THE INFLUENCE OF USING THE PROBLEM SOLVING MODEL AND TEACHER-MADE *HOTS*-BASED EVALUATION QUESTIONS ON STUDENT LEARNING OUTCOMES

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Abstract. This research aims to find out the effect of using problem solving models and hots-based evaluation questions made by teachers on the learning outcomes of Al-Hijrah IT Middle School students. The type of research used is quantitative experiment using a quasi-experimental method. The population in this research is all grade students. IPS Vlll at Al-Hijrah IT Middle School for the 2024/2025 academic year. Namely 60 students consisting of social studies classes Vlll-1, Vlll-2, Vlll-3, the sampling technique used in this research is saturated sampling where the entire population is sampled, the data analysis technique used in this research is the multiple regression model , the results of this research are that in this research the use of problem solving methods has a significant influence on learning outcomes because the calculated t value > t table (2.838> 2.010) and the significance level is 0.007 < 0.05. In this research, teacher-made hot-based evaluation questions have a significant influence on learning outcomes because the calculated t value is >t table (5.689> 2.010) and the significance level is 0.000 < 0.05. In this study, the calculated f value was 74.111 and the significance level was 0.000. This shows that simultaneously the teacher-made hot-based evaluation questions and the use of problem solving methods had a significant effect on Critical Thinking Ability because the calculated f value > f table (74.111 > 3.19) and significance level of 0.000 < 0.05

Keywords: problem solving model; hots-based evaluation questions; learning outcomes

I. INTRODUCTION

The problem-solving learning model is an effort by individuals or groups to find answers based on previously possessed knowledge, understanding, and skills in order to solve a problem. The goal of the problem-solving learning model is to make it easier for students to face and solve problems that occur in real environments, and for students to gain experience in problem-solving so that it can be applied in real life. In the implementation of the problem-solving learning model, there are five main steps, namely: orientation, problem identification, problem-solving alternatives, and drawing conclusions. To understand these five steps, they can be detailed as follows: The orientation stage is the process of providing a global overview of the material that will be covered in the learning process. This stage is intended to condition learning readiness. The apperception activity informs about conditioning learning readiness. The apperception activity informs about specific learning objectives and lesson materials, as well as learning activity information, tasks that the teacher must complete before discussing the lesson material. HOTS-based learning conducted by educators is very useful for optimizing students' abilities in critical and creative thinking. The concept of HOTS-based learning is not only aimed at achieving educational goals but also at developing students' abilities to think critically, creatively, and innovatively independently and to find solutions to various complex

problems. Therefore, HOTS-based learning is used to further optimize students' abilities in higher-order thinking, including analytical, evaluative, and creative thinking.

Table 1 Final Semester Exam Scores for Social Studies Class VIII at SMP IT Al-Hijrah

Class	Number of Students	Completed		Incompleted		KKM
		F	%	**F**	%	
Vlll-1	17	7	41.17%	10	58.82%	70
Vlll-2	17	8	47.05%	9	52.89%	70
Vlll-3	18	7	38.88%	11	61.11%	70

Source: Class VIII Document SMP IT Al-Hijrah

Based on Table 1.1, which presents the results of the preliminary study conducted by the researcher on April 11, 2024, regarding the end-of-semester exam results for class VIII, it is suspected that more than 50% of the IPS UAS scores are incomplete. More than half of the students do not meet the standards set in the curriculum or the learning materials taught at this junior high school, which could include low exam scores. The issue examined in this research is whether the use of problem-solving learning and HOTS (Higher Order Thinking Skills)-oriented evaluation questions affects the IPS learning outcomes of students in classes VIII-1, VIII-2, and VIII-3.

Identifying the low end-of-semester exam scores of students, it is seen that class VIII-3 has the highest rate of incomplete end-of-semester exams with a score of 61.11%, with a frequency of 11 students, while students who completed the exam scored 38.88%, with a frequency of 7 students. In class VIII-1, the end-of-semester exam scores were incomplete with a score of freequrncy of 7 students. Class Vlll-2 had an incomplete end-of semester Exam score of 52.89%, with a freequrncy of 9 students.

