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Research Article

Logan Avenue Problem Solving Learning Model (Laps-Heuristic) on Mathematics Learning Outcomes of Class VII Students at Wusto Imam An-Nasai Gowa

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Abstract: This study examined the effectiveness of applying the Logan Avenue Problem Solving (LAPS-Heuristic) learning model on mathematics learning outcomes among Class VII students at Wusto Imam An-Nasai Gowa using a one-group pretest–posttest design. The population consisted of all seventh-grade students enrolled in the even semester of the 2024/2025 academic year. A learning outcome test was employed as the primary research instrument to measure students' performance before and after the implementation of the learning model. The data analysis involved descriptive statistical methods combined with gain tests to assess the extent of improvement. The findings revealed that students' mathematics achievement fell predominantly within the very high category, with 53.85% of learners classified in this range, indicating a notable increase in category levels compared to their pretest performance. Furthermore, the percentage of students who successfully met the required minimum competency standards after the application of the LAPS-Heuristic model reached 96.15%. This outcome clearly illustrates that the vast majority of students—over 85%—achieved or exceeded the established passing threshold, suggesting that the integration of the LAPS-Heuristic approach was highly effective in enhancing mathematics learning outcomes. Overall, the results underscore that the LAPS-Heuristic learning model can serve as a practical and impactful strategy to improve student engagement, comprehension, and mastery of mathematical concepts in junior high school settings.

Keywords: Effectiveness; Heuristics; Learning Outcomes; Mathematics Education; Problem Solving.

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1. Background

The educational process is inseparable from the development process itself. Development is directed and aimed at developing quality human resources, and the development of economic sectors is interconnected and occurs simultaneously. Discussing education is, of course, inextricably linked to all the efforts that must be made to develop quality human resources. Quality human resources are defined through education (Hamalik, 2013:1).

In today's education world, most students are unable to connect what they learn with how that knowledge will be used. Students struggle to grasp academic concepts as they are typically taught, using abstract concepts and lecture methods. Yet, they desperately need to understand concepts related to the workplace and society in general where they will live and work. Therefore, teachers must be able to create a conducive atmosphere and make learning effective and enjoyable. In innovative learning, the methods used are no longer monotonous but rather flexible and dynamic, thus meeting the needs of students as a whole. One method that can be used in innovative learning is discussion. The discussion method is a method of delivering teaching materials that involves students in discussing and finding alternative solutions to problematic topics (Shoimin, 2014:18).

Problem solving in the heuristic method can be solved using a systematic method called LAPS (Logan Avenue Problem Solving), namely the problem is defined as a non-routine problem, the solution of which is not yet known, then a way is sought. Enter to find the key to finding or finding a solution. To solve it, the question words used are: what is the problem, are there alternatives, is it useful, what is the solution, and how best to do it. In this process, students are taught to solve through four stages. These stages start from the stage of understanding the problem, making a plan, the system of work, to the stage of evaluating the answers they have worked on. Starting from a problem that is not yet known how to solve, students will be carried away by a flow of curiosity, which will foster their learning motivation. The subject matter will be remembered longer, because in solving the problem, students seek references and find their own solutions. Based on the description of the background of the problem, the researcher is motivated to conduct a study entitled "The Effectiveness of Applying the Logan Avenue Problem Solving Learning Model (Laps-Heuristic) on Mathematics Learning Outcomes in Grade VII Students of Wusto Imam An-Nasai Gowa ".Based on the description that has been put forward in the background section, the following problems are formulated:Logan Avenue Problem Solving (Laps-Heuristic) learning model on mathematics learning outcomes in Class VII Wusto Imam An-Nasai Gowa students?.

2. Theoretical Study

2.1. Understanding Learning

According to Gagne (Suprijono, 2013:2), learning is a change in disposition or ability that a person achieves through activity. This change in disposition is not obtained directly from a person's natural growth process.

