

## **Increase Ability Solution Issues and Disposition Mathematical Middle School Students with Learning Models Cooperative Type of Trade a Problem**

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**Abstract:** Mathematics learning still uses a conventional teacher-centered learning model. Meanwhile, students are less actively involved and find it difficult to understand the questions given so their self-confidence and persistence in solving problems decreases. The research objective to be achieved is to improve problem-solving abilities and mathematical disposition in learning by using the trade a problem type cooperative learning model for junior high-level students at MTs Baitul Kirom, South Lampung for the 2023/2024 academic year. This form of research uses a Classroom Action Research (PTK) design which is carried out in 2 cycles. The subjects of this research were class VIII B students at MTs Baitul Kirom, South Lampung in 2023/2024. The research instruments used were a questionnaire on the student's mathematical disposition scale and cycle test questions. Based on the results and discussion, it can be seen that: (1) the percentage increase in problem-solving ability completion from the pre-survey was 20.97%, increasing to 51.6% in cycle 1, then increasing to 80.65% in cycle 2. (2) increase The percentage of mathematical disposition from the pre-survey was 25.8%, increasing to 64.52% in cycle 1, then increasing to 93.55% in cycle 2. Thus, there was an increase in students' mathematical problem-solving abilities and mathematical disposition from cycle I to cycle II. Based on the information above, it can be concluded: (1) The application of the trade a problem type cooperative learning model can improve the mathematical problem-solving abilities of class VIII B students at MTs Baitul Kirom for the 2023/2024 academic year. (2) The application of the trade-a-problem type cooperative learning model can improve the mathematical disposition of class VIII B students at Mts Baitul Kirom for the 2023/2024 academic year.

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### **1. Introduction**

Minister of National Education Regulation no. 22 of 2006 [1] states that one focuses on learning mathematics at the junior high school level, namely for students' ability solution problems. Peak success in learning mathematics is when students are capable solve solving problems faced. With the ability solution problems, students will more easily identify, organize, develop, and explain problem mathematics. However, what happened in the field Enough is different from what is expected and desired. Learning cooperative will give opportunities for students to study with fellow students in structured tasks [2].

Solving a problem is interpreted as an activity process which includes student methods and strategies in finish problem until find correct answer or appropriate [3]. Solving problem mathematical is something activity complex cognitive, as a process for overcoming something problems encountered and for finish it required several strategies [4]. Ability solution problems aimed at students capable think critically and creatively. With the existing ability solution problems, mathematical students expect their disposition mathematical.

Disposition is a form of growing character in self student after experience learning mathematics. Disposition mathematical usually related to How somebody thinks and does in a way math with positive way [5]. According to [6] the important development disposition mathematical is learning competence in mathematics, pupils and students need the ability to think at the math level height, attitude critical, creative and careful, objective and open, respectful beauty mathematics, and curiosity know and be happy Study mathematics.

Based on the Pre-survey conducted in class VIII B MTs Baitul Kirom Tanjung Sari obtained information, test results questioned ability solution problems that show that part big student obtained value below 70, based on trials question, not enough of the 20% who completed the pre-survey. Where is the rest Still gets a very low value or is not finished. Next, a questionnaire test was carried out on disposition mathematically and found amounting to 9.7% entered the very high category, only 5 students had it level disposition, and the rest Still in the category low even 3 of them had a level students his disposition is very low.

Results of observations and interviews with teachers at MTs. Baitul Kirom, said that learning mathematics Now using a learning model conventional teacher-centered with telling stories and

lecturing. Meanwhile, the students take notes and ask about responsibilities and assignments, but participants are not enough involved in the learning process. Students feel difficulty understanding question questions given by the teacher the question given is A little different from the example before, they are Confused about applying concepts that have been learned, trusting themselves, and having the tenacity to solve problems. Finally, student No can finish it and feel difficulty Concluding the end learning.

