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Application of Mathematical Problem Solving Sheets in Polya's Learning Strategy in Social Arithmetic Material

Abstract

This research is motivated by the students 'mathematical problem solving ability is still low, because mathematics learning in the classroom is not built to hone problem solving skills and the student worksheets used do not help students in honing students' mathematical problem solving skills, so the writer applies Polya's learning strategy with the help of problem solving sheet on social arithmetic material. This study aims to describe the steps of implementing Polya's learning strategy with the help of problem solving sheets in solving mathematical problems in social arithmetic material and to test mathematical problem solving skills by applying Polya's learning strategies with the help of problem solving sheets is it better than not implementing learning strategies Polya. This research was conducted using a quasi experimental method, with a population of all students of class VII Junior High School 3 Cisauk, Indonesia. The sample was selected using purposive sampling technique, namely students of class VII-6 and grade VII-7. Collecting data on students' mathematical problem-solving abilities using the final test (posttest). The results showed that Polya's learning strategy with the help of problem solving sheets on social arithmetic material was implemented properly and in accordance with Polya's steps. Based on the statistical test, it shows that the mathematical problem solving ability of students whose learning applies Polya's learning strategy with the help of problem-solving sheets is better than students whose learning does not apply Polya's learning strategy on class VII social arithmetic material at SMP Negeri 3 Cisauk, Indonesia.

Keywords: Polya's Learning Strategy, Mathematical Problem Solving Ability, Problem Solving Sheet, Social Arithmetic Material.

Introduction

Everyone needs problem solving skills in carrying out their daily life. Problems that come are various from various fields, as expressed by Holmes that people who have problem solving abilities will be able to live better lives, be able to compete in making ends meet, become better workers, and be able to master complex problems related to life daily (Madu 2017). In solving a problem, everyone is required to move quickly in solving it. Basically, everyone is actually able to

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find a way or steps in solving the problems they face, because the problems given do not exceed their limits. Things that are a problem for one person are not necessarily a problem for others, because everyone has different abilities to solve a problem. Problem solving abilities can be obtained through the learning process, one of which is by learning mathematics.

Mathematics is the basis of all fields of science that emphasize understanding rather than memorization. According to NCTM (National Council of Teachers of Mathematics) there are five standard mathematical abilities, namely, communication, representation, reasoning, proof and problem solving (NCTM in (Nurhaliza, Yurniwati, and Sumantri 2019)). Students need to master mathematical concepts and apply them in solving mathematical problems (Rosiyanti 2015)(Rosiyanti and Muthmainnah 2018). The ability to solve mathematical problems in Indonesia is still low. This can be seen from the results of an international survey, according to data from the three-year PISA (Program for International Student Assessment) survey initiated by the OECD (Organization for Economic Cooperation and Development) in 2018, for the mathematics category of 79 countries Indonesia is in position 72 with an average score of 379, below the OECD average score of 489 (Permana 2019). The factor that causes Indonesia to be in a low position in the PISA for the mathematics category is due to a lack of non-routine or high level problem solving skills. The PISA questions that were tested were contextual and understanding questions related to everyday life. PISA questions consist of 6 levels, level 6 is at the highest level to level 1 is at the lowest level. Meanwhile students in Indonesia are only accustomed to routine or low-level questions at level 1 and 2.

According to survey data from TIMSS (Trends in Mathematics and Science Study) in 2015 from 51 countries placed Indonesia in 46th position with a math score of 397 (Permana 2019). From the data from the two surveys, it can be seen that when compared to other countries, the problem-solving ability in Indonesia is very low, especially in mathematics. In the curriculum in some developed countries, problem-solving skills contribute greatly to education, one of which is solving mathematical problems. By solving mathematical problems students can practice and integrate theorems, concepts, problem solving strategies with prior knowledge (Tan 2019). Training students in solving mathematical problems is not just expecting students to solve a given problem or problem, but it is hoped that students can make solving strategies for subsequent problems and make them live everyday life related to the problem.

