



The Influence of Mind-Mapping Learning Model on Mathematical Communication Skills and Interests of Students of Elementary School 200110 Padangsidempuan City

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ABSTRACT

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The study aims to analyze the differences in students' mathematical communication skills through the mind mapping learning model better than those given regular learning, analyze the differences in students' interest in learning mathematics through the mind mapping learning model better than those given regular learning, analyze the interaction between learning and students' initial abilities on mathematical communication skills, analyze the interaction between learning and students' initial abilities on students' interest in learning mathematics at Padang Sidempuan City Elementary School. The sample was determined as many as 54 people consisting of 2 (two) classes. The research design used in this study was an experimental design with a 2x3 factorial. The results of the study concluded that students' mathematical communication skills were taught with the mind mapping learning model better than using regular learning. Students' mathematical communication skills have a high learning interest better than those with a low learning interest. There is an interaction between learning and initial mathematical abilities on students' mathematical communication abilities. There is an interaction between learning and initial mathematical abilities on students' learning interests.

Key Word

Communication Skills, Mathematics, Learning Interest, Mind Mapping Model

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INTRODUCTION

The development and progress in the education sector are also felt in the implementation of learning including developments in the implementation of mathematics learning in schools. According to Sujono (2018: 20) that in the development of modern civilization, mathematics plays an important role because with the help of mathematics all sciences become perfect. Mathematics

is a tool that is very much needed by all sciences, without the help of mathematics all will not make significant progress.

Mathematics learning is a universal science that underlies the development of modern technology, has an important role in various disciplines and advances human thinking power. Mathematics subjects need to be given to all students starting from elementary school to equip students with the ability to think logically, analytically, systematically, critically, and creatively, as well as the ability to work together (BNSP, 2006: 416).

However, in reality, mathematics learning is still concerning, seen from the low learning achievement achieved by students. As stated by Hayati (2020: 10) that mathematics achievement in Indonesia is still low compared to Malaysia and Singapore, which have fewer teaching hours each year than in Indonesia. Our achievement is 411, Malaysia's achievement is 508, and Singapore's 605, even though the teaching hours in Indonesia are 169 hours on average each year. While Malaysia is 120 hours, Singapore is only 112 hours.

In the teaching and learning process at school, we are often disappointed because of the low success of students in understanding and mastering mathematics subject matter. The implementation of mathematics learning is still faced with various problems. Mathematics lessons are still considered difficult, boring and often cause problems in learning. According to Nugroho (2018: 63) one of the problems that is often faced is the low mathematics ability of students. Indonesian students' mastery of mathematics is ranked 39th out of 41 countries. The mastered mathematics skills are only able to solve one step of the mathematics problem.

Various problematic facts were found that in the implementation of mathematics learning which resulted in low student learning outcomes. Low learning outcomes are a natural thing when viewed from the learning activities in the classroom that have been carried out by teachers. According to Saragih & Rahmiyana (2018) that the majority of questions given by mathematics teachers in Indonesia are too rigid. Generally, students in Indonesia work more on questions expressed in mathematical language and symbols that are set in a context that is far from the reality of everyday life. This of course results in students often feeling bored and considering mathematics as an unpleasant or difficult subject. Moreover, coupled with the teacher's habit of presenting lesson materials in finished form. Students do not learn mathematics by simply accepting and memorizing it but must learn meaningfully.

Based on the teacher's statement at one of the Elementary Schools (SD) in Padang Sidempuan City, it was found that the learning process was not running optimally, this can be seen from the learning process which was less

conducive because learning did not use varied methods. Student learning outcomes have not met the Minimum Completion Criteria (KKM) which was set at 70.00.

One of the solutions proposed to improve students' mathematics learning problems is by implementing fun learning using cooperative learning. According to Ibrahim (2018) that cooperative learning techniques are superior in improving student learning outcomes compared to individual learning experiences or cooperative models are very effective for student learning outcomes at all grade levels.

One of the cooperative learning methods is using mind mapping, especially in learning mathematics on fractional material that requires mind mapping for students in performing fractional arithmetic operations, both addition, subtraction, multiplication and division of fractional numbers. Buzan (2018) emphasized that learning with the mind mapping model is a process of mapping thoughts to connect certain concepts that are poured into an interesting and creative writing resembling a city map. So that the concept of learning will be easily understood by the brain.

