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# Development of Learning Tools Based on Realistic Mathematics Approach Using Hypercontent To Improve Ability Class VII Student Problem Solving

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**Abstract**
This study aims to 1) analyze how the level of validity, practicality and effectiveness of learning tools based on realistic mathematics approach using hypercontent to improve problem solving skills at MTs S Hajijah Amalia Sari; 2) analyzing the improvement of students' mathematical problem solving skills by using learning tools based on realistic mathematics approach using hypercontent at MTs S Hajijah Amalia Sari; 3) analyze the increase in students' learning independence by using learning tools based on a realistic mathematics approach using hypercontent at MTs S Hajijah Amalia Sari. This study uses the ADDIE development model which consists of 5 stages of Analysis, Design, Development, Implementation, Evaluation. The subjects in this study were seventh grade students of MTs S Hajijah Amalia Sari in the 2021/2022 academic year. The results showed that 1) Learning tools based on a realistic mathematics approach using hypercontent to improve problem solving and independence skills developed had met the criteria of being valid, practical and effective; 2) Improved problem-solving skills using learning tools based on realistic mathematics approach using hypercontent that has been developed seen from the N-gain value in the first trial of 0.42, increasing to 0.49 in the second trial, meaning that it is in the "medium" category;
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## 1. Introduction

Mathematics has several important objectives which are contained in the Regulation of the Minister of National Education of the Republic of Indonesia No. 22 of 2006 concerning Content Standards for Elementary and Secondary Education units regarding the objectives of each lesson. Mathematics subjects aim for students to have the following abilities: 1) understand mathematical concepts, explain the interrelationships between concepts, and apply concepts or algorithms flexibly, accurately, efficiently, and precisely, in problem solving, 2) use reasoning on patterns and characteristics. , perform mathematical manipulations in making generalizations, compiling evidence, or explaining mathematical ideas and statements, 3) solving problems which include the ability to understand problems, design mathematical models, complete models and interpret the solutions obtained, 4) communicate ideas with symbols, tables, diagrams , or other media to clarify the situation or problem. 6) have an attitude of appreciating the usefulness of mathematics in life, namely having curiosity, attention and interest in learning mathematics as well as a tenacious and confident attitude in problem solving.

The above shows that the process of learning mathematics in the classroom should receive important attention. However, the reality on the ground shows that students' mathematical abilities are not optimal or still lacking. Students' mathematical abilities that are not yet optimal can be seen from students' achievements in international mathematics competitions. This can be seen from the 2018 Program for International Student Assessment (PISA) data, in the category of mathematical ability, Indonesia is ranked 73rd out of 79 PISA participating countries (Hewi, La., Shaleh, Muh., 2020: 35). Meanwhile, based on Trends in International Mathematics and Science Study (TIMSS) (Rosnawati, 2013: 2) stated that Indonesia's average achievement in TIMSS 2011 was 386 which means it is at a low level and has decreased from the average achievement in TIMSS 2007 which is 397 , where the 2011 TIMSS framework is no different from the 2007 TIMSS framework.

This proves that the level of intelligence and ability of Indonesian students in solving math problems or problems is still low and has decreased. Indonesian students master more routine questions, simple computations, and measure knowledge of facts in daily contexts. Therefore, it is necessary to strengthen the ability to integrate information, draw conclusions, and generalize knowledge to other things. This shows that students do not yet have the ability to solve non-routine problems or questions that are required to think higher. Thus, one of the things that need to be developed is the ability to think high order (High Order Thinking Skills).

According to (Saputra, 2016: 91) High Order Thinking Skills (HOTS) is a thinking process of students at a higher cognitive level developed from various cognitive concepts and methods and learning taxonomies such as problem solving methods, bloom taxonomy , and the taxonomy of learning, teaching, and assessment. These

 

higher order thinking skills include problem-solving abilities, creative thinking skills, critical thinking, argumentation skills, and decision-making abilities (Dinni, 2016). In line with the general objectives of learning mathematics formulated by the National Council of Teacher Mathematics (2000), namely: (1) learning to communicate (mathematical communication); (2) learn to reason (mathematical reasoning); (3) learning to solve problems (mathematical problem solving); (4) learn to link ideas (mathematical connection); (5) the formation of positive attitudes toward mathematics (Somakin, 2010).