Given the importance of mathematical problem solving abilities, every student is made to have this ability. Solving mathematical problems is an activity of solving story problems, solving non-routine problems, and applying mathematics in everyday life (Tan 2019). Students will usually face problems if the learning material is related to solving mathematical problems, because in solving mathematical problems students need to link real life situations with mathematical ideas. In mathematics, the material that requires mathematical problem solving skills to solve problems is social arithmetic. Social arithmetic is one of the materials related to everyday life, such as buying and selling activities with elements of profit and loss being one of the concepts taught in social arithmetic material. But in the learning process, social arithmetic becomes a difficult and problematic learning material even though it is found in everyday life. If students are not able to master social arithmetic material well, then students cannot solve problems they encounter in everyday life.

Although the ability to solve mathematical problems is a competency that must be mastered by students, based on the results of observations at the State Junior High School 03 Cisauk. Indonesia in grade VII shows that learning mathematics in the classroom is not built to hone these abilities. Some teachers have not implemented mathematical problem solving as part of their mathematics learning program. Teachers still do not have the courage to solve problems in mathematics. Because the teacher is still confused about how to start and has not found an easy strategy that can be used. The teacher knows the strategy and its calculations but still has doubts about whether to carry out the strategy and the calculations used correctly to obtain a solution. As a result, students still experience difficulties if given problems related to solving mathematical problems.

In an effort to improve students' mathematical problem solving abilities, by implementing learning strategies and media can be used as an alternative that is used by teachers to involve students directly and actively in the learning process. The process of solving mathematical problem solving problems is different from the process of solving math practice questions. If a mathematical problem can be solved immediately, then the problem is not a problem (Tan 2019) (Widyasari and Rosiyanti 2018). Based on observations at SMPN 03 Cisauk. Indonesia one of the media or teacher support facilities used for practice in learning mathematics uses student worksheets. Student worksheets generally only provide a summary of the material, sample questions and practice questions. Student worksheets are assignments that provide exercises that can be completed and

solved directly using known procedures. Meanwhile, the problem is a more complex task that cannot be immediately identified and requires time to solve (Nissa 2015). So that learning using student worksheets does not help students in composing their own mathematical concepts in their thinking, so it is not appropriate for problems that require problem solving.

With this student worksheets are developed into problem-solving sheets in accordance with strategies that contain problems, information, learning activities, and problem-solving exercises for students. Problem solving sheets provide space for students to develop ideas or concepts, assist students in constructing their own mathematical concepts and provide systematic steps in solving problems. The troubleshooting sheet used is confronted with troubleshooting steps by applying Polya steps. Polya argues that in an effort to solve a problem, someone will take steps, namely understanding the problem, planning problem solving, implementing the solution plan, and checking the results again (Tan 2019)(Rosiyanti and Widyasari 2017). In addition, Polya's strategic steps are considered quite simple and systematic, so that it can make it easier for students when facing problem solving problems. Polya's strategy is also often found, especially in the world of mathematics education, so it can make it easier to provide further understanding of the Polya strategy that will be developed by researchers. By using the Polya learning strategy, the researcher wants to overcome the difficulties of students in solving problems experienced by students in social arithmetic material.

This research is supported by a research journal with the title: "The Influence of the Application of the Heuristic Strategy Model Polya on the Mathematical Problem Solving Ability of Students in Junior High School 2 Pekan Baru" which was previously carried out by Dewi (2013). This study shows that there is an influence in the application of the heuristic strategy of the Polya model and it can improve students' mathematical problem solving abilities.

Other research is supported by a research journal with the title: "Problem Solving Methods According to Polya to Develop Students' Ability in Mathematical Problem Solving in Junior High Schools" which had previously been carried out by Hadi and Radiyatul (2014). In this study, it shows that the problem-solving ability by applying problem-solving methods according to Polya is in very good qualifications and student learning outcomes improve at each meeting. Based on the above background and previous research, the writer wants to carry out research on "The application of Polya's learning strategies with the help of problem solving sheets in solving mathematical problems in social arithmetic material". From the results of Polya's learning strategy, the researcher wants to describe the steps of implementing Polya's learning strategy with the help of problem solving sheets and to test the mathematical problem-solving abilities of students who in their learning apply Polya's learning strategies with the help of problem solving sheets is it better than not implementing learning strategies Polya with the help of student worksheets.