According to Suyanto (2018: 94) also emphasized that the way to use the mind mapping model is to write the main theme as a central or middle point and think about branches or derivative themes that come out of the middle point to find the relationship between the main theme, important points of the main theme being studied, the development of each important point and find the relationship between each point. The implementation of learning with the mind mapping model on fraction material is to teach students to develop material and map it according to their thoughts, especially by carrying out fraction arithmetic operations consisting of addition, subtraction, multiplication and division of fractions. The teacher's task is of course to inform the concepts of fraction material, especially those related to fraction arithmetic operations, both through addition, subtraction, multiplication and division.

In addition to being related to the learning model, student characteristics factors are also an important concern during the implementation of learning. According to Uno (2018 :143) that student characteristics are one of the things that need to be identified by teachers to be used as a guide in developing learning programs. The identified characteristics can be in the form of learning interests.

The implementation of the mind mapping learning model is related to the way of taking notes that are creative, effective, and will literally map out thoughts. By using the mind mapping model, students can be more interested

in following the learning process, because in making it, mind mapping involves pictures, colors, and symbols. The existence of symbols and pictures in learning fractional arithmetic operations, both addition, subtraction, multiplication and division, attracts more attention or interest from students, so that students do not feel bored. In addition, students also find it easier to concentrate on understanding the subject matter.

Interest is one of the characteristics of students that is related to student learning activities. According to Darmadi (2018) that interest is a concern that contains elements of feelings. Interest is related to feelings of pleasure or displeasure. Therefore, interest greatly determines the attitude that causes students to be active in a learning or situation, or in other words, interest can be a cause or supporting factor for students to carry out their learning activities. By using mind mapping, of course, learning will be more interesting so that it fosters students' interest in learning.

Some research results that support the research to be carried out are the research of Hafid dkk (2023) on the Mind Mapping Learning Method on Elementary School Students' Learning Interests. The results of the study concluded that there was a significant influence of the Mind Mapping learning method on the learning interests of high school students at SDN 284 Labuaja, Kahu District, Bone Regency. This is indicated by the analysis of the hypothesis test with the T test, obtaining a t count of 5.770 and a t table with a significance of 5% of 2.00958 so that $t \text{ count} > t \text{ table}$.

The results of the study by Gunawan & Anbarsari (2021) on the Influence of the Mind Mapping Learning Method on Students' Learning Interests at SD/MI Al-Qolam Cibungbulang Bogor. The results of the study concluded that there was a significant influence of the use of the mind mapping method on students' learning interests at SD/MI Al-Qolam.

Research by Wati (2022) on the Impact of the Mind Mapping Learning Model in Improving Student Learning Outcomes in Elementary Schools. The results of the study concluded that the mind mapping learning model in improving student learning outcomes in elementary schools can be carried out in several subjects, has a moderate, feasible, and supportive category to be carried out in learning, especially in elementary schools. The implications of this study are that teachers can apply the mind mapping learning model to the learning process to improve student learning outcomes.

Research by Mawarni (2020) on the Influence of the Mind Mapping Method on Elementary School Students' Mathematics Learning Outcomes. The results of the study concluded that there was an influence of the mind mapping method on the mathematics learning outcomes of grade IV students. The

influence can be seen from the difference in learning outcomes between the experimental class and the control class. The average posttest score of the experimental class was 71.8 while the control class was 60.1. Likewise, it can be seen from the comparison of the n-gain value of the experimental class 0.49, while the N-Gain value of the control class was 0.23.

Research by Nurjanah et al., (2020) on the Analysis of the Influence of the Mind Mapping Type Cooperative Learning Model on Elementary School Student Learning Outcomes. The results of the study concluded that there was an influence of the Mind Mapping type cooperative learning model on elementary school student learning outcomes in the knowledge (cognitive) aspect. The learning outcomes of the knowledge aspect in the t-test calculation obtained a Tcount value > Ttable. This means that H_a is accepted so that there is an influence of the mind mapping type cooperative learning model on elementary school student learning outcomes. Where the effectiveness of the N-Gain mind mapping learning model gets a value of 54.5 with a moderate effectiveness category.