II. RESEARCH METHODS

eksperimen research method, which means research that meets scientific principles, namely concrete/empirical, objective, measurable, rational, and systematic. The quantitative method is also called the discovery method, because with this method, new science and technology can be found and developed with research data in the form of numbers and statistical analysis. argue that the quantitative approach is research based on positivist philosophy to study a specific population or sample and sampling in the eighth grade with data collection using instruments, and data analysis is statistical in nature.(Balaka, 2022)

The type of research is experimental quantitative research using the quasi-experimental method. The population in this study is all eighth-grade IPS students at Smp IT Al-Hijrah for the 2024/2025 academic year. Namely, 60 students consisting of IPS classes Vlll-1, Vlll-2, Vlll-3. The author designated the entire population as a sample, known as a saturated sample. The data collection technique used in this research was a questionnaire or written questions posed to respondents or the predetermined sample, with questions related to variables X1, X2, and Y. To test the hypothesis, multiple regression analysis was used to examine the effect of using the problem-solving method and teacher-made HOTS-based evaluation questions on students' learning outcomes. Multiple regression analysis was used to model the relationship between independent variables. (The use of problem solving methods and teacher-made hotspot-based evaluation questions on student learning outcomes). This research was conducted at SMP It Al-hijrah located on Jln. Williem Iskandar Pasar V, Medan Estate, Kab. Percut Sei Tuan, Deli Serdang Regency, North Sumatra 20371. This research is estimated to take 5 months, starting from the title submission process, proposal preparation, initial data collection, research, and journal writing, beginning in early March 2024.

The population in this study consists of all eighth-grade IPS students at SMP It Al-hijrah in the second semester of the 2023/2024 academic year. The sample for this research uses a purposive sampling approach and simple random sampling technique. The sample is determined through the use of purposive sampling, which includes several different variables. For the purposes of the research, the sample can be taken from a population of more than fifty.(A. Adib Abadi, 2006) The sampling in this study uses total sampling of all students at SMP It Al-hijrah in the even semester of the 2023/2024 Academic Year with the following table:

Table 2 number of students at SMP IT Al-Hijrah

NO	Class	Number of student
1.	VIII-1	17 Student
2.	VIII-2	17 Student
3.	VIII-3	18 Student
	Totall	52 student

The variables in this study consist of 3 variables: X1, X2, and Y. The X variables are independent variables, while the Y variable is the dependent variable.In this study, variable X1 is the use of the problem-solving method, variable X2 is teacher-made HOTS-based questions, and variable Y is learning outcomes. The research instrument used in this study is a questionnaire with an assessment. The data collection techniques used were through observation, questionnaires, and documentation. (Talitha Fendya Wimona & Chendra Wibawa Setya, 2018) Then, to test this research instrument, validity and reliability tests were conducted. Before starting the analysis, prerequisite tests were conducted first using regression analysis, such as normality test, homogeneity test, and linearity test. After that, the T-Test is used to determine the extent to which each exogenous variable can influence the endogenous variable.The testing tool used in this research is SPSS version 22. A hypothesis is a conclusion that is not yet final because it has not been tested or proven to be true. Therefore, a hypothesis can also be defined as a temporary solution to a problem that has been tested and may be true or may be false. The researcher refers to the formulation of the problem, objectives, and benefits of the research, thus the hypotheses proposed