One of the high-level abilities studied by researchers is problem solving ability. According to Rohmah & Sutiarso (2017) in their research that problem solving is an interaction between knowledge and error that uses the process of applying cognitive and affective factors in problem solving. (Cockcroft WH, 1986) states that the heart of mathematics is problem solving. Problem solving ability is the main focus in learning mathematics. Mathematics is only useful to the extent that it can be applied to certain situations, and the ability to apply mathematics to various situations is called problem solving ability.

Problem solving ability is very important in everyday life, because we will never be free from problems. The importance of problem solving skills is in line with In"am's (2014) opinion that problem solving is a mental process that requires a person to think critically and creatively, to look for alternative ideas and specific steps to overcome any obstacles or shortcomings. Furthermore, Ruseffendi (Effendi, 2012) states that problem-solving skills are very important in mathematics, not only for those who will later study or study mathematics, but also for those who will apply it in other fields of study and in everyday life.

From some of the opinions above, problem solving skills should be of particular concern, seeing its very good role in developing students' intellectual potential. However, in reality, students' problem solving abilities are still low. In Rohmah & Sutiarso's research (2017) said that the factors that cause errors when viewed from the difficulties and student learning abilities are described as follows: 1) Students are not able to absorb information well, 2) Lack of student experience in working on difficult questions, 3) Students do not understand the material carefully, 4) Weak ability of the prerequisite concept, 5) Negligence or carelessness of students (in the working process).

Marzuki (2012) in his research also revealed that the initial problem-solving ability of students, of 66 students, 60 students or 90.90% got a very poor score and only 6 people or 9.09%, who had a sufficient category score. This shows that the problem solving ability of students is still very low. In line with the initial research conducted by Saragih and Habeahan (2014) which states that in problem solving, it is often found that students only focus on the final answer without understanding how the answer process is correct or not. The result that often appears is that the student's answer is wrong.

From this data, it can be seen that students only focus on the final answer so that the process of understanding how to plan and solve problems is not considered which causes students' answers to be wrong. Problem solving ability is still low based on observations made by researchers on Thursday-Friday, 19-20 August 2021 in class VIII MTs S Hajijah Amalia Sari. The low mathematical problem solving ability of students can be seen from the results of diagnostic tests in the form of quadrilateral problem solving problems.

Based on the results of student answers obtained, namely from 32 students who were given this question, when viewed from the problem-solving scoring guidelines on the aspect of understanding the problem with achievement indicators, writing was known and asked correctly and completely there was only 1 person, writing down what was known and asked correctly. but 2 people did not complete, wrote down what was known and asked by 5 people, did not write down what was known and asked by 8 people, and 16 people did not give an answer at all.

In the planning aspect of problem solving, there are no students who use procedures that lead to correct answers, who use strategies that lead to wrong answers or do not try other strategies, there are 3 people, who use strategies that are less implementable and cannot be continued, there are 7 people, who use strategies There are 8 people who are not relevant and who do not provide an answer at all there are 14 people.

In the aspect of solving the problem, there are no students who write the results and procedures correctly, those who write the results are partially wrong (only calculations) there are 3 people, who write procedures that lead to the correct answer, there are 4 people, the final result of the calculation is wrong there are 7 people and those who don't give answers altogether there are 18 people.

Apart from solving students' problems that are lacking, namely the learning approach used by the teacher is still said to be an ordinary or conventional learning approach. In accordance with the results of the researcher's interview with one of the mathematics teachers at MTs S Hajijah Amalia Sari on Wednesday, June 23, 2021, he said that the learning activities took place as usual, the teacher explained the material and students listened to the teacher's explanation, followed by giving practice questions. Learning activities cannot be carried out in accordance with the existing RPP, the most important thing is that the explanation of the material reaches students and students can absorb the knowledge given by the teacher.

In line with the research of Maulydia, et al (2017) that teachers do not involve students in the learning process. The teacher still uses the usual form of learning, which is explaining with little interaction to give

 

examples of questions and rather than giving exercises. It can make students become accustomed to solving problems.

