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THE EFFECT OF THE MISSOURI MATHEMATICS PROJECT LEARNING MODEL SUPPORTED BY VISUAL AID TO IMPROVE STUDENTS' PROBLEM-SOLVING SKILLS

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ABSTRACT

This study aims to investigate the effect of the Missouri Mathematics Project (MMP) learning model assisted by teaching aids on students' mathematical problem-solving abilities in the topic of relations and functions at Kefamenanu Christian Junior High School. The study employed a quantitative approach using a quasi-experimental method with a pretest–posttest control group design. The research instrument consisted of three essay questions that met the validity and reliability criteria. Data were analyzed using SPSS version 27. The results showed that the mean pretest score of the experimental class was 39.58, while that of the control class was 38.33. Following the implementation of the MMP learning model assisted by teaching aids, the mean posttest score of the experimental class increased to 77.74. Furthermore, the one-sample t-test for mean problem-solving ability yielded $t_{calculated} = 2.072 > t_{critical} = 1.725$. *The comparison test of mean problem-solving ability yielded* $t_{calculated} = 3.487 > t_{critical} = 1.697$. *Meanwhile, the test of improvement in problem-solving ability yielded* $t_{calculated} = 11.954 > t_{critical} = 1.734$. *These results indicate that the experimental class met the assessed mastery criterion in mathematical problem-solving, performed better than the control class, and demonstrated a significant improvement following the treatment.*

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INTRODUCTION

Mathematics is a subject that plays a crucial role in developing logical, critical, systematic, and creative thinking skills (Amelia et al., 2022) . Mathematics instruction aims not only to help students master concepts and computational procedures but also to equip them with the ability to apply their knowledge to solve problems (Setyawati & Malasari, 2024). One important skill that needs to be developed is mathematical problem-solving. This skill encompasses the process of understanding a problem, planning a solution, implementing a strategy, and verifying the results obtained. Polya (1973) identified these four stages as essential steps in the problem-solving process (Al-Qoyyim et al., 2026). In line

with this, the National Council of Teachers of Mathematics (NCTM, 2000) emphasizes that problem-solving is one of the primary process standards in mathematics learning (Mufidah, 2025). Therefore, instruction must be designed so that students are not only able to arrive at an answer but also understand the mathematical processes and reasoning underlying the solution to a problem.

Although it plays a crucial role, mathematical problem-solving remains a challenge in the learning process at school. Students often struggle to identify given and requested information, determine relevant concepts, select solution strategies, and evaluate the accuracy of their answers (Sabrina Ovi Saffanah, 2022). These difficulties may be related to an insufficient understanding of concepts and a learning process that does not provide students with optimal opportunities to explore various problem-solving strategies (Mufidah, 2025). When instruction is teacher-centered and emphasizes the mechanical mastery of procedures, students tend to have limited ability to apply their knowledge when faced with problems that differ from the examples provided.

These issues were also identified based on the results of interviews and initial observations at Kefamenanu Christian Junior High School. The observations showed that students' learning activities tended to be monotonous and that their engagement in the learning process was not yet optimal. Students' thinking skills in solving mathematical problems still need to be developed, while the habit of copying classmates' work is still frequently observed. Furthermore, the teaching methods employed by teachers tend to rely on lectures and recitation, thereby limiting students' opportunities to explore concepts, propose strategies, and solve problems independently. These conditions are linked to students' difficulties in solving math problems, particularly those requiring conceptual understanding and the application of problem-solving strategies. These preliminary findings indicate the need for more active, structured learning that provides space for students to build understanding and develop independence in learning mathematics. Furthermore, based on the initial problem-solving test on the topics of Sets and Sequences, only 19.04% of the 19 students were able to carry out the stages of planning a strategy, implementing a solution plan, and checking their work.

This issue is particularly important in the topic of relations and functions because this material requires students to understand the relationship between two sets and to represent it using various methods, such as diagrams, ordered pairs, tables, and algebraic expressions. It is not enough for students to simply memorize the definitions of relations and functions; they must also be able to identify relationships that meet specific criteria and

apply these concepts to solve problems. Difficulty understanding the relationships between concepts can hinder students in determining solution strategies and verifying the correctness of their answers. Research findings by Puji Astuti & Fajri Wulan Dini (2025) also indicate that students struggle during the stages of implementing a solution plan and checking their answers due to a lack of deep conceptual understanding. These findings reinforce the importance of instruction that not only emphasizes the final result but also guides students through each stage of problem-solving systematically.