III. RESULT AND DISCUSSION

The Use of the Problem Solving Model Affects Learning Outcomes

In this study, the use of the problem-solving model significantly affects learning outcomes because the t-value > t-table (2.838 > 2.010) and the significance level is 0.007 < 0.05. Problem solving is a mental and intellectual process of identifying a problem and resolving it based on accurate data and information, so that precise and careful conclusions can be drawn. In achieving the goals, the problem-solving method is one of the elements that can determine the learning process. Thus, considering the selection of the learning model, it is important for teachers to choose a learning model that is appropriate and suitable for the needs of the students. Due to the teacher's lack of precision in choosing a less varied learning model, students are less active in class and feel less confident in solving the problems given by the teacher. The learning model considered appropriate to enhance students' learning outcomes is the Problem Solving learning model. The

Problem Solving learning model is about how students are able to solve problems on their own and can apply problem-solving skills to choose and develop solutions, thereby expanding the thinking process. The problem-solving learning model was chosen because it is the easiest method for students to use in solving HOTS questions. (Higher order thinking skills). In addition, this problem-solving learning model also

trains students to think critically, logically, and analytically so that students can directly discover new knowledge on their own. With this model, students become accustomed to being trained in solving problems related to everyday life. The results of this study are in line with the research conducted by Muhammad Susanto titled

"Implementation of the Problem Solving Model to Improve the Learning Activity of Eighth Grade Students in Science Subjects at SMP Giriroto 1." The research concluded that the application of the problem-solving method can enhance the learning activity in science among eighth-grade students at SMP Negeri Giri Roto.

Teacher-Made HOTS-Based Evaluation Questions Affect Learning Outcomes

In this study, teacher-made HOTS-based evaluation questions significantly affect learning outcomes because the t-count value > t-table ($5.689 > 2.010$) and the significance level is $0.000 < 0.05$. The HOTS learning concept emphasizes students' ability to think critically. The low quality of the evaluation (questions) used directly impacts the quality of policies regarding learning activities to be conducted in the next period. Several issues related to teachers' understanding of HOTS-based questions and their skills in producing questions that require critical thinking skills have been identified. The HOTS learning concept emphasizes students' ability to think critically The critical thinking skills of students can be seen in the way they apply knowledge and develop skills in various situations. HOTS is the ability of learners that focuses on higher-order thinking through the cognitive domain, using various cognitive methods and levels of taxonomy in learning, teaching, and evaluation. Higher-order thinking involves the ability to identify and solve problems, critical thinking skills, creativity, expression, ideas, and opinions. HOTS encourages students to develop critical thinking by practicing pattern recognition, organizing sequential learning, drawing conclusions, evaluating, and documenting every piece of evidence found (Rora Rizky Wandini, 2021). The results of this study are in line with the research conducted by Elyana, Yennita, and Fahrudin (2017) titled "Analysis of Higher Order Thinking Skills (HOTS) of MAN 2 Model Pekanbaru Students in Solving National High School/MA Level Physics Exam Questions." The results of that study show the influence of Higher Order Thinking Skills (HOTS) in enhancing students' ability to solve National High School/MA Level Physics Exam questions.

The Use of the Problem Solving Model and Teacher-Made HOTS-Based Evaluation Questions Affects Learning Outcomes

In this study, the calculated f-value is 74.111 and the significance level is 0.000. This indicates that simultaneously, teacher-made HOTS-based evaluation questions and the use of the problem-solving model significantly affect learning outcomes because the calculated f-value > table f-value ($74.111 > 3.19$) and the significance level is $0.000 < 0.05$. Learning outcomes are the results that occur and can be used as indicators of the value of using a particular teaching method. Learning outcomes according to Bloom are changes in three