The conventional approach used by teachers can be quickly prepared, because they are used to implementing it. The impact is that students cannot hone their thinking power, and only use ordinary methods. This makes it difficult for students to develop their ability to express creative ideas and tend to be dependent on the presence of the teacher in solving the mathematical problems they face. Students do not feel challenged to explore their thinking abilities more deeply.

To address the problems that occur in the field in the process of learning mathematics in schools, especially in mathematical problem solving abilities and student learning independence which results in low mathematics learning outcomes, teachers must make efforts to improve these conditions. Efforts made include improving learning tools.

Based on the statements and observations of researchers in the field, one of the causes of the low problem-solving ability and independent learning of students in schools is the teacher's learning tools that are not adequate for students to improve their abilities so that the learning carried out is less effective. This statement was revealed based on the researcher's interview with the mathematics teacher at MTs S Hajijah Amalia Sari on Wednesday, June 23, 2021, revealing that: 1) In addition to being less than optimal in preparing lesson plans, teachers also do not really understand the appropriate model or approach used to increase interest and motivation. students' motivation to learn mathematics, because it is not necessarily in accordance with the character of students 2) there is no use of LKPD at the school, only with teacher books and student books.

Responding to the problems that exist in learning mathematics as described above, especially those related to mathematical problem solving abilities, student learning independence, approaches to learning and learning tools. So it is necessary for teachers or researchers to choose models, approaches, strategies and learning methods. In line with research by Laurens, et al (2017) that it is important for teachers to develop more appropriate learning media, strategies, or learning models, which are more in line with the learning material or with the contexts faced by students.

One of the mathematical strategies based on the mathematization of everyday experiences and applying mathematics in everyday life is the Realistic Mathematics Learning (PMR) approach. Realistic Mathematics Education (RME) or Realistic Mathematics Learning (PMR) is a theory of teaching and learning in mathematics education. RME theory was first introduced and developed in the Netherlands by Hans Freudenthal. RME was developed and piloted in the Netherlands and proved successful in stimulating students' reasoning and thinking activities (Hobri, 2009). This theory refers to the Freudental opinion (Ningsih: 2014) which says that mathematics must be associated with reality and mathematics is a human activity. This means mathematics must be close to students and relevant to real everyday life.

In the Realistic Mathematics Approach (PMR), mathematics is not seen as a "finished" science or field of study, but is seen as something that must be constructed by students themselves. The Realistic Mathematics Approach (PMR) places the reality and environment of students as the starting point for learning. Learning does not start from definitions, theorems, or properties and is then followed by examples, but the properties, definitions, theorems are expected to be discovered by students themselves. Thus, it is clear that in realistic mathematics learning, students are encouraged or challenged to actively work and are even expected to construct or build their own knowledge to be obtained.

In addition, the PMR approach also has a direct impact on increasing mathematical problem solving abilities and student learning independence. In line with the research of Fauzan and Yerizon (2013), that the RME approach has a better effect than the conventional approach in improving students' problem solving and reasoning abilities, and the RME approach is more effective for independent learning. In Harahap's research, et al (2017) stated that students' problem-solving abilities increased by using PMR. This can be seen from the percentage of classical completeness in the first trial of 85.71% and the second trial of 90%. Very positive student response with a percentage of 80%. Similar to the research of Maulydia et al. (2017) that learning using PMR students' problem solving abilities increased and students responded positively. Zakaria and Muzakkir (2017) stated in their research that the RME approach is the right method to improve the quality of the teaching and learning process.

Furthermore, in the world of education as it is today, information technology has become a demand to be used and controlled by everyone, including teachers and students. So that with the information technology that continues to develop, it becomes a reference for teachers to continue to improve their innovation and creativity in the learning process and adapt technological developments to efforts to improve the quality of education. Advances in information and communication technology can provide many offers and options for the world of education in supporting the learning process. Students can find out that the material is not only limited to the stage of memory without understanding (rote learning) but learning materials can be absorbed meaningfully (meaning learning).

By considering the need for learning media for independent study that can contain concept/theory material,

 

detailed explanations, and other interesting content that can build imaginative thinking, the researchers chose learning media, namely student handbooks and student worksheets using hypercontent. The advantages of using hypercontent in learning, among others, can make the learning process more interesting because it is equipped with a QR Code that makes it easier to understand the material through images and videos that are linked in the module.