Mathematics means science related to numbers and operational strategies used in solving problems regarding numbers (Badan Pengembangan dan Pembinaan Bahasa 2016). According to Arrahim, mathematics is a science related to symbols, logic and concepts and can train the ability to think critically, logically and confidently which is beneficial for life and other science developers (Arrahim and Amalia 2018). Mathematical learning can raise awareness of the benefits of mathematics, develop thinking skills, self-confidence, an objective and open attitude in facing an ever-changing future (Nur Sholihat, Hidayat, and Rohaeti 2018). Ability is the ability or skill that a person has in solving a problem or job at hand (Lubis 2018). Ability is a skill from birth or is the result of practice and experience (Hutabarat 2019). The ability of a person basically consists of physical abilities, namely abilities that require energy, skills and characteristics and intellectual abilities, namely abilities that require mental activity such as thinking, reasoning and solving problems (Chotimah et al. 2018). With mathematical abilities a person acquires the ability to count and measure, think logically, consistently, independently, critically and creatively, the ability to observe patterns and structures, process data, make predictions based on existing data, distinguish things that are relevant to a problem and solve problems in various situations (Hutabarat 2019).

Problems are situations faced by students who need resolution and to get answers is not immediately known (Nurhaliza, Yurniwati, and Sumantri 2019). In mathematics learning, students are basically inseparable from the problem, because in learning mathematics the success or failure of students is marked by the ability to solve the problems they face (Nyoman et al. 2015). Problem solving is a process that uses knowledge and combines it with previously obtained concepts to overcome a problem or difficulty being faced so that a desired goal is achieved (Faturahman 2015). Solving problems requires higher-order, more complex thinking processes (Lubis 2018). Problem solving ability is knowledge that involves aspects of memory, understanding, application, analysis, evaluation and an attitude of being willing to accept challenges (Faturahman 2015). Problem-solving abilities are part of mathematics because in the

learning process and the solution it allows students to gain experience using pre-existing knowledge and skills to be applied to problem solving (Fitriani et al. 2018). The importance of problem-solving skills in mathematics is explained by Branca, namely, basic abilities in learning mathematics as the main process in learning which includes methods or strategies (Prihastuti et al. 2013). Meanwhile, mathematical problem solving ability is a skill in students to be able to use mathematical activities in solving mathematical problems, in other sciences and in everyday life (Ritonga 2018). If students are able to understand the problems that occur, are able to choose the right method or strategy, and are able to apply it in problem solving, then the student is said to be able to solve mathematical problems (Rostika and Junita 2017).

Broadly speaking, indicators of mathematical problem solving abilities according to (Rostika and Junita 2017) and Kesumawati in Mawaddah and (Mawaddah and Anisah 2015) are as follows:

1. Understand the problem, identify the elements that are known, asked and the adequacy of the elements needed.
2. Develop problem-solving plans, formulate mathematical problems or compile mathematical models.
3. Implement problem solving plans, implement resolution strategies.
4. Re-check the results, explain or interpret the results according to the problem.

Polya's Learning Strategy is a method or procedure used to deliver learning material using Polya's steps, namely understanding the problem, planning problem solving, implementing the settlement plan and reviewing the results. Polya stated that solving a problem requires a way to find a way out of a difficulty in order to achieve a goal that is not easily attainable (Tan 2019). According to (Nissa 2015) there are four stages of problem solving originating from Polya's theory, including:

1. Understand the Problem

At this stage, to understand a problem students must understand the language or terms used in the problem, identify what is known and asked, determine what conditions must be met and if the information obtained is sufficient, then state or write down the problem in an operational form so that easy to solve.

2. Planning for Problem Solving

At this stage, to plan problem solving students must think about problem strategies and develop mathematical models appropriately. From the information that has been obtained, students can use their skills and knowledge to think about how to solve the problem. Students can also use previously learned knowledge to make comparisons whether a problem like this has been encountered before, or whether this problem is new to him.

3. Carry Out the Completion Plan

At this stage, it is not easy to carry out the plans that have been made. Implementing the plan can be done by completing steps one by one with diligence and thoroughness, until the results obtained are correct and there are no more steps to resolve that are left behind.