One alternative that can be implemented to address this issue is the Missouri Mathematics Project (MMP) learning model. The MMP model organizes mathematics learning through concept-building activities, guided practice, independent or group work, and assignments designed to reinforce understanding. This learning structure provides students with the opportunity to understand the material, apply concepts in various exercises, receive guidance when encountering difficulties, and develop independence in solving problems (Ratni Dwita et al., 2025). These purposefully designed exercises are expected to help students build skills in selecting strategies, carrying out procedures, and evaluating their solutions. Thus, the MMP has the potential to serve as an alternative for creating a more structured learning experience focused on developing mathematical problem-solving skills.

The implementation of the MMP model can be reinforced through the use of manipulatives. Manipulatives help present abstract mathematical concepts in a more concrete and visual form, making the relationships between concepts easier to understand (Naimnule et al., 2023). In the topic of relations and functions, manipulatives can be used to demonstrate the relationship between elements of two sets, form corresponding pairs, and connect concrete representations with diagrams and mathematical symbols. The use of manipulatives can also encourage student engagement in observing, experimenting with, and discussing the concepts being studied. When integrated with the MMP learning stages, manipulatives are expected to help students better understand problems, develop appropriate solution strategies, and review their work. This integration is relevant to the learning conditions observed at Kefamenanu Christian Junior High School, particularly the need to enhance student engagement, conceptual understanding, and independence in solving mathematical problems.

Several relevant previous studies on the Missouri Mathematics Project (MMP) model, mathematical problem-solving skills, and the use of learning tools—including (Gulo, 2024)—examined the effect of the MMP learning model on the mathematical problem-

solving skills of eighth-grade students at UPTD SMP Negeri 1 Ulu Moro'o. The study employed a quasi-experimental method with a non-equivalent control group design. The results showed that the implementation of the MMP had an effect on students' mathematical problem-solving skills. These findings provide empirical support for the use of the MMP; however, they do not specifically examine the application of this model using teaching aids in the context of relations and functions.

Furthermore, Afla et al. (2024) examined the effect of MMP on the problem-solving skills and mathematical disposition of 10th-grade students at SMK Negeri 7 Lhokseumawe. The study employed a quasi-experimental design with a control group and administered only a posttest. The results indicated a significant effect of the MMP implementation on students' problem-solving skills and mathematical disposition. This study expands the body of research on MMP by measuring two aspects; however, it differs from the study conducted at Kefamenanu Christian Junior High School in terms of educational level, instructional content, and the use of teaching aids to support learning.

A study by Dhamma Sariputta et al. (2025) examined the use of GeoGebra-assisted MMP to assess the mathematical problem-solving skills of eighth-grade students on the Pythagorean Theorem. The study employed a pretest-posttest control group design and analyzed classical mastery as well as differences in problem-solving skills between the experimental and control classes. The results showed that the problem-solving skills of students in the experimental class achieved classical mastery and were better than those of the class that received direct instruction. This study is relevant because it integrates MMP with supporting media, specifically using GeoGebra as mathematical software and focusing on the Pythagorean Theorem.

Meanwhile, Zalukhu & Mendrofa (2025) developed MMP-based student worksheets to improve the mathematical problem-solving skills of junior high school students. The study used the ADDIE development model and focused on the validity, practicality, and effectiveness of the worksheets developed. The results showed that the worksheets achieved an average learning outcome of 85.00 with a classical mastery rate of 86.36%. This study emphasized the development of MMP-based instructional materials, whereas the study at Kefamenanu Christian Junior High School focused on testing the effect of the MMP model aided by teaching aids through a comparison between an experimental class and a control class.

Based on these studies, it is evident that the MMP has been examined as a learning model to improve mathematical problem-solving skills, both independently and with the

support of media and instructional materials. Nevertheless, there is still room to test the application of the MMP aided by teaching aids on the topics of relations and functions in the learning context at Kefamenanu Christian Junior High School. Differences in school context, characteristics of learning problems, subject matter, and types of supporting media provide the basis for this study to empirically re-examine the effectiveness of the MMP approach.