This is in line with the opinion of Prensky (2004, pp. 9-10) explaining that digital natives will learn if they really want to. They know what facilities (internet) are available and they can use to achieve their desires. Through the internet, they will surf looking for as much information as possible. If they make school assignments, the information they get may exceed the demands of the task, because of the vast amount of information available in cyberspace. They are spoiled by the wide variety of available devices and applications. The QR & Barcode Scanner application is also well known to students because with this application they can learn more easily by watching learning videos on YouTube or reading a more detailed explanation on the internet by scanning the available QR Code. Students must be proficient at using QR & Barcode Scanners because this is easier than students looking for explanations on Google by typing keywords that match the learning material, because students only need to open the QR & Barcode Scanner application and then immediately scan the QR Code, the teaching materials will appear.

Hypercontent-based learning will help the digital generation in the learning process. In simple terms, hypercontent can be understood as a concept that interweaves one material and another material simultaneously in a particular digital technology program (Prawiradilaga et al., 2017). Another meaning of hypercontent is a link (link) in a virtual word (virtual world), namely by combining two dimensions such as the virtual world with the real world. So that students not only learn to use textbooks, but students can watch learning videos and read material from cyberspace by entering a link or scanning the QR Code that is already in the textbook and Student Worksheet (LKPD) using the internet via their Smartphone.

Thus, using a learning tool based on a realistic mathematics approach (PMR) using hypercontent is expected to improve problem solving abilities and student learning independence. This is what prompted researchers to conduct research with the title "Development of Mathematics Learning Devices Based on Realistic Mathematics Approach (PMR) Using Hypercontent to Improve Problem Solving Ability of Class VII Students".

## 2. Research Method

### Types of research

This research is categorized into development research using the ADDIE learning device development model. This model consists of 5 stages of development, namely Analysis (Analysis), Design (Design), Develop (Development) and Implementatiton (Implementation) and Evaluation (Evaluation).

### Research Subjects and Objects

The subjects in this study were seventh grade students of MTs S Hajijah Amalia Sari in the 2021/2022 academic year, while the object of this research was a learning device developed based on a realistic mathematical approach using hypercontent to improve students' problem-solving skills on quadrilateral material.

### Data analysis

Data Analysis of Learning Device Validity

This validation is based on the opinion of five experts and practitioners in the field of education. Based on the expert opinion, the average value for each aspect will be calculated so that the average value for the total aspect is obtained.

Data Analysis of Practicality of Learning Devices

Practical criteria by looking at opinions or responses from experts who state that learning tools using a realistic mathematical approach can be used with little or no revision. The way to give an opinion about the practicality of this learning device is to provide a learning device assessment scale along with a learning device validation sheet according to the problem-based learning model.

Implementation of learning devices, provided observation sheets (observations) during the learning takes place. The implementation of the learning activity steps is observed by an observer who has been directed previously so that he can operate the learning implementation observation sheet correctly. The observation sheet on the implementation of learning devices is made in the form of choices with a score of 1 to 5, with the provisions of a score of 5 (very good), a score of 4 (good), a score of 3 (good enough), a score of 2 (not good), and a score of 1 (not good). ).

Data Analysis of Learning Device Effectiveness

Data on the effectiveness of the learning tools developed were analyzed from: (1) data on student learning mastery, (2) achievement of learning objectives, and (3) student responses.

 

For the effectiveness of learning tools related to mathematical problem solving abilities, it is determined based on the achievement of classical student learning mastery. Minimum completeness is analyzed by considering that students can be said to be complete if the student's score individually reaches a score of 80. This 80 is the value of the Minimum Completeness Criteria (KKM) for class VII MTs S Hajijah Amalia Sari. Furthermore, a lesson is said to have been completed classically, that is, at least 85% of students who take the test have achieved a score of 80. Percentage of Classical Completeness (PKK) 85%.

**Data Collection Instruments and Techniques**

Learning Tool Validation Instruments

The learning device validation instrument is a learning device validation sheet that is used to obtain data about the quality of learning tools based on the assessment of experts. Validation sheets for lesson plans, student books (BS), and student activity sheets (LKPD). This validation sheet contains the components that are assessed including: format, language, illustrations, and content.