Research by Ekawati & Kusumaningrum (2020: 8) on the Influence of the Mind Mapping Learning Method on the Learning Outcomes of Class V Students of Elementary School 2 Sumberrejo. The results of the study concluded that there was a significant influence on student learning outcomes before being given treatment and after being given treatment by implementing the mind mapping learning method. There is a difference in the learning outcomes of class V students between the application of the mind mapping learning method and the conventional learning method. This is also evidenced by the independent samples t-test which shows that, when viewed from a significant point of view, it is smaller than 0.05, which is 0.007. Based on the results of data analysis and discussion, the conclusion that can be drawn from this study is that the application of the mind mapping method can improve student learning outcomes.

Research by Mukholifah et al., (2022:10) on the Influence of the CIRC Learning Model with Mind Mapping media on Elementary School Student Learning Outcomes. The results of the study concluded that the results of the study with the independent sample t-test proved that Tcount = 4.447 and Ttable = 2.000 where Tcount is greater than Ttable ($4.447 > 2.000$) so that, rejection of H_0 and acceptance of H_1 . Thus, the application of the CIRC model with mind mapping media is able to optimize student learning outcomes.

Related to the problems and several research results above, the researcher attempted to conduct research with the title: The Influence of the Mind-Mapping

Learning Model on the Mathematical Communication Skills and Interests of Students of Elementary School 200110 Padang Sidempuan City.

RESEARCH METHOD

This research was conducted using a quantitative method with a quasi-experimental design. According to Sugiyono (2019: 107), quasi-experimental research is research used to find the effect of certain treatments on others under controlled conditions. The main characteristic of quasi-experimental design is the development of true experimental design, which has a control group but cannot fully function to control external variables that affect the implementation of the experiment.

The population in this study were all fifth grade students of SDN 200110 Padang Sidempuan City in the 2022/2023 Academic Year, totaling 54 students divided into 2 classes, namely class V-A and class V-B. Each class consists of 30 students. The sample is a portion or representative of the population to be studied. The sample in this study was determined to be all classes V-A and V-B as research samples. To determine the treatment of the experimental class and the control class, a total sampling technique was used. The results of the drawing of the two selected classes were class V-A as the control class with the mind mapping learning model treatment of 27 students and class V-B as the experimental class with the usual treatment of 27 students.

In this study, the instruments used to collect research data were mathematical communication ability tests and student learning interest questionnaires. The communication ability test is to measure students' mastery and communication skills in mathematics learning. The mathematical communication ability test contains a mathematics learning outcome test with an instrument in the form of an essay test.

Learning interest is known by giving a questionnaire to students that has been prepared using a Likert scale. The results of the questionnaire will determine the category of students with high interest and low interest. This student learning interest questionnaire was given to students in the experimental and control groups before they took the final test. The learning interest questionnaire in this study consisted of statements with 5 answer choices, namely SS (Strongly Agree), S (Agree), R (Undecided), TS (Disagree), and STS (Strongly Disagree). Each answer choice is given a score, namely SS = 5, S = 4, R = 3, TS = 2, and STS = 1.

The analysis technique used in this study is inferential statistics, which is a statistical technique used to analyze sample data and the results are applied to

the population. Furthermore, the data analysis technique used in this study is inferential statistics through a two-way ANOVA statistical test.

RESULTS AND DISCUSION

Results

The results of the 2x3 ANOVA test calculations on the data on students' mathematical communication skills are presented in Table 1.

Table 1.

Results of ANOVA Test of Mathematical Communication Ability

Tests of Between-Subjects Effects					
Dependent Variable: Test Results					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3473.426 ^a	5	694.685	11.019	.000
Intercept	207054.025	1	207054.025	3.28403	.000
Model	874.714	1	874.714	13.875	.000
KAM	1504.838	2	752.419	11.935	.000
Model * KAM	589.985	2	294.993	4.679	.014
Error	3278.298	52	63.044		
Total	308000.000	58			
Corrected Total	6751.724	57			
a. R Squared = ,514 (Adjusted R Squared = ,468)					

Based on Table 1, it can be explained that the significance value of the model on communication skills is 0.000 and is smaller than the significant value of 0.05 ($0.000 < 0.05$). So it is concluded that the influence of the mind mapping model is better than ordinary learning on students' mathematical communication skills. There is an interaction between learning and initial abilities on students' mathematical communication skills as evidenced by the calculation results of $0.014 < 0.05$.

The results of the 2x3 ANOVA test calculations on student learning interest data are presented in Table 2.

