

The Effects of Using the Inquiry Learning Model to Develop Critical Thinking Skills in Grade 7 Mathematics Students at the Langsa State Junior High School

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Abstract This research aims to: analyze the effect of the inquiry learning model on the critical thinking skills of seventh grade students at the Langsa State Junior High School and determine the interaction between the learning model and KAM on the critical thinking skills of seventh grade students at the Langsa State Junior High School. This type of research is a quasi-experimental research. The experimental class is class VII.2A, which consists of 32 students and the second roll of paper as the control class is class VII.5B, which consists of 32 students. The results showed that: There is an effect of the inquiry learning model on the critical thinking skills of seventh grade students at the 3 Langsa State Junior High School and there is an interaction between the learning model and KAM on the critical thinking skills of seventh grade students at the 3 Langsa State Junior High School.

Keywords: *critical thinking ability, inquiry learning model*

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1. Introduction

Learning in the 2013 curriculum has the aim of achieving high order thinking skills (HOT) from an early age. Critical thinking is a manifestation of HOT (Rosmayadi, 201) [1]. Critical thinking skills are needed in all subject including mathematics, because they have a very dominant role in educating students. Students are expected to acquire the ability to manage information in order to survive in an ever-changing, uncertain and competitive situation (Simbolon, Manullang, Surya and Syahputra, 2017) [2].

Critical thinking is a form of thinking that needs to be developed in every student. According to Samosir (2018) [3], critical thinking is the process of seeking, obtaining, evaluating, analyzing, synthesizing and conceptualizing information as a guide for developing one's thinking with self-awareness, and the ability to use this information to increase creativity and take risks. The same thing is expressed by Temel (2014) [4] critical thinking is thinking that helps in solving problems and making judgments. It is a higher order thinking ability, which describes the processes of interpretation, analysis, evaluation, inference, explanation and self-regulation. Ennis as reflective and logical thinking that focuses on deciding what to believe or do (Putu Verawati, Wahyudi, Taufik, 2018) [5].

Some indicators of mathematical critical thinking skills according to Widyatiningtyas, Kusumah, Sumarmo, Subandar (2015) [6] are: (1) finding relationships, namely students' ability to reconstruct problem elements and formulate relationships in solutions; (2) analyze the data, namely the ability of students to identify and make decisions about the problems encountered, (3) analyze the elements, namely the ability of students to identify the elements contained in a relationship; (4) analyzing the relationship, namely the ability of students to examine the relationship and interaction between the elements of the problem and then make decisions for its resolution; (5) criticizing the evidence, namely the ability of students to make comments, peel, add, subtract, or rearrange the mathematical proofs they have learned; (6) solving problems, namely the ability of students in test results or answers in solving problems.

Based on this, it can be concluded that students need critical thinking skills to support their understanding of a problem. To understand a problem, students should not only understand the raw information it contains, but students should also be able to understand its purpose, the concepts/ideas that compose the information, the underlying assumptions, the point of view/objectives that inform it, and the questions asked.

However, the current reality is that students' critical thinking skills in learning mathematics are still low and need to be improved. According to Simbolon, Manullang,

Surya and Syahputra (2017) the ability to think critically is low because learning mathematics only describes steps to only count without helping students to put ideas in spoken and written form. In solving problems, students are seen to be less enthusiastic about completing the appropriate abilities. Then, students do not feel compelled to reason and think further how to solve the given problem. Based on the results of research conducted by Ayu Latifa, Putu Verawati, Harjono (2017) [7] students' critical thinking skills are low because the learning process that has been applied so far has not been able to improve critical thinking skills, because exercises to improve these abilities have not been carried out.

Sugianto, Suryandari, Age (2020) [8] The inquiry learning model is a series of studies that involve all students to think carefully, analogically and systematically so that they can solve the problems they face. So students must be active when learning takes place. Purwati (2014) [9] explains that inquiry learning is a learning that requires students to carry out activities such as planning investigations, observing, analyzing, interpreting data, proposing answers, formulating conclusions and communicating, in essence students play an active role in following the learning process.