Mathematical Problem Solving Ability Test Instruments

The test instrument for mathematical critical thinking skills is in the form of a structured description test.

Student Response Instrument

The instrument for student responses is a student response questionnaire which is an opinion or student response to the components and learning tools developed. The technique used to obtain student response data is carried out by distributing learning independence questionnaires to students. Student responses in this study are students' opinions on interest, feelings of pleasure, up-to-date, interest, and ease of understanding learning material through learning tools developed through a realistic mathematics approach.

**Learning Media Development Procedure**

Analysis

The purpose of the definition stage is to determine and define learning needs by analyzing the objectives and limitations of the material. The activities carried out at this stage are early-late analysis, student analysis, concept analysis, task analysis, and specification of learning Objectives.Design

The basis of the preparation of the test is the analysis of the concepts described in the specification of learning objectives. The test in question is a student's mathematical problem solving test. To design a test of students' mathematical problem solving abilities, a grid of questions was made based on indicators of students' mathematical problem solving ability and their scoring reference.

Media selection activities are carried out to determine the right media for the presentation of the Quadrangle material. The media selection process using hypercontent assisted is adjusted to the results of concept analysis and task analysis. From the results of the concept analysis, students are expected to be able to understand the quadrilateral. Thus, the suitable media are visual media, namely books and LKPD.

The selection of formats for RPP, Student Books (BS), and LKPD, is adjusted to the principles. Characteristics and learning steps of realistic mathematics approach. The choice of learning format is also adjusted to the 2013 Curriculum. The RPP includes KI, KD, learning indicators, learning objectives, learning materials, learning activities, models, learning methods, learning resources, assessments, which consists of instruments, answer keys, and scoring guidelines. The activities carried out in this step are writing the initial design of the learning device which includes, Student Books, LKPD, and tests of students' mathematical problem solving abilities. This initial draft is referred to as draft 1.

Development Stage

The following details the steps taken at the development stage, namely:

Validasi/penilaian Ahli (Expert Appraisal)

In this activity an evaluation is carried out by experts in their fields. Expert validation is a technique to get suggestions for improvement as well as an assessment of the learning tools that have been produced at the design stage. The learning tools in question are all materials that have been developed at the design stage.

Trial of Research Instruments

The research instrument used in this study was a test of students' mathematical problem solving abilities and independence. Before using the research instrument, the research instrument was first tested on a class outside the sample. Furthermore, validity and reliability tests were carried out. The purpose of this stage is to produce good research instruments, in the sense that they are valid and suitable for use during field trials.

Field Trial

Field trials were conducted to obtain direct input on the learning tools that have been developed so as to produce the final tools. The learning tools were tested in schools to see the practicality and effectiveness of the learning tools that have been designed to improve students' problem solving abilities and mathematical independence.

Implementation

This activity was carried out in a limited manner in a discussion forum for mathematics subject teachers in grade

 

VII MTs S Hajijah Amalia Sari. The result of this stage is to recommend to all mathematics subject teachers in grade VII MTs S Hajijah Amalia Sari to use this device as an alternative learning on Quadrangle material.

## 3. Research result

Validation of Learning Tools Using Realistic Mathematics Approach Learning Tools that were Developed

The research instrument used in this study was a mathematical problem solving ability test. Before using the research instrument, the research instrument was first tested on a class outside the sample, then the validity and reliability were tested. The goal is to produce a good research instrument, in the sense that it is valid and usable. The results of the validity and reliability test of the instrument are described as follows:

The validity of the questions was analyzed using the product moment person correlation formula, namely by correlating the score of the item with the total score. The results of the test instrument test for students' mathematical problem solving abilities are presented in Table 1. below.