learning behaviors encompassing three domains: the cognitive, affective, and psychomotor domains. According to Anderson, the cognitive domain of Bloom's taxonomy consists of remembering, understanding, applying, analyzing, evaluating, and creating. The affective domain includes learning objectives that explain changes in attitudes, interests, values, and the development of appreciation and adjustment. The psychomotor domain includes behavioral changes that indicate that students have learned certain physical manipulative skills. The new abilities acquired after students learn, according to Gagne, Briggs, and Weger, are capabilities or performances that can be observed as learning outcomes. (Rusmono, 2012). The results of this study are in line with the research conducted by Muhammad Susanto titled "The Application of the Problem Solving Model to Improve the Learning Activity of Eighth Grade Students in Science Subjects at SMP Giriroto 1." The research concluded that the application of the problem-solving model can enhance the learning activity of Science among eighth-grade students at SMP Negeri Giri Roto. Additionally, the research conducted by Elyana, Yennita, and Fahrudin (2017) titled "Analysis of Higher Order Thinking Skills (HOTS) of MAN 2 Model Pekanbaru Students in Solving National Physics Exam Questions at the SMA/MA Level" shows the influence of Higher Order Thinking Skills (HOTS) in improving students' ability to solve National Physics Exam questions at the SMA/MA level.

Research Prerequisite Test

1. Question Difficulty Test

One common method used is the formula for the percentage of students who answered correctly (p) on a question. The formula is: Question Difficulty Level = Number of Students Who Answered Correctly

Total Number of Students Usually, questions with a low difficulty level (p close to 0) are considered difficult, while questions with a high difficulty level (p close to 1) are considered easy. The results of this study show that out of the questions given to the students, 35 students answered correctly and 25 students answered incorrectly, with a total sample size of 52 students. The calculation of the question difficulty level is as follows: $35/52 = 0.673$

The result shows a question difficulty score of 0.673, which is close to 1, indicating that the questions can be considered not too difficult for the students.

2. Normality Test

In this study, the method that can be used to assess data normality is the Kolmogorov-Smirnov Test. The Kolmogorov-Smirnov Test in this study uses the following guidelines for decision-making:

a) If the significance value < 0.05, then the data distribution is not normal,

b) If the significance value > 0.05, then the data distribution is normal.

Table 3. One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		52
Normal Parameters[a]	Mean	.0000000
	Std. Deviation	3.17773535
Most Extreme Differences	Absolute	.137
	Positive	.080
	Negative	-.137
Kolmogorov-Smirnov Z		.989
Asymp. Sig. (2-tailed)		.281

a. Test distribution is Normal.

The table above shows that the Asymp. Sig. (2-tailed) value is 0.281 > 0.05, so in this study, the data distribution is normal.Linearity Test. To test the linearity of a model, you can use the linearity test by performing a relapse on the model you want to test. The standard for selecting linearity is by analyzing the significance value of the linearity deviation that occurs due to the linearity test (using SPSS) with the alpha value used. If the significant value of the Deviation from Linearity > alpha (0.05), then the value is linear.

Table 4. ANOVA Table X1*Y

		Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)	1468.931	14	104.924	6.429	.000
	Linearity	1217.630	1	1217.630	74.603	.000
	Deviation from Linearity	251.301	13	19.331	1.184	.328
Within Groups		603.895	37	16.321		
Total		2072.827	51			

Table 5. ANOVA Table X2*Y

		Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)	1712.169	16	107.011	10.385	.000
	Linearity	1473.191	1	1473.191	142.965	.000
	Deviation from Linearity	238.977	15	15.932	1.546	.142
Within Groups		360.658	35	10.305		
Total		2072.827	51			

Based on the two ANOVA tables above, it shows that in this study, the Deviation from Linearity is above alpha (0.05), indicating a linear value, and the data distribution is normal. 4. Multicollinearity. The multicollinearity test is conducted to examine the presence of relationships among independent variables in the regression model. To test for multicollinearity, one can look at the Variance Inflation Factor (VIF) value in the regression model. The multicollinearity test has a criterion: if the VIF value is below 10.

Table 6. Coefficients[a]

		Collinearity Statistics	
Model		Tolerance	VIF
1	(Constant)		
	The use of problem-solving model Teacher-made HOTS-based evaluation questions	.436	2.292
	The use of problem-solving model Teacher-made HOTS-based evaluation questions	.436	2.292

Coefficients[a]

a. Dependent Variable: LEARNING OUTCOMES

The table above shows that both the Price Perception and Product Quality variables have a tolerance value of 0.436 > 0.10 and a VIF value of 2.292 < 10, meaning that in this study, the data distribution is normal.