2.2. Understanding Learning

In his book entitled Cooperative Learning, Suprijono (2013:13) states that learning, based on its lexical meaning, means the process, method, and act of learning. In learning, teaching is defined as the teacher's efforts to organize the learning environment. From a learning perspective, teaching is the teacher providing learning facilities for students to learn. Therefore, the subject of learning is the student. Learning is student-centered. Furthermore, learning should be a meaningful activity, namely the liberation to actualize all human potential, not the other way around. Learning must foster an atmosphere such that students actively ask questions and express ideas.

2.3. Learning Effectiveness

Supardi (2015:164) states that effectiveness is an effort to achieve predetermined goals according to needs and plans, using available data, resources, and time to obtain maximum results, both quantitatively and qualitatively. Effectiveness is the relationship between stated goals and results, and indicates the degree of conformity between stated goals and achieved results. Learning effectiveness is nothing other than a learning effort that is based on the criteria of attractiveness or utility, meaning that by utilizing a set of hidden characteristics, teachers help students achieve learning goals. In other words, effectiveness is one indicator of a good learning process.

2.4. Mathematics Learning Outcomes

Learning outcomes can be explained by understanding the two words that form them: "results" and "learning." The term "result" refers to an achievement resulting from an activity or process that results in a functional change in input (Purwanto, 2013:44). Meanwhile, according to Reber (Suprijono, 2013:3), learning is the process of acquiring knowledge. Learning is the process of gaining knowledge.

Evaluation at the end of the activity Study teach What is commonly called a learning outcome test is conducted to determine the level of student success. Learning outcomes are used as a measure to determine the extent to which students have mastered the material that has been given. According to Gagne (Purwanto, 2013: 42), learning outcomes are the formation of concepts, namely categories that we give to existing stimuli in the environment, which provide an organized scheme for assimilating new stimuli and determining relationships within and between categories. According to Bloom (Suprijono, 2013: 6), learning outcomes include cognitive, affective, and psychomotor abilities. The cognitive domain is knowledge (knowledge, memory), comprehension (understanding, explaining, summarizing, examples), application (applying), analysis (describing, determining relationships), synthesis (organizing, planning, forming new structures), and evaluation (assessing). The affective domain are receiving, responding, valuing, organization, and characterization . The psychomotor domain includes initiatory, pre-routine, and routine skills. Psychomotor skills also include productive, technical, physical, social, managerial, and intellectual skills. In his book, Arifin (2012: 298) states that learning outcomes are the result of an interaction between learning and teaching. From the teacher's perspective, teaching ends with an assessment of learning outcomes. From the student's perspective, learning outcomes are the end of the experience and the culmination of the learning process.

2.5. Logan Avenue Problem Solving Learning Model (Laps-Heuristic)

A learning model is a pattern used as a guideline in planning learning both in and outside the classroom. According to Arenda (Suprijono, 2013:46), a learning model refers to the approach to be used, including learning objectives, the learning environment, and classroom management. A learning model can be defined as a conceptual framework that describes systematic procedures for organizing learning experiences to achieve learning objectives. Through learning models, teachers can help students acquire information, ideas, skills, ways of thinking, and express ideas. Learning models also serve as guidelines for teachers in planning teaching and learning activities.

The Logan Avenue Problem Solving learning model is a series of guiding questions in problem solving. LAPS (Logan Avenue Problem Solving) usually uses the question words what is the problem, are there alternatives, are they useful, what is the solution, and how best to do it (Shoimin, 2014:96). Then according to (Ngalimun, 2016:244) LAPS-Heuristic is a series of guiding questions in the context of problem solving. LAPS (Logan Avenue Problem Solving) with the question words what is the problem, are there alternatives, are they useful, what is the solution, and how best to do it. The steps in the Logan Avenue problem solving learning model that must be carried out (Shoimin, 2014:97) are: (1) understanding the problem; (2) planning the solution; (3) solving the problem according to the second step plan; (4) checking the results obtained (looking back).