**Table 1. Validity of Items for Mathematical Problem Solving Ability**

| Question points | $r_{xy}$ | $r_{count}$ | $r_{table}$ | Interpretation |
|---|---|---|---|---|
| 1. | 0.875 | 17,04 | 0,444 | Valid |
| 2. | 0.805 | 16,48 | 0,444 | Valid |
| 3. | 0.907 | 19.68 | 0,444 | Valid |
| 4. | 0.802 | 14,68 | 0,444 | Valid |

The table is a test of the research instrument for the problem solving test for four essay questions with a significance level of 5%, dk = 20-2 = 18, obtained rtable = 0.444. If it refers to the test criteria, with the test criteria being rcount > rtable, then the problem-solving ability test can be used or is valid. Thus, based on calculations performed manually and excel, it is concluded that the problem-solving ability test can be used or is valid.

**Table 2. Learning Tool Validation Results**

| Validator | Learning Media | | | |
|---|---|---|---|---|
| | RPP | LKPD | BS | TKPKM |
| Validator 1 | RK | RK | RK | RK |
| Validator 2 | RK | RK | RK | RK |
| Validator 3 | RK | TR | TR | RK |
| Validator 4 | RK | TR | TR | TR |
| Validator 5 | RK | TR | TR | TR |

Information:
RK : Learning tools can be used with “minor revisions”
TR : Learning tools can be used “without revision”

In Table 2., it can be seen that experts and practitioners state that realistic mathematical tools can be used with little revision and no revision. So, according to the practicality criteria, the problem-based device has met the practical criteria according to the expert.

Furthermore, the practicality of the device will be tested in the field. The implementation of learning tools through a realistic mathematical approach was measured using an observation sheet on the implementation of a realistic mathematical approach. The results of data analysis on observing the implementation of a realistic mathematical approach device concluded that the achievement of the implementation level of learning tools in the first trial was included in the high category, which means that the realistic mathematics approach was practical or can applied.

Effectiveness of Learning Tools by Using Realistic Mathematics Learning Tools by using the developed . Realistic mathematics tools will be feasible to use if they can have a positive impact or significant influence on learning. Thus, the realistic mathematical approach developed must meet the effectiveness criteria, namely: (1) classical student learning completeness, namely at least 85% of students who take part in learning are able to achieve a score of 80; (2) the achievement of learning objectives of at least 75%; (3) at least 80% of the subjects studied gave a positive response to the components of the developed realistic mathematical approach; and (4) the learning time is at least the same as ordinary learning. In the first trial, all of these things have not been fulfilled, so the second trial is carried out again with a description of the effectiveness of the learning device.

The results of the students' mathematical problem solving ability showed that the students' level of completeness in the trial activity 1, namely the results obtained in the pre test there were 20 students who did not complete and 12 students who completed, while the post test results obtained 10 students who did not complete and 22 students who completed the test. problem solving skill. Students' mastery in the pretest and posttest increased due to the pretest, students had not studied the material in the questions given while in the posttest students had studied the material in the questions given using a realistic mathematical approach using hypercontent and using learning tools that had been developed. And for the percentage of classical completeness

 

of mathematical problem solving in trial 1, it can be seen that the percentage of classical completeness of students' mathematical problem solving abilities in the pre test of trial I is 62.5% (incomplete) and 37.5% (completed) while the percentage of completeness of solving ability The students' mathematical problems in the post test of the first trial were 31.25% (not complete) and 68.75% (completed).

The results of the mathematical problem solving ability in the second trial show that the average problem solving ability of students on the pre test results is 65,917 and the average problem solving ability of students on the post test results is 83,300. If categorized based on the level of problem solving ability, then the level of problem solving ability of students on the results of the pre test trial 2 obtained the results of the pretest of students' problem solving abilities, namely, no students who obtained the very high category (0%), who obtained the high category of 4 students ( 12.5%), which obtained the medium category as many as 14 students (43.75%) who obtained the low category as many as 2 students (6.25%) and as many as 12 students (37.5%) who obtained the very low category. that the percentage of classical completeness of students' mathematical problem solving abilities in Pre test trial 2 is 46.88% (incomplete) and 53.13% (completed) while the percentage of completeness of students' mathematical problem solving abilities in Post test trial 2 is 15.63 % (not completed) and 84.38% (completed).

The results of the achievement of learning time in the second trial were six meetings. When compared with ordinary learning that has been carried out so far, there is no difference between the achievement of learning time using realistic mathematics learning tools in the first trial and the achievement of ordinary learning time.