Table 2.
Results of ANOVA Test of Learning Interest

Tests of Between-Subjects Effects					
Dependent Variable: Minat					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3369.288 ^a	5	673.858	9.971	.000
Intercept	208428.659	1	208428.659	3.08403	.000
Model	1073.776	1	1073.776	15.888	.000
KAM	1317.399	2	658.699	9.747	.000
Model * KAM	562.977	2	281.488	4.165	.021
Error	3514.298	52	67.583		
Total	309864.000	58			
Corrected Total	6883.586	57			

a. R Squared = ,489 (Adjusted R Squared = ,440)

Based on Table 2, it can be explained that the significance value of the model on interest is $0.000 < 0.05$. So it is concluded that the influence of the mind mapping model is better than ordinary learning on students' learning interest. There is an interaction between learning and initial ability on students' learning interest as evidenced by the calculation results of $0.021 < 0.05$.

In learning at school, teacher factors and teaching methods are very important factors. This means that teacher mastery of learning strategies is very necessary to improve teacher professional abilities in teaching, therefore teachers must be able to determine the most appropriate strategy and in accordance with the objectives, characteristics of students and the material to be delivered (Purwanto, 2013).

Discussion

The learning model used in delivering mathematics lessons must consider the characteristics of the lesson as explained previously. Mathematics lessons are very closely related to everyday life and will be very easy for students to understand if the learning model used directly requires students to make observations. However, mathematics lessons also need to be explained by teachers theoretically using the lecture method. However, teachers must be

creative in combining the lecture method with other methods that support creating a pleasant atmosphere so that learning materials are easily understood by students (Isjoni, 2018: 86).

In addition to the nature of the subject matter, one of the other basic ideas used by teachers as a consideration in designing learning models is student characteristics. Student characteristics are one of the things that teachers need to identify to be used as a guide in developing learning programs. Each student has different potential and characteristics (Sugiarto, 2018; Swadarma, 2018). A teacher must try to accommodate the students' potential to the maximum in the learning model applied in the classroom. Student characteristics such as student interests.

If we look at the considerations in choosing a learning model based on the nature of the material and the characteristics of the students, then the mind mapping model is one of the learning models that can be chosen in mathematics lessons. The mind mapping learning model tries to maximize and accommodate the potentials that exist in students, so that it becomes a learning model that has many variations of learning methods in it. This makes the mind mapping learning model able to create a pleasant atmosphere that motivates students to learn (Marxy, 2017; Deporter & Hernacki, 2016).

Several research results are in line with previous research, namely research by Agustin et al., (2018: 11) which concluded that the mind mapping learning model supports student learning activities in a very effective and innovative way. With mind mapping, students are invited to be actively involved in the learning process, from organizing information to linking various concepts. This technique helps students organize material visually, making information easier to understand and remember. In addition, mind mapping encourages students to think critically and creatively, because they have to identify relationships between concepts and illustrate them in an interesting way. The use of colors, images, and symbols in mind mapping also adds an element of fun to learning, so that students feel more motivated and enthusiastic.

Research by Gunawan & Anbarsari (2021) concluded that the mind mapping model supports students' understanding of mathematics learning materials in a very effective way. This technique helps students organize and connect various mathematical concepts in a visual form that is easier to understand. With mind mapping, the main concept is placed in the center and connected to related sub-concepts, allowing students to see the overall picture of the material being studied. The use of colors, images, and symbols also makes information more interesting and easier to remember. The process of

making mind maps encourages students to think critically and analytically, because they have to understand and connect various concepts.

Research by Mukholifah et al., (2022) concluded that the mind mapping model significantly increases students' interest and mathematical communication skills. By using mind mapping, students can organize mathematical concepts visually and systematically, which makes it easier for them to understand and explain the material. The use of colors, images, and symbols in mind mapping makes the learning process more interesting and enjoyable, so that students' interest in mathematics increases. In addition, Sumarmo (2018) stated that mind mapping encourages students to think critically and analytically, and to identify relationships between various mathematical concepts. When students are asked to explain their mind maps to classmates or teachers, they practice conveying mathematical thinking clearly and in a structured manner. This not only helps students understand mathematics better but also improves their ability to communicate that understanding effectively (Van de Walle & Bay-Williams, 2018: 161; Sukardi, 2018). Thus, the mind mapping learning model is able to foster interest in learning and develop students' mathematical communication skills simultaneously.