Logan Avenue Problem Solving learning model has several advantages (Shoimin, 2014:97), including the following:can arouse curiosity and motivation to be creative; (2) besides having knowledge and skills,requires the ability to skillfully read and ask correct questions; (3) produce original, new, unique and varied answers and can add new knowledge; (4) can improve the application and knowledge that has been obtained;(5)invites students to have problem-solving procedures, are able to make analyses and syntheses, and are required to make evaluations of the results of their solutions; (6) is an important activity for students who involve themselves, not just in one field of study but (if necessary) in many fields of study.Besides having advantages as stated above, the Logan Avenue problem solving learning model also has several disadvantages (Shoimin, 2014:97-98), namely: (1) when students do not have interest or do not believe that the problem being studied is difficult to solve, they will feel reluctant to try; (2) the success of the learning strategy requires sufficient time for preparation; (3) without understanding why they are trying to solve the problem being studied, they will not learn what they want to learn.

3. Research Method

The research design used was a one-group pretest-posttest design. It was developed by: 1) administering a test to measure the variables before the treatment was administered (pretest), administering treatment to the subjects (variable x) and 3) administering another test to measure the dependent variable after the treatment (posttest). Differences caused by the experimental treatment are determined by comparing pretest and posttest scores obtained

from the same or relatively similar measuring instruments (Sudjana and Ibrahim, 2012:35). The research design is as follows:

Table 1. one group pretest – posttest design.

Pretest	treatment	posttest
o_1	x	o_2

(Sudjana and Ibrahim, 2012:35).

3.1 Population and Sample

The population in this study was all students of Class VII Wusto Imam An-Nasai Gowa in the even semester of 2024/2025 . Because the population consisted of only one class, the entire population was used as the research sample.

3.2. Treatment Design

The steps or stages taken by researchers when implementing the Logan Avenue Problem Solving (Laps-Heuristic) learning model are: (a) The researcher presents the lesson material. (b) Researchers divided students into random groups, each consisting of 5-6 members. (c) Researchers distributed Group Worksheets (LKK) to be solved by the formed groups through reading books, research, asking questions, and discussing. First, the researchers encouraged students to understand the problem, followed by formulating questions for both students and researchers to guide them in solving the problem. The researchers then implemented the solution plan and reviewed the solutions obtained. (d) The researcher asked each student to determine temporary answers to the LKK questions from the data they obtained. (e) The researcher asked the students to re-test their temporary answers with their group members to get the most correct answer. (f) The researcher asked the students to draw conclusions, namely the students had to come to a conclusion about the final answer to the LKK questions and write it down to work on the answer sheet provided. (g) Researchers help students reflect and evaluate the discussions and processes they use by randomly appointing several students to represent their groups to work on the whiteboard and then discuss them together. (h) Drawing conclusions means that students must come to a final conclusion about the answer to the problem.

Instrument Type

The instrument used in this study was a learning outcome test. This test was intended to determine the level of student learning achievement on the material taught using the Logan Avenue Problem Solving (Laps-Heuristic) learning model, the learning outcome test consisted of 5 numbers of questions, namely the test before being given treatment and 5 numbers of questions for the test after being given treatment, with the provision that the difficulty of both tests was relatively the same/identical (Sudjana and Ibrahim, 2012:35). The weight range for each test was 0 to 100. This test was intended to determine the average increase in student learning outcomes on the material taught.

Other instruments used are student activity observation sheets, student response questionnaires, and learning implementation.

Instrument Validation

Before the test instrument was used at the research location, it was first validated by a lecturer from the mathematics education department of STKIP-YPUP as validator I and a mathematics subject teacher from Class VII Wusto Imam An-Nasai Gowa as validator II.

3.3. Data Analysis Techniques

The data analysis technique used in this study is descriptive analysis and gain test techniques.

Descriptive Analysis

Learning outcomes

Mathematics learning outcome scores obtained from student learning outcome tests. For analysis purposes, frequency distribution tables, mean, standard deviation, median, mode, range, and ideal score were used.

Data in the form of learning outcomes are then categorized qualitatively based on techniques according to categorization (Adaptation Arikunto, 2013:281), namely:

Table 2. learning outcome categories.

Mastery Level	Learning Outcome Categories
80-100	Very high
66-79	Tall
56-65	Currently
40-55	Low
0-39	Very low

Student activities in learning

Data from observations of student activities were analyzed quantitatively and qualitatively. Quantitative analysis was carried out by determining the frequency percentage.