According to [7], learning model cooperative involves student as element main in learning so that expected student can more active in understanding something problem mathematics. Students need something that can be done give understand more related something problems in mathematics. Learning model cooperatives can practice various attitudes, values, and skills of social students, as well as invite students more active in developing knowledge, attitudes, and creativity in the atmosphere of Study teaching nature open. Trade a problem is one of the learning models that use team cooperatives to help participants educate learn and understand material learning. that model is good for studying because the average participant educates their characteristics like cooperating with friends to finish problems.

Learning cooperative Type trade a problem is the type where students in a way pair write questions and answers For topics assigned by the teacher. Then they exchange questions with group other. According to [8] with exists application of learning models cooperative type trade a problem expects student to be involved further in the learning process teach in a way effective and possibly invites students more active in learning and lots of training questions so that can increase understanding student to material. According to Kagan Spencer in [9] on learning models Trade a Problem there is PIES analysis: Positive Interdependence, Individual Accountability, Equal Participation, Simultaneous Interaction.

## 2. Research methods

Types of research This is a Classroom Action Research (PTK). In this PTK model researchers do research carried out with a method cycle repetitive. Every cycle covers four stages: planning, implementation, observation, and reflection. The implementation cycle is then based on the results from reflection on cycle 1. Cycle 2 is implemented if the learning process in cycle 1 lacks satisfaction or is not by expected results. Every end cycle held a test cycle for increased ability solution problems and disposition mathematical with indicator success that has been determined.

On research action class This subject to be taken is participant education class VIII B MTs. Baitul Kirom, Mulyo Sari, District. Tanjung Sari, South Lampung year 2023/2024 teachings with as many students as many as 31 students. Composed of 17 participants who educated men and 14 participants who Educated Women.

Data collection techniques used are tests and questionnaires, tests given from purposeful essay questions For know results learn on aspects ability solution problem mathematical participant education carried out every end cycle For measure level success student. Test questions consists of the 4 appropriate essay questions with material that has been studied in each cycle as well as the solution use stages solution problem. Whereas the questionnaire aims To collect data regarding the disposition of mathematical students. Questionnaire the given to students after learning mathematics as much 27 points appropriate statement with indicator disposition mathematical student with using a learning model cooperative type trade a problem at the end every cycle.

Stages in learning with a cooperative model type trade a problem [10], namely:

- 1) Students are formed into groups consisting of 4-5 students. Each group member has a number from 1-5,
- 2) The teacher distributes question sheets and answer sheets,
- 3) Each group member makes a question on the question sheet then the answer key on the answer sheet,
- 4) Each group exchanges questions with other groups,
- 5) Each group discusses the answers and tries to find agreement on each group's answer to each question then writes it on the back of the question sheet,
- 6) The teacher says one number. Students with these numbers in two groups exchange question sheets to explain their group's answers. And share the answers they have written previously to their group partners,
- 7) Group representatives return to their original groups. Group members discuss the answers of other groups,
- 8) All students discuss the next one.

The calculation score ends based on guidelines evaluation ability solution problem mathematical student is as follows.

$$FinalScore = \frac{obtainedscore}{maximumscore} \times 100$$

**Table 1** Classification of Mathematical Problem-solving Abilities.

Mark	Classification
$85,00 \leq Score \leq 100$	Very good
$70,00 \leq Score < 85,00$	Good
$55,00 \leq Score < 70,00$	Enough
$40,00 \leq Score < 55,00$	Not enough
$0 \leq Score < 40,00$	Very less

Source[11]

Analysis of questionnaire data scale disposition mathematical student based on results score questionnaire use formula following:

$$S_A \% = \frac{S_A}{\sum A} \times 100\%$$

Information :

$S_A$  %: Percentage of students' mathematical disposition

$S_A$ : Score obtained

$\sum A$ : Maximum score

**Table 2.** Qualification of Disposition Score Results Mathematics.

Disposition Interval	Category
$p \geq 80\%$	Very high
$60\% \leq p < 80\%$	Tall
$40\% \leq p < 60\%$	Low
$p < 40\%$	Very low

Source [12]

Indicator PTK's success size or benchmark in determining whether is *research* carried out succeeded or Not [13] mentioned that "implementation action said to succeed if the average results Study student experience improvements and criteria completeness Study student meet the targets that have been set determined in a way classic namely 75% as well obtain value  $\geq 70$ ".

ability solution problem mathematical student said increase if in the learning process seen exists enhancement amount completed students ability solution the problem with criteria 75% of total students in class, finished with mark  $\geq 70$ . Disposition mathematical students said to increase if the results instrument questionnaire show that as many as 75% of students in class reach a minimum assessment of 60%.

