \geq$ BNT then cannot reject H_0, meaning that the average learning outcomes of students with low academic ability in classes that experience the offline MAM type cooperative learning model are the same as students in classes who experience the online MAM type cooperative learning model.

Based on the results of calculating the value of $|\bar{x}_3 - \bar{x}_4| = 15{,}77$ and the value of BNT $= 1{,}84$, it was decided to reject H_0. So, significantly the average learning outcomes of students with low academic ability in classes that experience the MAM-type cooperative learning model offline are more than students in classes that experience the online MAM-type cooperative learning model.

Discussion

The research results in two classes XI of Tombatu Christian Vocational School on Arithmetic Rows and Series, in classes that experience cooperative learning models of offline MAM and online MAM generally show differences in average student learning outcomes. This is based on the hypothesis testing that has been done. From these results, through further test results also obtained the following results:

1. There is a significant difference in the learning outcomes of students with high academic ability in classes that experience the MAM-type cooperative learning model offline and MAM online. Significant differences can be seen from the average value obtained for each learning model. The class experiencing the MAM-type cooperative learning model offline has an average of 82.09, while the class experiencing the MAM-type cooperative learning model online has an average of 76,83. This means that students with high academic abilities get better learning outcomes using the MAM learning model offline than the MAM learning model online.

2. There is a significant difference in the learning outcomes of students with low academic ability in classes that experience the MAM-type cooperative learning model offline and MAM online. Significant differences can be seen from the average value obtained for each learning model. The class experiencing the MAM-type cooperative learning model offline has an average of 65.14, while the class experiencing the MAM-type cooperative learning model online has an average of 49,37. This means that students with low scores get better learning outcomes using the MAM-type cooperative learning model offline rather than the MAM-type cooperative learning model online.

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3. Significant differences exist in student learning outcomes in classes that experience the MAM-type cooperative learning model offline and MAM online. This difference can be seen in the average class scores. The class experiencing the MAM-type cooperative learning model offline has an average value of 75.5, while the class experiencing the online MAM-type cooperative learning model has an average value of 65. ,85. In addition, it was also seen that during the learning process, students who experienced the MAM-type cooperative learning model online had difficulties with the network connection used.

CONCLUSION

Based on the research results obtained, the following conclusions can be drawn:

1. There is a significant difference in the learning outcomes of students with high academic ability in classes that experience the MAM-type cooperative learning model offline and MAM online. The learning outcomes of students with high academic abilities who study offline are more than students who study online.

2. There is a significant difference in the learning outcomes of students with low academic ability in classes that experience the MAM-type cooperative learning model offline and MAM online. The learning outcomes of students with low academic ability who study offline are more than students who study online.

3. Significant differences exist in student learning outcomes in classes that experience the MAM-type cooperative learning model offline and MAM online. The learning outcomes of students who study offline are more than students who study online.

REFERENCESS

Anifa, R. T., Zainil, M., & Pusra, D. (2021). Peningkatan Hasil Belajar Siswa dalam Pembelajaran Tematik Terpadu Menggunakan Model Pembelajaran Kooperatif Tipe Make A Match Kelas IV SD Negeri 20 Indarung. Jurnal Pendidikan Tambusai, 3278-3283.

Domu, I., Regar, V. E., Kumesan, S., Mangelep, N. O., & Manurung, O. (2023). Did the Teacher Ask the Right Questions? An Analysis of Teacher Asking Ability in Stimulating Students' Mathematical Literacy. Journal of Higher Education Theory & Practice, 23(5).

Domu, I., Pinontoan, K. F., & Mangelep, N. O. (2023). Problem-based learning in the online flipped classroom: Its impact on statistical literacy skills. Journal of Education and e-Learning Research, 10(2), 336-343.

Kamarianto, Noviana, & Alpusari. (2018). Penerapan Model Pembelajaran Problem Based Learning Untuk Meningkkatkan Hasil Belajar Matematika SD. Jurnal Primary Progam Studi Pendidikan Guru Sekolah Dasar Fakultas Keguruan dan Ilmu Pendidikan Universitas Riau, 40-47.

Lolombulan, J. H. (2017). Statistika bagi Peneliti Pendidikan. Yogyakarta: Andi.

Mangelep, N. (2013). Pengembangan Soal Matematika Pada Kompetensi Proses Koneksi dan Refleksi PISA. Jurnal Edukasi Matematika, 4(7), 451-466.

Mangelep, N. O. (2015). Pengembangan Soal Pemecahan Masalah Dengan Strategi Finding a Pattern. Konferensi Nasional Pendidikan Matematika-VI,(KNPM6, Prosiding), 104-112.

Mangelep, N. O. (2017). Pengembangan Website Pembelajaran Matematika Realistik Untuk Siswa Sekolah Menengah Pertama. Mosharafa: Jurnal Pendidikan Matematika, 6(3), 431-440.

Mangelep, N. O. (2017). Pengembangan Perangkat Pembelajaran Matematika Pada Pokok Bahasan Lingkaran Menggunakan Pendekatan PMRI Dan Aplikasi GEOGEBRA. Mosharafa: Jurnal Pendidikan Matematika, 6(2), 193-200.

Mangelep, N., Sulistyaningsih, M., & Sambuaga, T. (2020). Perancangan Pembelajaran Trigonometri Menggunakan Pendekatan Pendidikan Matematika Realistik Indonesia. JSME (Jurnal Sains, Matematika & Edukasi), 8(2), 127-132.

Rikin, M. (2019). Upaya Meningkatkkan Hasil Belajar Dan Kreatifitas Siswa Kelas X Pada Materi Barisan Dan Deret Menggunakan Metode Kooperatif Tipe Make A Match Di SMKN 5 Kota Jambi Provinsi Jambi. Journal Education Of Batanghari, 1 (2), 21-35.

Rompas, V. D., Wenas, J. R., Sambuaga, O. T., & Mangelep, N. O. (2023). Analysis of Students' Difficulties in Completing Operational Problems with Algebraic Forms. Jurnal Pendidikan Tambusai, 7(1), 2696-2703.

Runtu, P. V. J., Pulukadang, R. J., Mangelep, N. O., Sulistyaningsih, M., & Sambuaga, O. T. (2023). Student's Mathematical Literacy: A Study from The Perspective of Ethnomathematics Context in North Sulawesi Indonesia. Journal of Higher Education Theory and Practice, 23(3), 57-65.

Shoimin, A. (2017). Model Pembelajaran Make A Match Untuk Pembelajaran yang Menyenangkan. Jurnal Taman Cendikia , 52-59.

Suprijono, A. (2015). Cooperative Learning Teori dan Aplikasi PAIKEM. Yogyakarta: Pustaka Belajar.

Susanto, A. (2013). Teori Belajar dan Pembelajaran di Sekolah Dasar. Jakarta: PT Kharisma Putra Utama.

Tiwow, D., Wongkar, V., Mangelep, N. O., & Lomban, E. A. (2022). Pengaruh Media Pembelajaran Animasi Powtoon Terhadap Hasil Belajar Ditinjau dari Minat Belajar Peserta Didik. Journal Focus Action of Research Mathematic (Factor M), 4(2), 107-122.

Tiwow, D. N. F., Tambingon, H. N., Rotty, V. N. J., Lomban, E. A., & Mangelep, N. O. (2022). The Influence Of Adobe Flash-Based Learning Media On Interest In Learning Mathematics. Journal Of Education And Teaching Learning (JETL), 4(3), 243-254.