The steps for analyzing student activities are as follows: (a) Determine the frequency of student activity observation results for each activity in one meeting. (b) Find the percentage of student activity frequency by dividing the frequency by the total frequency for all indicators, then multiplying by 100%.

$$\textbf{Percentage} = \frac{\textbf{jumlah skor pilihan "Ya" yang diperoleh}}{\textbf{jumlah skor total pilihan "Ya"}} \times \textbf{100\%}$$

If 0%-20% of students carry out the indicators asked, the observer ticks No, and if 80%-100% of students carry out the indicators asked, the observer ticks Yes.

Table 3. student activity categories.

Percentage (%)	Category
$90 < x \leq 100$	Very good
$75 < x \leq 90$	Good
$60 < x \leq 75$	Not good
$40 < x \leq 60$	Not good
$0 \leq x \leq 40$	Very bad

(Source: Nurkencana in Natalia, 2016:35)

Student Response

Data on student responses were obtained from a student response questionnaire regarding learning activities, then analyzed quantitatively and qualitatively. The activity carried out to analyze student responses was to count the number of students who responded according to the aspects asked and then calculate the percentage. The steps for analyzing student responses are as follows: (a) Determining the frequency of student response observation results. (b) To find the percentage of student response frequency, divide the frequency by the total frequency for all indicators, then multiply by 100%.

$$\textbf{Percentage} = \frac{\textbf{jumlah skor pilihan "Ya" yang diperoleh}}{\textbf{jumlah skor total pilihan "Ya"}} \times \textbf{100\%}$$

Table 4. student response categories.

Percentage of student responses (100%)	Category
$90 < x \leq 100$	Very positive
$75 < x \leq 90$	Positive
$60 < x \leq 75$	Quite positive
$40 < x \leq 60$	Less positive
$0 \leq x \leq 40$	Very less positive

(Source: Nurkencana in Natalia, 2016:35)

Implementation of learning

Learning implementation is data on the researcher's achievements in providing treatment in the classroom, ensuring that the learning process truly aligns with the expected conditions and processes. In this study, learning implementation is considered successful if the activities have been carried out during the learning process at least well.

The steps for quantitative analysis of learning implementation are as follows: (a) Determine the frequency of the results of observations of researcher activities for each

activity. (b) To find the percentage of frequency of learning implementation, divide the frequency by the total frequency for all indicators, then multiply by 100%.

$$\textbf{Percentage} = \frac{\textbf{jumlah tanda cek pada kolom "ya"}}{\textbf{jumlah total tanda cek}} \times \textbf{100\%}$$

The categorization of implementation is in accordance with the following table:

Table 5. categorization of learning implementation.

Average score	Category
$91 < x \leq 100$	Very good
$75 < x \leq 91$	Good
$30 < x \leq 75$	Currently
$25 < x \leq 50$	Not enough
$0 \leq x \leq 25$	Very less

(Source: Arikunto in Natalia, 2016:36)

Gain Test

This gain test was conducted to determine the effectiveness of the Logan Avenue Problem Solving learning model in mathematics learning outcomes. This can be done by calculating the average value of students' mathematics learning outcomes in the sample class from the pretest and posttest using the normal gain formula (Adapted by Hake in Sundayana, 2015:151).

$$N_{gain} = \frac{\textbf{skor posttest} - \textbf{skor pretest}}{\textbf{skor ideal} - \textbf{skor pretest}}$$

With the interpretation of N- gain as follows:

Table 6. Interpretation of Normalized Gain.

Gain Coefficient	Interpretation
$0.00 < g < 0.30$	Low
$0.30 \leq g < 0.70$	Currently
$0.70 \leq g \leq 1.00$	Tall

3.4. Effectiveness Criteria

Because effectiveness is a standard or level of achievement of a goal with a previously determined plan, it is necessary to apply effectiveness criteria in this research by referring to:The mathematics learning outcomes score of Class VII Wusto Imam An-Nasai Gowa students after applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model classically was 85%, reaching the KKM, which was 75.significant increase in the learning outcomes of Class VII Wusto Imam An-Nasai Gowa students from the pretest to the posttest scores with the minimum gain value being in the moderate category, namely $0.30 \leq g < 0.70$.Student activities during learning using the Logan Avenue Problem Solving (Laps-Heuristic) learning model are at least in the good category, namely $75 < x \leq 90$.Student responses after learning by applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model are at least in the positive category, namely $75 < x \leq 90$.The implementation of learning with the Logan Avenue Problem Solving (Laps-Heuristic) learning model is at least in the good category, namely $75 < x \leq 91$.