### 3. Results and Discussion

#### 3.1 Research Results

Study This start was held Saturday 2 December 2023 to Monday 18 December 2023 consisting of of two cycles with each cycle there were 3 meetings and each meeting took place for 2 hours of lessons (2 × 40 minutes).

Stage planning in cycles 1 and 2, 1 steps first thing to do before carrying out the learning process is to make a device consisting of learning from the syllabus, Plan Implementation Learning (RPP), Worksheets Students (LKS), questions test cycle, grid question test cycle, questionnaire disposition mathematical students, grid questionnaire disposition mathematical students, and sheets observation educators and participants educate. Then device learning the validated by validators consisting of two lecturers education mathematics at Universitas Muhammadiyah Metro, and one eye teacher lesson mathematics at MTs Baitul Kirom Tanjung Sari.

Stage implementation starting at the meeting first. At the meeting first and second, researchers share students in groups in a way heterogeneous consisting of 1-5 students. Researcher Act as a class teacher who carries out the learning process teach in accordance with scenarios and lesson plans that have been made previously. Scenarios and lesson plans are used by researchers as references or guidelines in carrying out process learning. Data teacher activity is obtained from the results observer's observations of teacher activities in apply learning model cooperative type trade a problem use sheet observation teacher activities.

Meeting third test cycles and questionnaires scale disposition mathematical students with results that use the learning model cooperative type trade a problem can increase the ability solution problem and disposition mathematical students. However the increase Not yet achieve indicator targets desired success namely 75% of the total students in class, finished with a mark  $\geq 70$ , and the assessment of students' mathematical disposition stated that 75% of students in the class achieved a minimum questionnaire assessment of 60%. The calculation

results score question test based on guidelines assigned scoring and results questionnaire scale disposition mathematical student as follows:

**Table 3** Test Question Result Data Cycle 1 Ability Solution Problem Mathematics Student Class VIII B MTs Baitul Kirom.

Mark	Frequency	Percentage	Information
$\geq 70$	16	51.6%	Complete
$< 70$	15	48.4%	Not Completed
<b>Amount</b>	31	100%	

**Table 4** Disposition Data Mathematical Students in Cycle 1

Disposition Interval	Category	frequency	Percentage
$p \geq 80\%$	Very high	5	16.13%
$60\% \leq p < 80\%$	Tall	15	48.39%
$40\% \leq p < 60\%$	Low	11	35.48%
$p \leq 40\%$	Very low	0	0%
<b>Amount</b>		31	100%

Improvements and developments achieved by students during cycle 1 are: Student scores in cycle 1 increased namely 51.6% of students who received marks  $\geq 70$ . This figure has increased and is better when compared to the pre-cycle test results, namely 21.5% of students who received a score in the "Completed" category. This also applies to the students' mathematical disposition scale, 20 students got a percentage score above 60%, a number that increased rapidly compared to the pre-assessment results where there were only 8 students who met the "High" and "Very High" categories. These results are not satisfactory and have not achieved the research target.

The reflection is carried out To use correct obstacles in cycle 1 For applied to cycle 2, including (1) Participants educate Still not enough believe self For ask about material that is not yet available understood as well as the settlement process with use steps solution problem, (2) When discussing, there are 1-2 participants students who feel not enough comfortable with his group because participant educate No used to with Study group, (3) Participants educate Not yet used to present results discussion the group at the front class. After all, participants are not enough to believe in themselves and feel Afraid will There is an error.