Thus, it is known that the achievement of learning time using realistic mathematics learning tools in trial II is the same as the usual learning time that has been carried out so far, namely six meetings with basic competencies: (1) explaining the properties of rectangles; (2) Solve quadrilateral problems related to flat shapes. This is in accordance with the learning time criteria, namely the achievement of the minimum learning time is the same as ordinary learning, thus the achievement of the second trial learning time has been achieved. Based on the results of the second trial data analysis, it is known that the learning tools developed have been effective.

**Improved Student Problem Solving Ability**

The analysis of increasing students' mathematical problem solving abilities in the first trial will be seen through the N-Gain from the results of the pretest and posttest of students' mathematical problem solving abilities in the first trial. The results of the N-Gain calculation on problem solving abilities can be seen in the following table:

**Table 3. Summary of N-Gain Results of Mathematical Problem Solving Ability Trial I**

| N-Gain | Interpretation | Total students |
|---|---|---|
| $g > 0,7$ | Hight | 3 |
| $0,3 < g \leq 0,7$ | Medium | 26 |
| $g \leq 0,3$ | Low | 3 |

Based on the table above, it can be seen that 3 students got N-Gain scores in the range > 0.7 or experienced an increase in learning independence in the "High" category. For students who experienced an increase in learning independence in the "Medium" category or got an N-Gain score of 0.3 < g 0.7 totaled 26 people and 6 people who got an N-Gain score g 0.3 or experienced an increase in learning independence with "Low" category.

The analysis of increasing students' mathematical problem solving abilities in the second trial will be seen through the N-Gain from the results of the pretest and posttest of students' mathematical problem solving abilities in the second trial. The results of the summary of N-Gain mathematical problem solving abilities can be seen in Table 4. below:

**Table 4. Summary of N-Gain Results of Experimental Mathematical Problem Solving Ability II**

| *N-Gain* | Interpretation | Total students |
|---|---|---|
| $g > 0,7$ | Hight | 4 |
| $0,3 < g \leq 0,7$ | Medium | 24 |
| $g \leq 0,3$ | Low | 4 |

The average N-Gain value is 0.49 if it is interpreted into the classification described in Chapter III, then the total increase in mathematical problem solving ability in the first trial obtained is in the "medium" category or with an N-Gain percentage of 49% .

Based on the table above, it can be seen that 4 students got N-Gain scores in the range > 0.7 or experienced an increase in problem solving abilities with the "High" category. For students who experienced an increase in their mathematical problem solving ability in the "Medium" category or got an N-Gain score of 0.3 < g 0.7, there were 24 people and 4 people who got an N-Gain score g 0.3 or experienced an increase in ability. problem solving with category “Low”.

 

## 4. Conclusion

Based on the results of the analysis and discussion in this study, several conclusions are put forward as follows. Learning tools in the form of lesson plans, LKPD and Student Books which were developed based on a realistic mathematical approach using hypercontent were declared valid to be used to improve problem solving abilities and student learning independence at MTs S Hajijah Amalia Sari. The average validity of the lesson plans is 4.225, the average validity of student worksheets is 4.112 and the average validity of student books is 4.139. Learning tools in the form of RPP, LKPD and Student Books which were developed based on a realistic mathematical approach using hypercontent were stated to have been practically used to improve problem solving abilities and student learning independence at MTs S Hajijah Amalia Sari. Practicality in terms of 1) The response of the expert team or validator stating that the learning tools can be used with minor revisions 2) The implementation of the learning tools on the criteria O_k=3,321 (Good). Learning tools in the form of and Student Books which were developed based on a realistic mathematical approach using hypercontent were declared to have been effectively used to improve problem solving abilities and student learning independence at MTs S Hajijah Amalia Sari. The effectiveness in terms of 1) classical completeness reached 83,300%, which had met the criteria for completeness, namely 80% of students reached the KKM. 2) Student responses to learning are very positive with gains above 80% for all students, namely 95.95%. The improvement of the problem solving ability of students at MTs S Hajijah Amalia Sari who was taught using learning tools based on a realistic mathematics approach using hypercontent was stated to increase from trial 1 to trial 2 seen from the N-Gain in trial 1 of 0.42 which increased to 0, 49 on trial 2.

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