4. Results and Discussion

4.1. Research result

After conducting the research, quantitative and qualitative data were obtained in the form of student learning outcome tests, student activities, student responses, and learning implementation. The research results obtained by the author after conducting the research are as follows:

Descriptive Analysis Results

The results of the descriptive analysis were used to describe the mathematics learning outcomes obtained by students. To obtain a clear picture of the students' mathematics learning outcomes, a grouping was obtained. This grouping was carried out into five categories: very high, high, medium, low, and very low.

Description of students' mathematics learning outcomes before applying the Logan Avenue problem solving learning model (Laps-Heuristic).

Pretest scores of Class VII Wusto Imam An-Nasai Gowa students presented in appendix B and complete calculations in appendix D. The results of the descriptive statistical analysis can be seen in table 4.1.

Table 7. Description of students' mathematics learning outcomes before applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model.

Statistics	Statistical Value
Sample Size	26
Ideal Score	100
Maximum Score	70
Minimum Score	10
Range	60
Average	37.23
Variance	302.34
Standard deviation	17,388
Median	37.5
Mode	15,20,40

Source: Processed Data

Based on the table above, it shows that the average score obtained from 26 students on the parallelogram and rhombus learning outcome test before using the Logan Avenue Problem Solving (Laps-Heuristic) learning model is 37.23, which means that the average score of students' mathematics learning outcomes is centered at 37.23 with a standard deviation of 17.388, which shows that the data deviation from the average value is 17.388. The scores achieved by students are spread with a minimum of 10 which is the lowest possible score that reaches 0 and a maximum score of 70 which is the highest possible score that reaches 100. The range of 60 which is the difference between the highest score and the lowest score. The median is 37.5, which means that 50% of the total number of students obtained a score above 37.5 and 50% of students obtained a score below 37.5. The mode which is the highest value obtained by students is 15,20,40, this shows that the level of student ability varies.

From the overall pretest scores, if grouped into five categories of learning outcomes, the distribution of frequencies, percentages, and categories of learning outcomes are shown in the table below:

Table 8. Percentage of Student Scores Before Implementing the Logan Avenue Problem Solving Learning Model (Laps-Heuristic).

No	Interval	Frequency	Percentage (%)	Category
1	80 - 100	0	0	Very high
2	66 – 79	1	3.85%	Tall
3	56 – 65	3	11.54%	Currently
4	40 – 55	9	34.62%	Low
5	0 - 39	13	50.00%	Very low
Amount		26	100%	

Source: processed data

From table 4.1 shows that the average score of students' mathematics learning outcomes is 37.23. When viewed based on table 4.2 shows that the average value of mathematics learning outcomes is in the interval 0-39 and is categorized as very low so it can be concluded that the average mathematics learning outcomes of students on the material of parallelograms and rhombuses before being taught with the Logan Avenue Problem Solving (Laps-Heuristic) learning model are in the very low category.

Students' Mathematics Learning Outcomes After Implementing the Logan Avenue Problem Solving Learning Model (Laps-Heuristic)

From the learning outcome test after (posttest) the Logan Avenue Problem Solving (Laps-Heuristic) learning model was applied , it is presented in appendix B and calculated in full in appendix D. Meanwhile, the analysis results are summarized in table 4.3.

Table 9. Description of students' mathematics learning outcomes after applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model.