From the results implementation cycle 2 is known as student experience enhancement.

**Table 5** Test Question Result Data Cycle 2 Ability Solution Problem Mathematics Student Class VIII B MTs Baitul Kirom

Mark	Frequency	Percentage	Information
$\geq 70$	25	80.65%	Complete
$< 70$	6	19.35%	Not Completed
<b>Amount</b>	31	100%	

**Table 6** Disposition Data Mathematical Students in Cycle 2

Disposition Interval	Category	Frequency	Percentage
$p \geq 80\%$	Very high	17	54.84%
$60\% \leq p < 80\%$	Tall	12	38.71%
$40\% \leq p < 60\%$	Low	2	6.45%
$p \leq 40\%$	Very low	0	0%
<b>Amount</b>		31	100%

Based on the results test question ability solution problem participant students in cycle 2 already reached the indicator success set, which is the indicator success results Study in a way classical minimum 75% of the amount participants educated with mark  $\geq 70$ . Results from the questionnaire scale disposition mathematical students filled in at meeting 3 in cycle 2, participants incoming students in the "High" category as many as 12 students with a percentage was 38.71% and the "Very High" category was 17 students with a percentage 54.84%. This figure shows that a total of 29 participants educated or 93.55% of participants have reached specified indicators. Achievement figures indicate the stated has to achieve the set targets, ie as many as 75% of students in class reach a minimum assessment of 60%.

Based on the results of implementation learning in cycle 2, the learning process using a learning model Cooperative Type Trade A Problem can increase the ability solution problems and disposition mathematical students because Already achieved the desired research targets.

### 3.2 Discussion

Study This aim For know enhancement ability solution problems and disposition mathematical students with apply the learning model cooperative type trade a problem on the material SPLDV in Class VIII- B MTs Baitul Kirom Tanjung Sari, year teachings 2023/2024.

Based on the results research, the ability solution problems for students in class VIII B in the pre-survey was still very low, with only 6 students out of 28 students. Then after learning in cycle 1 abilities solution problem, mathematics students stated an increase. Cycle 1 amount completed students increased to 16 students, or equivalent with 51.6%. Amount not yet achieved the targets set by researchers, namely  $> 75\%$  students who get grades  $\geq 70$ , so from That researcher carry out learning to cycle 2. After learning in cycle 2, the abilities solution problems students stated increased with a total of 25 students amounting to 80.65%. With This, the ability solution problems mathematics students have achieved the set target. This matter in line with what was conveyed [14] ability to solve problems is the potency of a student To finish or prove questions non-routine stories and questions. Problem no the routine is identical to the ability solution problem Because is one of the mandatory abilities owned or controlled by one person student. According to [15] the ability solution a problem is the ability for somebody to explore and come up with creative strategies To obtain knowledge to find solution to problems faced.

The following research [16], the whole student can finish the problem using the Polya model. Completion problems with the Polya model make things easier for students to finish problems. Enhancement ability solution problems students because exists application of the model learning cooperative type trade a problem where participant educate sued For participate active in learning. [10] stated that "the TAP learning model is development something type of learning model solution problem with using strategy or approach heuristic that is form Suite question which is helpful hints participant educate in find method solution problem through simplification problem". The use of learning models to trade problems can be succeed For increase their ability solution problems Because participant students who get it learning with the TAP learning model will be able solution problem mathematical better participant learners who get it learning trade problems Already used to solve problems and active in the solving process problem.

Disposition mathematical student said increase. Pre-results survey, the disposition of mathematical students Still classified as very low Because only 8 students, or 25.8 % received it mark  $\geq 60\%$ . Meanwhile, based on a scale questionnaire disposition mathematical students in cycle 1 are visible that as many as 20 or 62.52% of students complete the set targets. Amount This is considered Still Not yet achieved achievement targets scale disposition mathematical, that is 75% of students in class reach a minimum assessment of 60%. Then in cycle 2, it is seen that almost all students are categorized as complete Because as many as 29 out of 31 students amounting to 93.55% of students who received marks  $\geq 60\%$ . This figure shows that the learning process in cycle 2 has increased and has achieved the set targets. These results are by what is explained by [17], Disposition mathematical No only as attitude just but also as tendency For think and act positive.