4. Recheck the Results

This stage is an important stage, although it is often overlooked in solving problems. When students have succeeded in understanding the problem, planning problem solving and implementing the plan for completion, students can review or re-examine the steps and the results of problem solving have been obtained. Because errors may always occur, therefore it is desirable to have an examination.

Learning media is a tool used in delivering learning material to facilitate the achievement of learning objectives. By using learning media students will be interested and easy to understand the material presented, so that it can increase student motivation and desire to learn and achieve learning objectives (Sri Wahyuni 2019). One of the learning aids that teachers can use is to make it easier for students to understand the material and increase student activity in the learning process by using problem solving sheets. This problem-solving sheet can guide students to find concepts so that students can solve problems, give students the opportunity to use their own discussion in concluding the results of activities carried out and expose students to problems in everyday life (Nur Prabawati et al. 2019). The problem-solving sheet is faced with the problem-solving stage using Polya's steps, namely by understanding the problem, planning problem solving, implementing the resolution plan and checking the results again. Problem solving sheets using Polya's steps are expected to provide space for students to develop ideas and provide systematic steps in solving problems so that the goal of forming problem-solving abilities will be achieved properly.

In this study, learning by applying Polya's learning strategy with the help of problem-solving sheets, the possibility of solving mathematical problems is certainly better than learning that does not apply Polya's learning strategy. Because

learning by applying the Polya learning strategy students will be given the right questions or steps, so that students are more guided in solving a given problem. Whereas learning that does not apply learning strategies in learning is only given questions with basic calculations and not given the right steps in solving mathematical problems. There can also be the possibility that learning that applies Polya's learning strategy with the help of problem-solving sheets is not better than learning that doesn't apply Polya's learning strategy, because each student has different abilities. It is likely that it will be easier to apply learning strategies to smart students than students with lower abilities. For students with low mathematical abilities, implementing learning strategies according to him can be more difficult.

Method

This research is a quasi experiment because not all variables that may have an effect can be controlled by the researcher (Armila, Asnawati, and Sutiarso 2017). The design in this study used a Posttest-only control design. The treated group is called the experimental group and the untreated group is called the control group. The treatment given to the control group was in the form of learning that did not apply Polya's learning strategy while the experimental group was given learning by applying Polya's learning strategy with the help of problem solving sheets.

Table 1.

Design Research Design

Class	Group	Treatment	Posttest
VII-6	Control	X	T
VII-7	Experiment	Y	T

Information:

X: The group did not implement Polya's learning strategy with the help of problem solving sheets.

Y: The group applies Polya's learning strategy with the help of problem solving sheets.

T: Test students' mathematical problem solving abilities.

The population taken in this study is a limited population because the data sources have clear quantitative boundaries, have members whose numbers can be determined and the members can be counted (Jaya 2019). In this study the population was class VII students covering class VII-1 to class VII-8 with a total number of 328 students, consisting of 152 female students and 176 male students at State Junior High School 3 Cisauk, Indonesia even semester of the year 2019/2020 teaching.

The sampling technique used in this study is the purposive sampling technique in which the sample selection is determined for certain reasons (Jaya 2019). The sample was taken by purposive sampling with the consideration that the selected class was taught by the same teacher so that it had the same learning experience and treatment. In this case the researcher discussed and interviewed the math teacher first and decided which two classes were taken to apply Polya's learning strategy with the help of problem solving sheets and Polya's learning strategy was not applied. In this case, two classes were sampled, namely class VII-6 as many as 40 students and class VII-7 as many as 40 students. Class selection is based on suggestions received from the teacher that the two selected classes are classes where there are several students who have problems in learning that are in accordance with the problems to be studied. Class VII-6 was given learning using Polya's learning strategy, while class VII-7 was given learning using Polya's learning strategy with the help of problem solving sheets.

Instruments are the same as the tools used to collect data. In this study, the instruments used were in the form of test instruments and non-test instruments. The test instrument used in this study was a problem solving sheet in the form of description questions. Problem solving sheets are made based on indicators of mathematical problem solving abilities in social arithmetic material which are useful for measuring students' mathematical problem solving abilities after being given treatment. The test used is in the form of a final test (posttest) given to grades VII-6 and VII-7. The non-test instrument used in this study was an observation sheet. When learning takes place, the teacher makes observations to find out the extent to which the researcher can carry out learning according to Polya's learning strategy with the help of problem solving sheets used in social arithmetic material. Before being used, the instrument was tested on other subjects.