Statistics	Statistical Value
Sample Size	26
Ideal Score	100
Maximum Score	90
Minimum Score	70
Range	20
Average	81
Variance	25.92
Standard deviation	5,091
Median	80
Mode	76.85

Source: Processed Data

Based on the table above, it shows that the average score obtained from 26 students on the parallelogram and rhombus learning outcome test after using the Logan Avenue Problem Solving (Laps-Heuristic) learning model is 81, which means that the average score of students' mathematics learning outcomes is centered on 81 with a standard deviation of 5.091, which shows that the data deviation from the average value is 5.091. The scores achieved by students are spread with a minimum of 70 which is the lowest possible score that reaches 0 and a maximum score of 90 which is the highest possible score that reaches 100. The range of 20 which is the difference between the highest score and the lowest score. The median is 80, which means that 50% of the total number of students obtained a score above 80 and 50% of students obtained a score below 80. The mode which is the highest score obtained by students is 76 and 85.

From the overall posttest scores, if grouped into five categories of learning outcomes, the distribution of frequencies, percentages, and categories of learning outcomes are shown in the table below:

Table 10. Percentage of Student Scores After Implementing the Logan Avenue Problem Solving Learning Model (Laps-Heuristic).

No	Interval	Frequency	Percentage (%)	Category
1	80 - 100	14	53.85%	Very high
2	66 – 79	12	46.15%	Tall
3	56 – 65	0	0	Currently
4	40 – 55	0	0	Low
5	0 - 39	0	0	Very low
Amount		26	100%	

Source: processed data

From table 4.3 it shows that the average score of students' mathematics learning outcomes is 81. When viewed based on table 4.4 it shows that the average value of mathematics learning outcomes is in the interval 80-100 and is categorized as very high so it can be concluded that the average mathematics learning outcomes of students on the material of parallelograms and rhombuses after being taught with the Logan Avenue Problem Solving (Laps-Heuristic) learning model are in the very high category.

Description of Comparison of Average Student Learning Outcomes Before and After Implementing the Logan Avenue Problem Solving Learning Model (Laps-Heuristic)

Logan Avenue Problem Solving (Laps-Heuristic) learning model was implemented to improve student learning outcomes and address problems faced by students during the learning process. To determine the improvement in mathematics learning outcomes before

and after being taught using the Logan Avenue Problem Solving (Laps-Heuristic) learning model, see Table 4.5.

Table 11. Frequency Distribution and Percentage of Learning Outcome Scores Before and After Implementing the Logan Avenue Problem Solving Learning Model (Laps-Heuristic).

No	Score	Category	Frequency		Percentage (%)	
			pretest	*posttest*	*pretest*	*post-test*
1	90 - 100	Very high	0	14	0	53.85%
2	80 - 89	High	1	12	3.85%	46.15%
3	65 - 79	Medium	3	0	11.54%	0
4	55 - 64	Low	9	0	34.62%	0
5	0 – 54	Very low	13	0	50.00%	0

Based on table 4.5 before the application of the Logan Avenue Problem Solving (Laps-Heuristic) learning model, 50.00% of students' mathematics learning outcomes were in the very low category and after applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model, students' learning outcomes were in the very high category with a percentage of 53.85% so that the range of categories obtained increased.

The following is a bar chart to provide a clearer picture of the improvement in learning outcomes of Class VII Wusto Imam An-Nasai Gowa before and after the application of the Logan Avenue Problem Solving (Laps-Heuristic) learning model .