In terms of the approach used, the mind mapping model uses a student-oriented approach. The mind mapping model seeks to optimize the potential possessed by students while respecting the differences of each student as a unique individual (Mahmudi, 2018: 5). Each student has different potential and has extraordinary abilities to process information if only the right model is used to help them learn.

The learning interest of students taught using the mind mapping learning model is higher than the learning interest of students taught using the usual learning method (Slameto, 2015: 32; Hurlock, 2016;). Students who follow learning with the mind mapping learning model have become accustomed to being active in solving problems thinking individually to get concepts. Because the learning process is not just transferring knowledge from teachers to students, but a process that is conditioned or attempted by the teacher.

Some opinions and research results that are relevant and support the results of this study are according to Danim (2013) that interest is a feeling of liking and a feeling of interest in something or an activity without being told. For example, when a child has a high interest in singing, the child will often sing without being told by others. Because in essence, interest is the acceptance of the relationship between oneself and something outside of oneself, the stronger or closer the relationship, the greater the interest.

According to Hurlock (2016: 114) that interest is something that can identify the existence of a child's personality. Interest is a source of motivation that drives them to do what they want. When someone sees that something will benefit them, they feel interested. This then brings satisfaction when satisfaction decreases, interest decreases (Buzan, 2018; NCTM, 2013).

Related to the importance of interest in a person's life and learning activities, it can be proven from several research results that have been carried out (Fitri & Karlimah, 2018: 11). The results of the study (Sri Rezeki et al., (2022: 10) put forward the conclusion that specifically to focus on the role of achievement goals in determining the perception of task values and then draw the conclusion that interest in the context of education is very important, especially the implications for supporting the learning process so as to support the achievement of educational goals.

The results of the study by Fadliyana et al., (2023: 11) concluded that the main effects of learning interest, type of goal, and task difficulty on performance were all significant and the interaction between type of goal and task difficulty on performance was significant. These implications need to be considered in the implementation of education and future needs.

The results of the study by Gumanti et al., (2023: 8) concluded that interest should be a source that drives people to do what they want if they are free to choose. When they see that something will be profitable, they feel interested. This then brings satisfaction. When satisfaction decreases, interest decreases. According to Ahmar (2019: 10), in general, interest is influenced by two factors, namely factors that come from within the individual himself and factors that come from outside the individual. Intrinsic factors consist of interest, attention and activity.

Based on several opinions and research results above, it can be concluded that the results of this study are in line with several opinions and previous research results. Thus, it can be concluded that interest is a feeling of liking something that will motivate someone to do what they want to do and what they choose themselves. Interest has a great influence on the process and achievement of learning outcomes. If the learning material being studied does not match the child's interests, then the child will not be interested in learning as well as possible. There is no attraction for children resulting in reluctance to learn.

CONCLUSION

The mathematical communication skills of students taught using the mind mapping learning model are proven to be better than those taught using

conventional learning. This model facilitates students in compiling and conveying mathematical ideas in a more structured and clear manner. With the mind mapping model, students can more easily connect mathematical concepts, so that they are able to communicate their understanding more systematically and deeply. The mathematical communication skills of students with high learning interests are proven to be better than those with low learning interests. Students with high learning interests tend to be more active in participating in the learning process, more enthusiastic in understanding the material, and more confident in conveying mathematical ideas. High learning interests encourage students to be more involved in discussions, ask questions, and develop deeper ways of thinking, so that their ability to communicate mathematical concepts becomes stronger. Conversely, students with low learning interests tend to be less active, so that their mathematical communication skills do not develop optimally. These results indicate that learning interests have an important role in improving students' mathematical communication skills.

There is a significant interaction between learning and initial mathematical abilities on students' mathematical communication abilities. This shows that the effectiveness of the learning model in improving mathematical communication abilities is greatly influenced by the level of students' initial mathematical abilities. Students with high initial abilities tend to be able to understand and convey mathematical concepts more quickly, especially if the learning method applied is in accordance with their learning style.

There is a significant interaction between learning and initial mathematics ability on students' learning interest. This interaction shows that the effectiveness of learning methods in increasing students' learning interest is highly dependent on their initial mathematics ability. Students with high initial abilities tend to be more interested and motivated when learning is presented with challenges that match their level of understanding. Conversely, students with low initial abilities need a more supportive and adaptive approach to arouse their learning interest.

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