After the learning was carried out, the students were given a final test to obtain data on the students' mathematical problem solving abilities. After obtaining the necessary data, then compiled, then carried out the prerequisite analysis test, namely the test for hormality and homogeneity. After conducting the prerequisite test, the selection and hypothesis testing were carried out.

Result and Discussion

After the research was carried out, the research data obtained were then analyzed to obtain conclusions from the results of the study in the form of a comparison of the mathematical problem solving abilities of students whose learning applied Polya's learning strategy with the help of problem solving sheets and with students whose learning did not apply Polya's learning strategy with the help of student worksheets. . In this study, the test instrument to be used was tested first consisting of the instrument validity test and the instrument reliability test. After the data is obtained, the prerequisite test is carried out, namely the normality test and the homogeneity test, then the hypothesis is tested using the t-test. Meanwhile, the non-test instrument was tested using the observation data analysis test.

The validity test was carried out in two ways, namely the expert validity test and the empirical validity test. Expert validity test, posttest questions were validated by one of the mathematics education lecturers at the Muhammadiyah University of Jakarta, Indonesia and one of the mathematics teachers in Indonesia. The validator states that the questions can be used without revision. The empirical validity test was tested on 38 students of class VIII-7 of State Junior High School 3 Cisauk who had studied social arithmetic material. The posttest consists of 5 questions to explain social arithmetic material. Furthermore, these results were tested for the validity of the test instrument using the Pearson product moment correlation coefficient. The validity test is done by calculating the correlation between the scores or question items. The results of the validity test can be seen in table 2 as follows.

Table 2.

Test Results of the Test Instrument Validity

	Problem 1	**Problem 2**	**Problem 3**	**Problem 4**	**Problem 5**
total	573	338	321	256	304
$\mathbf{r_{count}}$	0,620	0,414	0,493	0	0,410
$\mathbf{r_{table}}$	0,349	0,349	0,349	0,349	0,349
Result	Valid	Valid	Valid	invalid	Valid
Criteria	High	rather	Rather	Very low	rather

Based on the results of the analysis, it shows that of the 5 questions, question 1 with $0{,}620 > 0{,}349$, question 2 with $0{,}414 > 0{,}349$, question 3 with $0{,}493 > 0{,}349$, and question 5 with $0{,}410 > 0{,}349$ are said to be valid because $r_{count} > r_{table}$. Question 1 with high criteria and question 2, question 3, question 5 with sufficient criteria. Whereas for question 4 with $0 < 0.349$ it is said to be invalid because $r_{count} > r_{table}$, with very low criteria.

Measurement of the reliability coefficient of the test instrument used the Cronbach Alpha technique. The results of the calculation of the reliability test can be seen in table 3 as follows:

Table 3.

Test Instrument Reliability Test Results

	Problem 1	**Problem 2**	**Problem 3**	**Problem 4**	**Problem 5**
x	573	338	321	256	304
$\sum x^2$	10.385	3.702	3.287	2.048	3.008
S_i^2	3,897	4,121	2,093	0	3,750
$\sum S_i^2$	13,861				
S_t^2	35,250				
Reliability $(\mathbf{r_{11}})$	0,758				
Criteria	**High**				

Based on the results of the analysis, it shows that the test instrument is reliable because $r_{11} \geq r_{table}$ or $0{,}758 \geq 0{,}349$ and the criteria for $r_{11} = 0{,}758$ are in the interval value $0.60 \leq r_{11} < 0.80$ with high criteria. In this study the data were obtained through several methods, namely the test method, the method of observation and the method of documentation. The test method is used to measure students' ability to solve mathematical problems in social arithmetic material. The observation method is used to observe researchers in carrying out research using Polya's learning strategy with the help of problem solving sheets with social arithmetic material. While the documentation method is used to obtain data directly from the research site in the form of photographs which aim to support the research results.