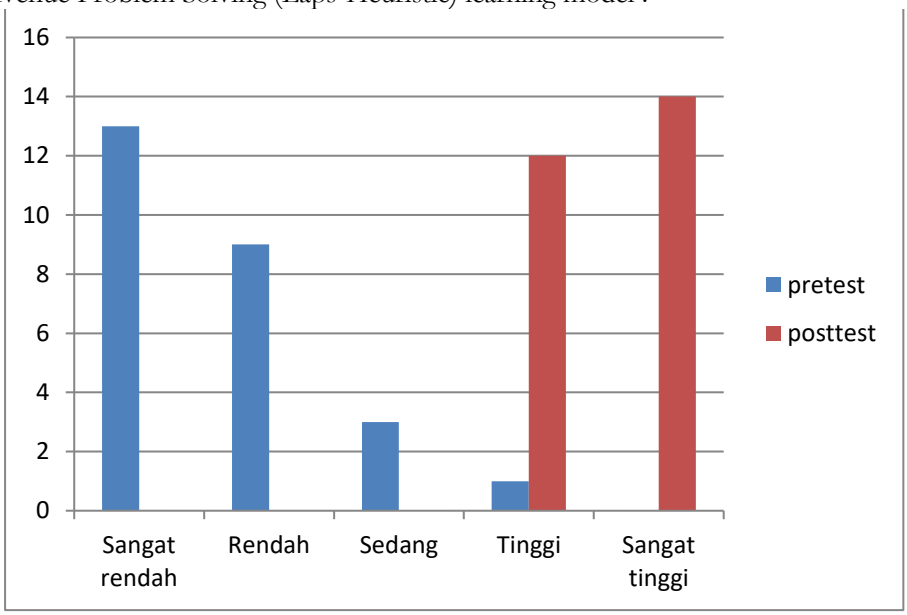

Figure 1. Frequency bar diagram of mathematics learning outcomes categories for Class VII Wusto Imam An-Nasai Gowa.

Description of Students' Mathematics Learning Outcomes Based on Minimum Completion Criteria

Students' mathematics learning outcomes after applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model are shown in the following table:

Table 12. Percentage of Learning Outcomes Completion.

Criteria	Number of Students	Students Complete	Percentage	Category	Information
% ≥ 85%	26	25	96.15%	Completed	Effective

Based on table 4.6 above, it shows that the percentage of students' mathematics learning outcomes after applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model is 96.15%, so it can be concluded that students' mathematics learning outcomes are higher than the KKM value.

Gain Test

The gain test was conducted to determine the extent of the increase in student learning outcomes before (pretest) and after (posttest) applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model. By using the gain test formula, the normalized gain test was obtained, namely 0.69. By referring to the gain value criteria, it can be concluded that the increase in student learning outcomes before (pretest) and after (posttest) applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model is in the moderate category.

Description of Student Responses to the Implementation of the Logan Avenue Problem Solving Learning Model (Laps-Heuristic)

The student response questionnaire was used to determine the extent of students' responses or reactions to learning using the Logan Avenue Problem Solving (Laps-Heuristic) learning model. The results of the student response analysis are presented in the table below.

Table 13. Descriptive Analysis of Student Responses with the Logan Avenue Problem Solving Learning Model (Laps-Heuristic).

Student response indicators	Score obtained	Total score	Percentage (%)
1	24	26	92.31
2	24	26	92.31
3	23	26	88.46
4	22	26	84.62
5	25	26	96.15
6	22	26	84.62
7	23	26	88.46
8	24	26	92.31
Jumlah			719.25
Rata-rata			89.91

From the student responses given to 26 students with a total of 8 positive questions after participating in lessons using the Logan Avenue Problem Solving (Laps -Heuristic) learning model, an average of 89.91% was obtained. This indicates that student responses to the learning process are in the positive category.

Description of Student Activities in the Implementation of the Logan Avenue Problem Solving Learning Model (Laps-Heuristic)

The results of observations of student activities during learning using the Logan Avenue Problem Solving (Laps-Heuristic) learning model can be presented in table 4.8 and the complete calculations in appendix C.

Table 14. Descriptive Analysis of Student Activities by Applying the Logan Avenue Problem Solving Learning Model (Laps-Heuristic).

Group name	The th meeting				Amount	Total score	Percentage (%)
	I	II	III	IV			
1	4	5	5	6	20	30	66.67
2	6	4	3	6	19	30	63.33
3	6	4	6	4	20	30	66,67
4	4	4	5	6	19	30	63.33
5	4	5	4	5	20	30	66,67
Jumlah							326.67
Rata-rata							81.67

Logan Avenue Problem Solving (Laps-Heuristic) learning model shows an average percentage of student activity of 81.67%. The results of the analysis of student activity indicate that student participation and activeness during the learning process are in the good category.

Descriptive Data Analysis of Learning Implementation Observation Sheets by Applying the Logan Avenue Problem Solving Learning Model (Laps-Heuristic)

Logan Avenue Problem Solving Learning Model (Laps-Heuristic) can be presented in table 4.9, complete calculations in appendix C.