Increasing disposition of mathematical students from cycle 1 to cycle 2 as in research [16] which says that disposition mathematical pushes students own more abilities than the rest that don't show trend disposition such as mathematics. Then, the ability will influence the formation ability in mathematics, including the ability of the student to solve problems mathematically. Because of the application of learning models cooperatively *trade problem* Where participants are enthusiastic and enthusiastic in the learning process. Students who have disposition mathematical tall show that student own interest, desire know, and power meeting in carry it out task mathematics. This is also influenced by method learning to know the method specified learning. According to [18] students who have disposition mathematical talent trust themselves in using mathematics, completing problems, reasoning, and communicating ideas on learning mathematics, assessing application mathematics to other situations in mathematics and experience daily. With *the trade-a-problem* model students feel learning is not monotonous and boring Students become braver and communicate ideas or results up front in class. And appropriate what was said by [19] Disposition of mathematical students is desire, awareness, inclination, and sincerity student For think and do in a way mathematical to finish the problem mathematics faced.

## 4. Conclusions and Suggestions

Based on the results learning that have been done stated so can taken conclusion that the application of the learning model cooperative type trade a problem can increase the ability solution problems mathematical student class VIII B Mts Baitul Kirom year teachings 2023/2024. Based on test test results cycle, the percentage

completion of the pre - test survey by 20.7% increase to 51.6% in cycle 1. Meanwhile in cycle 2 the percentage completeness increase to 80.65%. And the application of learning models cooperative type trade a problem can increase disposition mathematical student enhancement disposition obtained based on questionnaire scale disposition mathematical student can seen from percentages categorized as "Very High" and "High" or with percentage  $\geq 60\%$  in the pre-survey it was only 25.8%, increasing to 64.52%. Meanwhile, in cycle 2, the percentage of completion increased to 93.55%. Research result This can be one alternative reference for researchers in developing research similar to other materials. Research results are also expected can be wrong one alternative solution for internal teachers repair classroom learning in a way more creative and innovative so as capable increase the results study students.

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### Author Profile

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Adelia is a 2019 cohort undergraduate student majoring in Mathematics Education at Universitas Muhammadiyah Metro. She completed her bachelor's degree on time, within 4 years and 2 months, achieving a commendable GPA of 3.69. During her studies, she served as the sports coordinator for the Mathematics Education student association.

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Satrio WicaksonoSudarman has been a lecturer at Universitas Muhammadiyah Metro Foundation since 2013, teaching in the Mathematics Education program. He has been a certified educator since 2016 and currently serves as the coordinator for student affairs within the program structure. Additionally, he has been the head of the Mathematics Education program's laboratory since 2021. Outside campus duties, he acts as an assessor for the National Accreditation Board for Schools and Madrasahs in Lampung Province from 2021 to 2025.

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Dr. Sudarman is a civil servant lecturer seconded to the Universitas Muhammadiyah Metro Foundation since 1992. He obtained his educator certification in 2005 and has held various roles including Head of the Research and Community Service Institute (LPPM) and Vice Rector I at Universitas Muhammadiyah Metro. He completed his doctoral studies in 2019 and currently lectures in the master's program in Mathematics Education at Universitas Muhammadiyah Metro.

#### **Nego Linuhung,**

Nego linuhung, the career as a lecturer began in 2014 when Nego was appointed as a permanent lecturer in the Mathematics Education Program at Universitas Muhammadiyah Metro. He obtained a teaching certificate in 2017. In 2019, Nego Linuhung pursued a doctoral degree (S3) in Mathematics Education at Malang State University, funded through the Domestic Postgraduate Education Scholarship (BPPDN) from the [20] Ministry of Research, Technology, and Higher Education.