The innovation of this research lies in the application of the MMP method aided by teaching aids to address learning problems directly observed at Kefamenanu Christian Junior High School, namely monotonous learning activities, low student independence, the habit of copying classmates' work, and the dominance of lecture-based and rote learning. Teaching aids were used to help students understand the concepts of relations and functions visually and concretely, while the MMP stages facilitated guided and independent practice in problem-solving. In addition, this study evaluated learning outcomes through an average mastery test, a comparison of abilities between the experimental and control classes, and a test of ability improvement in the experimental class. Thus, the contribution of this study is not merely the combination of a learning model and media, but rather the testing of its application in a specific school context and with specific subject matter using several statistical evaluation perspectives.

RESEARCH METHODOLOGY

This study employed a quantitative approach using a quasi-experimental method through *a pretest-posttest control group design*. This design was chosen because the study was conducted in classes that had formed naturally within the school, making full randomization of individual students impossible; instead, randomization was applied at the group (class) level using the cluster random sampling technique. This design allows the researcher to compare the initial (pretest) and final (posttest) conditions between the group that received instruction using the Missouri Mathematics Project (MMP) model supplemented with teaching aids and the group that received conventional instruction, thereby enabling the controlled identification of the treatment's effect on students' problem-solving skills.

Table 1. Pretest-Posttest Control Group Design (Abraham & Supriyati, 2022)

Group	Pretest	Treatment	Posttest
Experimental	E1	X	E2
Control	K1	–	K2

Where E1 = the experimental group's pretest score; E2 = the experimental group's posttest score; K1 = the control group's pretest score; K2 = the control group's posttest score; X = the treatment consisting of instruction using the Missouri Mathematics Project model supplemented with teaching aids.

The study was conducted at Kefamenanu Christian Junior High School during the odd semester of the 2025/2026 school year. The study population consisted of all eighth-grade students, comprising Class VIII A and Class VIII B. Based on the results of a random draw, Class VIII B was designated as the experimental group, which received instruction using the Missouri Mathematics Project model supplemented with teaching aids and taught by the researcher, while Class VIII A was designated as the control group, which received instruction using the direct instruction model and was taught by the subject teacher. Before the intervention was administered, the equivalence of the two groups' initial abilities was tested using a test of equality of means on the pretest scores to ensure there were no significant differences between the two groups.

The data collection method used was a written essay-style test, administered in two stages: a pretest before the intervention and a posttest after the intervention was completed. The essay format was chosen so that the patterns and variations in students' problem-solving steps for mathematical problems could be observed in greater depth than with multiple-choice tests. The study was conducted over six sessions: the first session was used for the pretest; the second through fifth sessions were used for instruction in each group; and the sixth session was used for the posttest. The tested material covered relations and functions, with problem-solving questions designed based on indicators of mathematical problem-solving ability.

The primary instrument in this study was a mathematical problem-solving test in the form of open-ended questions designed based on problem-solving ability indicators. As a supplement, an observation sheet was also used to systematically observe and record learning activities based on predetermined indicators. Before being used for data collection, the problem-solving test instrument was tested for validity and reliability. The results of the validity tests for the pretest and posttest items are presented in Table 2.

Table 2. Validity of Pretest and Posttest Test Items

Item	Calculated R for Pretest	Posttest Calculated R	Table R	Notes
Question 1	0.642	0.965	0.413	Valid
Question 2	0.438	0.848	0.413	Valid
Question 3	0.801	0.965	0.413	Valid

All three items in both the pretest and posttest were deemed valid because the calculated r-value was greater than the table r-value (0.413) at a significance level of 0.05. The results of the reliability test using Cronbach's alpha coefficient showed a value of 0.937 for the pretest items and 0.964 for the posttest items, both of which fall into the "highly reliable" category.

Data analysis was conducted in stages using SPSS version 27, including prerequisite tests and hypothesis tests. The prerequisite tests consisted of normality and homogeneity tests. The normality test was performed on the pretest and posttest data of both groups using the Kolmogorov-Smirnov test at a significance level of α = 5%, with the criterion that the data are normally distributed if the significance value is > 0.05 (Usmadi, 2020). 's test for homogeneity was performed using the Harley test at the same significance level, with the criterion that the data are considered homogeneous if the significance value is > 0.05.