Presentation of the form of research data that will be described is the analysis of the final test (posttest) which contains indicators of mathematical problem solving abilities which in learning apply Polya's learning strategy with the help of problem solving sheets in the experimental group (VII-7) by comparing mathematical problem solving abilities which in learning did not apply Polya's learning strategy with the help of student worksheets in the control group (VII-6), as well as an analysis of the results of teacher observations which contained descriptions of the steps for implementing Polya's learning strategies in solving mathematical problems with the help of problem solving sheets on social arithmetic material.

Before analyzing all the data, a description of the implementation of learning in the experimental group (VII-7) is presented which applies Polya's learning strategy with the help of problem-solving and learning sheets in the control group (VII-6) who do not implement Polya's learning strategy with the help of worksheets students. The implementation of learning carried out in six meetings can be described as follows.

Preparation Phase

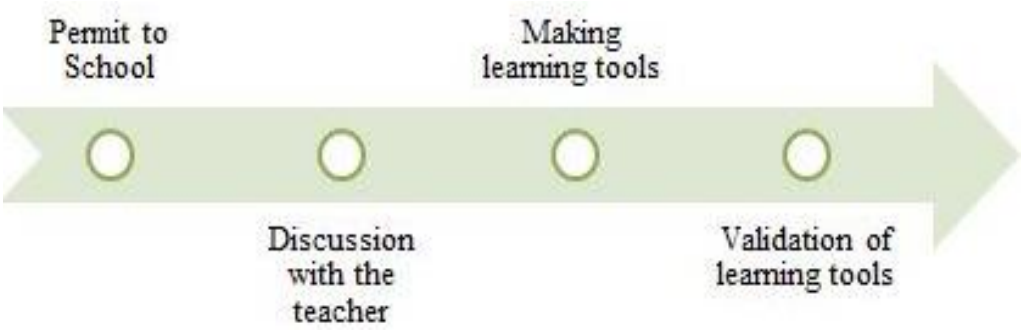

Figure 1.

Stages of Research Preparation

Starting by giving a permit to the school and consulting with the school regarding the objectives of the research that will be carried out at the school. After obtaining permission from the school, the researcher then discussed with the mathematics teacher to determine the class to be studied. Next, the researcher prepares a Learning Implementation Plan, then makes student worksheets for the control group (VII-6) and problem-solving sheets for the experimental group (VII-7). Where the differences in this worksheet are found in the problem solving steps, the problem solving sheet applies the Polya steps, while on the worksheet students do not apply the Polya steps, but the questions and material given are the same. Before being applied to students, the student worksheets and problem-solving sheets have been validated by one of the mathematics education lecturers in Indonesia. Then the researcher made posttest questions and made an observation sheet to be filled in at each meeting.

Implementation Stage

This meeting was held six times, consisting of five meetings to implement Polya's learning strategy with the help of problem solving sheets for social arithmetic material and one meeting to conduct a posttest. In each meeting, in the experimental class (VII-7), the first step is to understand the problem, students are asked to observe and understand activity 1 contained in the problem-solving sheet on story questions 1, 2 and 3. The researcher gives students the

opportunity to search as much as possible. Perhaps the known information on each problem and needed in problem solving. The following is a picture of the work of students in the experimental group (VII-7) and the control group (VII-6).