Table 15. Descriptive analysis of the observation sheet for the implementation of learning by applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model.

No	Meeting	Score obtained	Total score	Percentage (%)
1	I	9	9	100
2	II	7	9	77.78
3	III	7	9	77.78
4	IV	9	9	100
Amount				355.56
Average				88.89

Based on Table 4.9, it is known that the implementation of learning using the Logan Avenue Problem Solving (Laps-Heuristic) learning model shows an average percentage of learning implementation of 88.89%. The results of the learning implementation analysis indicate that the implementation of learning during the learning process is in the good category.

4.2. Discussion

The mathematics learning outcomes of Class VII Wusto Imam An-Nasai Gowa after implementing the Logan Avenue Problem Solving (Laps-Heuristic) learning model reached the KKM of 75. Based on the description of the learning outcomes of Class VII Wusto Imam An-Nasai Gowa obtained through research results, it is known that the percentage of students' mathematics learning outcomes after implementing the Logan Avenue Problem Solving (Laps-Heuristic) learning model was 96.15%. This shows that that more than 85% of students' mathematics learning outcomes achieved the KKM after applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model.

There was a significant increase from the pretest to posttest scores (the interpreted gain value was classified as high or gain = 0.69). This increase in learning outcomes was tested to determine how much it increased. Therefore, the researcher used the normal gain formula by calculating the average value of students' mathematics learning outcomes from pretest to posttest data. In calculating the average value of pretest to posttest, the average student learning outcomes after (posttest) were higher than before (pretest) applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model. And the results of the normal gain test were obtained at 0.69 with a moderate category according to the criteria (Adaptation of Hake in Sundayana, 2015: 151). This indicates that there was a significant increase from the pretest to posttest scores (the interpreted gain value was classified as moderate).

Student activity during learning using the Logan Avenue Problem Solving (Laps-Heuristic) learning model was in the good category. In addition to administering tests to obtain learning outcome data, the researcher also used an observation sheet for student activity during the treatment. The data was then analyzed qualitatively and quantitatively to determine the percentage. The analysis showed a student activity percentage of 81.67%, based on Nurkencana's categorization. in Natalia (2016:35) shows that student activities are in the good category.

Student responses after learning by applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model were in the positive category. Student response questionnaires were distributed at the last meeting after applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model. Furthermore, the data were analyzed qualitatively and quantitatively to determine the percentage. Based on the categorization of student responses according to Nurkencana in Natalia (2016:35), the analysis results obtained a percentage of student responses of 89.91% and indicated that student responses were in the positive category.

The implementation of learning by applying the Logan Avenue Problem Solving (Laps-Heuristic) learning model is in the good category. The observation sheet of the implementation of learning during the treatment was then analyzed qualitatively and quantitatively to determine the percentage. From the analysis results, the percentage of

learning implementation was 88.89% and based on the categorization according to Arikunto in Natalia (2016:36) shows that the implementation of learning is in the good category.

The results of this research are related to the theory expressed by Jauhar (2011:163) that learning can be said to be effective (ffective/successful) if it achieves the target or at least achieves the basic competencies that have been set. Besides that, what is also important is... With the many experiences and new things that students "gain", teachers are also expected to gain "new experiences" as a result of two-way interactions with students.

Based on the results of the descriptive analysis, it can be concluded that the Logan Avenue Problem Solving (Laps-Heuristic) learning model is effective in improving the mathematics learning outcomes of Class VII Wusto Imam An-Nasai Gowa.

5. Conclusion

Based on the results of previous research and discussions, it can be concluded that the application of the *Logan Avenue Problem Solving* (Laps-Heuristic) learning model is effective in mathematics learning for Class VII Wusto Imam An-Nasai Gowa.Based on these conclusions, the author makes the following suggestions:Teachers are expected to be more creative in presenting lesson materials by implementing a variety of learning models to motivate students and prevent them from getting bored while learning mathematics. One learning model that can increase student motivation is *Logan Avenue Problem Solving* (Laps-Heuristic). For future researchers, they can develop this learning model and strengthen the results of this research by reviewing it first and being able to conduct better research than before.

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