After the prerequisite tests were met, four stages of hypothesis testing were conducted. First, a test of the equality of means was conducted on the pretest data of the two groups using an independent two-sample t-test to ensure that the initial abilities of both groups were equivalent before the treatment was administered. Second, a mastery test was conducted using a one-sample t-test on the posttest data of the experimental group to determine whether the average learning outcomes of the experimental group exceeded the Minimum Mastery Criteria (KKM) set by the school. Third, a comparison test was conducted using an independent two-sample t-test on the posttest data of both groups to determine whether the experimental group's problem-solving ability was superior to that of the control group. Fourth, a gain test was conducted using a paired t-test on the difference between the pretest and posttest scores of the experimental group to measure the magnitude of the improvement in problem-solving ability following the intervention. In all hypothesis tests, the decision criteria were based on a 5% significance level (α = 0.05), with H0 rejected if the significance value (p) was less than 0.05 or if the calculated t-value exceeded the critical t-value in accordance with the direction of the hypothesis being tested.

RESULTS AND DISCUSSION

Results

Before testing the hypotheses, prerequisite tests—namely, the normality test and the homogeneity test were conducted (Delaila Siregar et al., 2024). The normality test was performed on the *pretest* and *posttest* data of the experimental and control groups using the Shapiro-Wilk test at a 5% significance level. At the time of the pretest, there were 2 students

absent from both the experimental and control groups. A summary of the test results is presented in Table 3.

Table 3. Results of the Normality Test (Shapiro-Wilk)

Data Group	N	Sig.	Description
Experimental Pretest	19	0.319	Normal
Control Pretest	13	0.953	Normal
Experimental Posttest	21	0.195	Normal
Control Posttest	15	0.967	Normal

All data groups yielded significance values greater than 0.05, so H0 was accepted, meaning that all pretest and posttest data for both groups were normally distributed, while the homogeneity test was conducted using Levene's test on the pretest and posttest data for both groups. The results of the pretest homogeneity test showed a significance value of 0.285, while the results of the posttest homogeneity test showed a significance value of 0.744. Since both significance values were greater than 0.05, it can be concluded that the variances of the pretest and posttest data for both the experimental and control groups are homogeneous. Since the condition of data normality is met, parametric statistical tests—namely the one-sample t-test, the independent two-sample t-test, and the paired two-sample t-test—can be used in hypothesis testing.

The results of the hypothesis tests—including the test for equality of means, the test for completeness, the comparison test, the improvement test, and the enhancement test—are summarized in Table 4.

Table 4. Hypothesis Test Table

Type of Test	Data Tested	Test Statistic	t-table	Decision	Interpretation
Equality of Means (two-sample independent t-test)	Experimental pretest vs. control pretest	t = 0.181 df = 30	2.042	H0 accepted	The mean initial ability scores of the two groups are equivalent
Achievement (one-sample t-test, passing score = 70)	Experimental posttest	t = 2.072 df = 20	1.725	H0 is rejected	The experimental posttest mean exceeds the passing score
Comparison (two-sample independent t-test)	Experimental posttest vs. control posttest	t = 3.487 df = 30	1.697	H0 is rejected	On average, the experimental group's problem-solving skills were

					better than those of the control group
Improvement (paired t-test)	Experimental pretest vs. posttest	t = 11.954 df = 18	1.734	H0 is rejected	There was a significant increase after the treatment
Difference in Increase (Independent Samples t-Test)	Experimental Increase vs. Control Increase	t=4.214 df=30	1.697	H0 is rejected	The average improvement in problem-solving skills in the experimental class was greater than that in the control class

Based on the results of the hypothesis testing, it is concluded that the MMP model aided by teaching aids has a positive effect on the improvement of problem-solving skills.

The results of the above study are supported by the descriptive statistics. The differences in improvement between the experimental and control groups can be seen in the following table.

Table 5. Descriptive Statistics of the Difference in Class Improvement

class_gain	N	Mean	Std. Deviation	Standard Error of the Mean
Experiment	19	39.5826	14.43286	3.31112
Control	13	19.8169	10.58290	2.93517

The results in Table 5 show that the average increase in the experimental class from the pretest to the posttest was 39.5826 units, while the control class increased by 19.8169 units. This indicates that the MMP model, supported by the Resi Board teaching aid, has a positive effect on improving students' mathematical problem-solving skills.

Discussion

The mastery of mathematical problem-solving skills among students in the experimental class was closely linked to the teachers' success in implementing the Missouri Mathematics Project (MMP) instructional model, with a 95% implementation rate. This percentage indicates that instruction was carried out very effectively in accordance with the stages of the MMP model.