4 Hypothesis Testing

1. Partial Test (T-Test)

The t-test is intended to see whether there is a significant partial effect of the independent variable on the dependent variable. The form of the test is as follows:

a. Ho: $b_i = 0$ (the independent variable has no positive and significant partial effect on the dependent variable).

b. Ha: $b_i \neq 0$ (the independent variable has a positive and significant partial effect on the dependent variable).

c. The calculated t-value will be compared with the table t-value. The decision-making criteria are:

1) Ho is accepted if the calculated t-value < table t-value at $\alpha = 5\%$

2) Ha is rejected if the calculated t-value > table t-value at $\alpha = 5\%$

3) With a sample size of 52 and df = n-2 at a significance level of 0.05, the table t-value is 2.010

Table 7. Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	6.961	5.409		1.287	.204
	The use of problem-solving model Teacher-made HOTS-based evaluation questions	.281	.099	.306	2.838	.007
	The use of problem-solving model Teacher-made HOTS-based evaluation questions	.622	.109	.613	5.689	.000

a. Dependent Variable: learning outcomes

Table 4.14 shows that in this study, variable X1 (Use of the problem-solving model) has a t-value of 2.838 and a significance level of 0.007, meaning that in this study, the use of the problem-solving model has a significant effect on Learning Outcomes because the calculated t-value > table t-value (2.838 > 2.010) and the significance level 0.007 < 0.05.

b. Table 4.14 shows that in this study, variable X1 (Teacher-made HOTS-based evaluation questions) has a t-value of 5.689 and a significance level of 0.000, meaning that in this study,

teacher-made HOTS-based evaluation questions have a significant effect on Learning Outcomes because the calculated t-value > table t-value (5.689 > 2.010) and the significance level 0.000 < 0.05.

5. Simultaneous Significance Test (F-test)

The F-test (simultaneous significance test) is a test conducted to see whether independent variables, individually (simultaneously), have a positive and significant effect on the dependent variable. Through statistical testing with the following steps: This test is conducted by comparing the F table and the calculated F. If F calculated ≤ F table or sig. F value > 0.05

a. Ho is accepted if F calculated < F table at α = 5%
b. Ha is rejected if F calculated > F table at α = 5%
c. With a sample size of 52 and df = n-2 at a significance level of 0.05, the F table value is 3.19

Table 8. ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	1557.829	2	778.914	74.111	.000[a]
Residual	514.998	49	10.510		
Total	2072.827	51			

a. Predictors: (Constant), teacher-made HOTS-based evaluation questions, use of the problem-solving model
b. Dependent Variable: Learning Outcomes

The table above shows that in this study, the calculated f value is 74.111 and the significance level is 0.000. This indicates that simultaneously, the teacher-made HOTS-based evaluation questions and the use of the problem-solving model significantly affect learning outcomes because the calculated f value > table f value (74.111 > 3.19) and the significance level is 0.000 < 0.05.

IV. CONCLUSSION

In this study, the use of the problem-solving model has a significant effect on Learning Outcomes because the calculated t-value > table t-value (2.838 > 2.010) and the significance level is 0.007 < 0.05. In this study, teacher-made HOTS-based evaluation questions have a significant effect on Learning Outcomes because the calculated t-value > table t-value (5.689 > 2.010) and the significance level is 0.000 < 0.05. In this study, the calculated f-value is 74.111 and the significance level is 0.000, indicating that simultaneously, teacher-made HOTS-based evaluation questions and the use of the problem-solving model significantly affect Learning Outcomes because the calculated f-value > table f-value (74.111 > 3.19) and the significance level is 0.000 < 0.05.

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