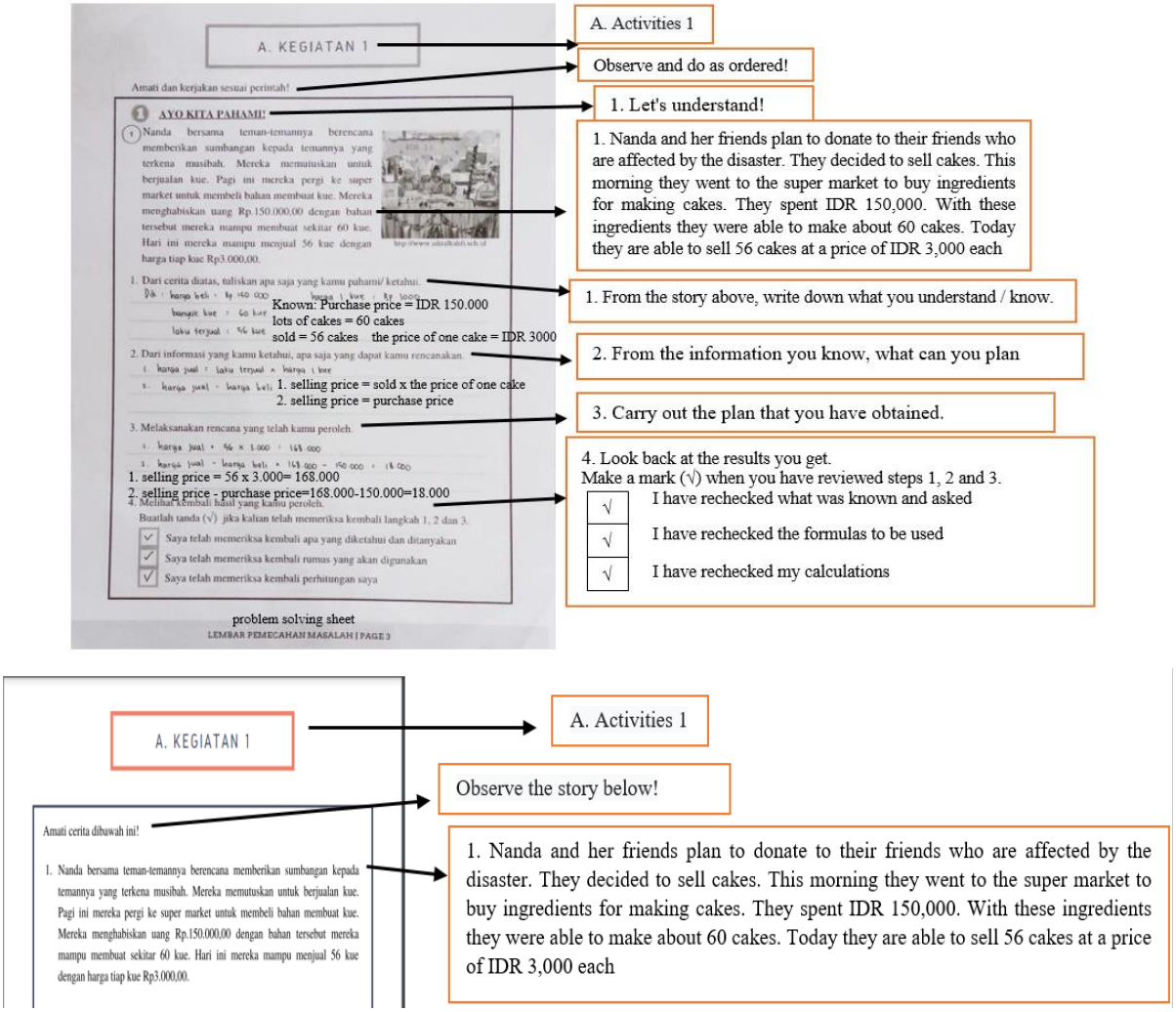

Figure 2.

Comparison of Problem Solving Sheets and Student Worksheets

In Figure 2, in the experimental class (VII-7), the first step is understanding the problem, students are asked to observe and understand the problem by writing down what is known and what is being asked in the question. The second step is planning problem solving, students are asked to find and determine formulas related to what is known and asked to solve the problem. The third step is carrying out the completion plan, students are asked to work on and solve the problem using the formula that was previously planned. The fourth step is to review the results, students are asked to review or check whether in understanding the problem, planning problem solving, and implementing the solution plan is correct and there are no mistakes, after everything is correct students are asked to fill in the available checklist column. During the learning process, students are asked to be more active in conveying their thoughts in discussions, students are also asked to identify and solve existing problems. Then the researcher asked the students whether there was something that was not understood and the students were given the opportunity to ask questions. Whereas in the control group (VII-6), the first activity students were asked to read the material contained in the student worksheets.

Each meeting, students work on the practice questions contained in the problem solving sheet

for the experimental group and student worksheets for the control group. In solving the problem, the steps used begin with determining what is known and asked, then determining the formula to be used, followed by working on and completing calculations. At the sixth meeting, the experimental group (VII-7) and the control group (VII-6) will hold a final test (posttest) of social arithmetic material with the same questions.