During the review phase of the first session, the teacher reviewed the prerequisite material related to relations and functions—specifically, sets—and in the second session, students were given the opportunity to present the results of the assignment from the first session. At the beginning of the lesson, 50% of the students appeared to have forgotten the

concept of sets they had previously learned, but by the second session, this figure had increased to 76.19%. There were several students who did not complete the assignment given in the previous session. This situation had the potential to hinder students' understanding of the material on relations and functions during the first session and their ability to express relations and functions during the second session. Students' awareness of the need to prepare by completing the assigned tasks and understanding the prerequisite material greatly assisted the teacher in conducting the review phase. The findings of this study align with (Nurlaeli et al., 2025), which indicate that students' cognitive readiness regarding the material is still classified as moderate to low. Pre-instructional preparation, such as reviewing previous lessons, creating summaries, and independent study, are aspects that require attention. At this stage, the teacher is able to reactivate the knowledge students already possess. These activities provide a foundation for students to understand new material and identify the information needed when solving math problems (Cutting et al., 2023) .

During the development stage, the teacher explained the concepts of relations and functions in the first session and presented examples of relations and functions in the second session, using the Resi Board as a teaching aid. Based on student observations, student engagement at this stage increased to 100%. This was due to the use of the Resi Board, which helped the teacher pose questions and gave students the opportunity to answer and explain their solutions in front of the class. Through these activities, concepts that were previously explained verbally became more concrete and interactive (Saputra et al., 2019). Students did not merely listen to the teacher's explanations but were also actively engaged in the process of understanding problems, determining solution strategies, and communicating their answers. These findings align with those of Syaputra et al. (2025), which emphasizes the connection between understanding problems, processing and presenting answers, and communicating mathematical thinking processes; and (Amany et al., 2024), which also indicates that the ability to explain problem-solving strategies and present mathematical arguments is an important part of mathematical communication. This activity supports the development of problem-solving skills, particularly in understanding problems and planning solutions.

During the seatwork phase, the teacher was able to facilitate practice activities and guide students who were struggling without taking over the problem-solving process. Based on observations, 100% of the students were actively engaged in the discussion. Students exchanged opinions, compared strategies, and refined their understanding based

on feedback from the teacher and their peers. The teacher also facilitated the students by providing additional examples using the Resi Board as a teaching aid. This facilitation helped students overcome difficulties in applying concepts of relations and functions to solve problems. After gaining an understanding through explanations and discussions, students were then able to complete the exercises independently using the prepared Student Worksheets (LKS). This independence is crucial because low student autonomy leads to poor problem-solving skills, particularly in the steps of systematic problem-solving and checking the results obtained. This finding aligns with the research by Karim et al. (2023), which showed that students with high learning autonomy were able to complete all four steps of Polya's problem-solving model, whereas students with moderate and low autonomy still experienced difficulties at certain stages, particularly in verifying their solutions.

During the homework phase, the teacher assigns follow-up tasks to reinforce understanding and provide students with opportunities to practice applying the concepts they have learned, as well as to familiarize them with solving problems using Polya's problem-solving steps. During this phase, students also successfully draw conclusions about the concepts of relations and functions.

The research results also showed that the mathematical problem-solving skills of students in the experimental class—which implemented the Missouri Mathematics Project (MMP) model aided by the Resi board teaching aid—were better than those of students in the control class, which implemented the direct instruction model. This finding was supported by an increase in the average mathematical problem-solving score of students in the experimental class, from 39.58 on the pretest to 79.16 on the posttest. This finding aligns with the research findings of Dhamma Sariputta et al. (2025), which indicated that the mathematical problem-solving skills of students who participated in MMP-based instruction were better than those of students who participated in direct instruction. The consistency of these results suggests that the implementation of the MMP model, combined with instructional media, can support the development of mathematical problem-solving skills. This improvement indicates that students' skills developed after participating in MMP-based instruction supported by the Resi board. Furthermore, observation results showed that, on average, 90% of students in the experimental class were actively engaged in learning, whereas in the control class, only 33.33% of students appeared active. This difference is related to the characteristics of the instructional approach implemented,

particularly regarding the use of teaching aids, opportunities for discussion, and the practice of solving problems using systematic problem-solving steps.

In the control class, which employed direct instruction, learning activities were dominated by the teacher's explanations and demonstrations of problem-solving examples. The teacher explained the concepts of relations and functions without using visual aids, so students primarily received information through verbal explanations and examples written on the blackboard. Additionally, students did not have specific opportunities to exchange ideas through discussion during the observed lessons. These conditions resulted in relatively limited peer interaction when discussing problem-solving strategies. Student engagement was primarily evident in activities such as listening to explanations, taking notes, and answering the teacher's questions, whereas opportunities to express opinions, compare strategies, and explain thought processes were not yet optimal. Findings by Wahyuni & Khodijah (2024) also indicate that teacher-centered mathematics instruction can lead to students having a poor understanding of concepts and tending to solve problems based solely on the examples provided.

In contrast, in the experimental class that implemented the MMP model aided by a whiteboard, students had greater opportunities to engage directly in learning. The whiteboard was used as a teaching aid to present math problems and questions that encouraged students to participate by answering and explaining their solutions in front of the class. The findings of this study are supported by the findings of Angco & Angco (2024), who identified that the use of mathematical teaching aids can support student engagement and participation in learning. Teachers also facilitated discussions so that students could exchange opinions, compare problem-solving strategies, and improve their understanding of the concepts of relations and functions. Through these activities, students not only receive information from the teacher but also engage in the process of understanding problems and communicating their solutions.

In addition to discussions, students in the experimental class were trained to solve problem-solving questions using Polya's four-step method: understanding the problem, planning a solution, carrying out the plan, and checking the answer. This training was implemented during discussion sessions and independent practice (seatwork) so that students would not merely focus on the final answer but would also be able to develop a structured problem-solving process. During the first session, observations revealed that 52.38% of students still struggled with the planning stage. Some students were unable to determine the appropriate strategy based on the given information and the question's

prompts, leading them to jump straight into calculations without first formulating a plan. The results of a study by Maulida et al. (2025) also showed that student errors occurred during the planning stage, accounting for 30% of all errors. This indicates that planning a solution remains a challenge for some students in the process of solving mathematical problems.

To address these difficulties, the teacher provided guidance through guiding questions, discussions, and exercises using a whiteboard. Students were instructed to identify known and unknown information, determine appropriate strategies, implement those strategies, and review their answers. In the second session, observations showed that 90.47% of students were able to follow Polya's problem-solving steps. This indicates a significant improvement after students became accustomed to using Polya's steps in problem-solving. This progress suggests that repeated practice and teacher guidance help students become more accustomed to applying problem-solving steps systematically. These findings are consistent with those of Siahaan et al. (2022), who showed that the use of a number line has the potential to help students understand the concepts of relations and functions.

Independent practice activities further reinforce this process because students have the opportunity to apply the concepts of relations and functions, as well as Polya's steps, without relying entirely on help from teachers or peers. Through these exercises, students become accustomed to understanding problems, selecting solution strategies, carrying out the planned steps, and checking the accuracy of their results. This process aligns with the increase in students' average problem-solving scores from 39.58 to 79.16. This improvement indicates that after participating in the instruction, students achieved better results in solving mathematical problem-solving questions. This finding is consistent with the findings of Karim et al. (2023), namely that the application of MMP can support students in carrying out Polya's problem-solving stages, although students' abilities at each stage are influenced by their level of independent learning.

Overall, the increase in average pretest and posttest scores, the high level of student engagement in learning, and the development of students' ability to apply Polya's steps provide a pedagogical explanation for the better results in the experimental class. The use of a whiteboard, facilitation of discussions, and regular problem-solving practice were key elements in the implementation of MMP in this study. Nevertheless, the increase in scores from 39.58 to 79.16 indicates a change in learning outcomes in the experimental class, while

the conclusion that MMP is more effective than direct instruction needs to be supported by the results of statistical tests comparing the two classes.

CONCLUSIONS AND RECOMMENDATIONS

Based on the research findings and discussion, it can be concluded that the Missouri Mathematics Project (MMP) learning model, supported by the "resi board" teaching aid, has a positive effect on students' mathematical problem-solving skills in the topic of relations and functions. Teachers are advised to implement the Missouri Mathematics Project (MMP) learning model, supported by the "resi board" teaching aid, as an alternative to improve students' mathematical problem-solving skills. In its implementation, teachers need to pay special attention to the review stage, because in this study, some students had not prepared by completing the homework assigned in the previous session, resulting in a less-than-optimal review of the material. Therefore, teachers need to ensure that students complete their homework, check their work consistently, and provide feedback or follow-up so that students are better prepared for the lesson. In addition, teachers should continue to encourage students' active participation in discussions and accustom them to solving problems based on Polya's steps.

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