The students' final test data were processed, tested for analysis prerequisites, and tested hypotheses. The results of the normality test can be seen in table 4 as follows:

Table 4.

Results of Normality Test of Students' Mathematical Problem Solving Ability

	Control Group	**Experiment Group**
χ^2_{Count}	6,7548	5,5966
χ^2_{table}	7,815	7,815
Decision	Ho accepted	H Ho accepted
Conclusion	Normal	Normal

Based on table 4, the results of the control group normality test (VII-6) obtained a value of χ^2_{count} , namely $6{,}7548$. To get the value $\chi^2_{\text{table}} = 7{,}815$. Because $\chi^2_{\text{count}} \leq \chi^2_{\text{table}}$ is $6{,}7548 \leq 7{,}815$, so Ho is accepted and Ha is rejected. So it can be concluded that the data on students' mathematical problem solving abilities in the control group (VII-6) is normally distributed. While the normality test for the experimental group (VII-7) obtained a value of χ^2_{count}, namely $5{,}5966$. To get the value $\chi^2_{\text{table}} = 7{,}815$. Because $\chi^2_{\text{count}} \leq \chi^2_{\text{tabel}}$ is $5{,}5966 \leq 7{,}815$, so Ho is accepted and Ha is rejected. So it can be concluded that the data on students' mathematical problem-solving abilities in the experimental group (VII-6) is normally distributed.

After processing the normality test, then the homogeneity test, the results of the homogeneity test can be seen in table 5 as follows:

Table 5.

Homogeneity Test Results of Students' Mathematical Problem Solving Ability

	Control Group	**Experiment Group**
Average	50,48	65,20
Variance	230,05	158,68
$\mathbf{F_{count}}$	1,45	
$\mathbf{F_{table}}$	1,757	
Decision	Ho accepted	
Conclusion	Homogeneous	

Based on table 5, the results of the homogeneity test show that the variance of the two sample groups above is $\text{F}_{\text{count}} \leq \text{F}_{\text{table}}$, namely $1{,}45 < 1{,}757$, so that Ho is accepted and Ha is rejected. So it can be concluded that the variance of the two samples is homogeneous.

Based on the prerequisite analysis test, the final data for the control group (VII-6) and the experimental group (VII-7) were normally distributed and had a homogeneous variance. Then proceed with data analysis using t-test to determine the comparison of the implementation of Polya's learning strategy with the help of problem solving sheets in solving mathematical problems of social arithmetic material. The results of hypothesis testing can be seen in the following table.

Table 6.

Hypothesis Test Results of Students' Mathematical Problem Solving Ability

	Control Group	**Experiment Group**
Average	$\overline{\text{X}_1} = 50{,}48$	$\overline{\text{X}_2} = 65{,}20$
Variance	$\text{S}_1^2 = 230{,}05$	$\text{S}_2^2 = 158{,}68$
$\mathbf{t_{count}}$	$-4{,}72$	
$\mathbf{t_{table}}$	$-1{,}994$	
Decision	Ho was rejected	
Conclusion	There are differences in solving abilities students' mathematical problems in the experimental group and the control group	

Based on table 6, the results of the hypothesis test show that$-\text{t}_{\text{count}} \leq -\text{t}_{\text{table}}$, namely $-4.72 \leq -1.994$, so that Ho is rejected and Ha is accepted. So it can be concluded that there is a comparison of mathematical problem solving abilities between students in the control group (VII-6) who in their learning did not apply Polya's learning strategy with the help of student worksheets with students in the experimental group (VII-7) who in their learning applied Polya's learning strategy with the help of sheets solution to problem.

Conclusion

Based on the research the results of hypothesis testing obtained diperoleh of -4.72. And t_{table} $1{,}994$. So it can be concluded that $-\text{t}_{\text{count}} < -\text{t}_{\text{table}}$ or $-4.72 < -1{,}994$, then Ho is rejected and Ha is accepted. Thus, the mathematical problem solving ability of students whose learning implements Polya's learning strategies with the help of problem solving sheets is better than the mathematical problem solving

abilities of students whose learning does not apply Polya's learning strategies with the help of student worksheets on class VII social arithmetic material at State Junior High Schools. 3 Cisauk, Indonesia.

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