Furthermore Said (2017) [10] supports above by explaining that inquiry is various forms of activity involving observation, asking questions, referring to books and other sources to obtain what is already known from simple experimental evidence, using tools to collect data, analyze and interpret data, submit answers, explanations and estimates and communicate results. Inquiry requires identification of the assumptions used, the use of logical and critical thinking, and consideration of a matter. The purpose of the inquiry learning model is to develop students' ability to think logically and systematically (Yanti, Partono, Kuswanto, Mundilarto, 2019) [11].

In inquiry learning students are actively and independently involved in making, testing and evaluating hypotheses. The teacher only acts as a guide who directs students towards the learning objectives that are arranged in the worksheets given to students (Pinasti, 2019) [12]. Inquiry learning is designed to invite students directly into the scientific process in a relatively short time. Learning with the inquiry model can improve scientific understanding, be productive in thinking, and students become skilled in obtaining and analyzing information (Al-Tabany, 2017). In addition, in the process this model focuses more on the process of thinking both analytically and critically to seek and find answers to problems faced by students. Furthermore, in the inquiry learning model, the learning process focuses on the ability of students (student centered) in finding answers to a problem so that students can be actively involved in learning (Yanti, Partono, Kuswanto, Mundilarto, 2019).

Based on the explanation above, it is concluded that the inquiry learning model can improve students' critical thinking skills, this is in line with the results of Khasanah and Abdulla's research (2016) [13] that students' critical thinking skills who study using the inquiry learning model are better than students who learn by using the inquiry learning model are better than conventional learning model. Not much different from the results of Zaini's research (2016) showing that guided inquiry learning has a

significant influence on student learning outcomes, and the critical thinking skills of students taught with this model are categorized quite well. Then the research results of Maryam, Kusmiyati, Merta, Artasya (2019) [14] showed that the inquiry learning model had an effect on improving students' critical thinking skills. Furthermore, the research results of Nurali, Busnawir, Samparadja, Ili (2018) [15] show that the mathematical critical thinking ability of the guided inquiry class students is higher than the mathematics critical thinking ability of direct learning class students in terms of learning independence.

In addition to critical thinking skills, the thing that teachers need to pay attention to is the students' initial mathematical ability (KAM). Early mathematical abilities are skills possessed by students before the mathematics learning process is carried out. Students' initial abilities are abilities that students already have before they take part in the learning that will be given (Razak, 2017) [16]. Rachmawati (2018) [17] explained that the initial ability is the ability that has been possessed by students before participating in the learning that will be given. This initial ability (entry behavior) describes the readiness of students to accept the lessons that will be delivered by the teacher. It is important for the teacher to know the initial abilities of students before they start with their learning, because then it can be known: a) whether students already have or knowledge which is a prerequisite to take part in learning; b) the extent to which students already know what material will be presented. By knowing these two things, teachers will be able to design learning better (Razak, 2017).

Based on this, the researcher is interested in conducting a further study by modifying the learning model and seeing its effect on students' critical thinking skills, then the author raises it in a research title "The Influence of Inquiry Learning Models on Critical Thinking Skills for Class VII SMP Negeri 3 Langsa".

2. Methods

2.1. Research Pattern

This type of research is a quasi-experimental research, namely research conducted to obtain information which is an approximation to data that can be obtained with actual experiments in conditions that do not allow for control and manipulation of all relevant variables (Noor, 2015).

2.2. Subject

The experimental class is class VII.2A, which consists of 32 students and the control class is class VII.5B, which consists of 32 students.

2.3. Research Design

The design used in this study was the Randomized Control Group Pretest-Posttest using the division of two research groups, namely the experimental research group using the inquiry learning model, and the control research group without using the inquiry learning model, as illustrated in [Table 1](#) below:

Table 1. Design of Randomized Control Group Pretest-Posttest

Group	Pretest	Perlakuan	Posttest
Experiment	T ₀	X	T ₁
Control	T ₀	-	T ₁

Information:

T₀: The results of the pretest experimental class and control class
 T₁: Posttest results for the experimental class and the control class
 X: Treatment using the inquiry learning model

2.4. Research Procedure

The complete research procedure carried out in this study is presented in the form of the following steps or research flow:

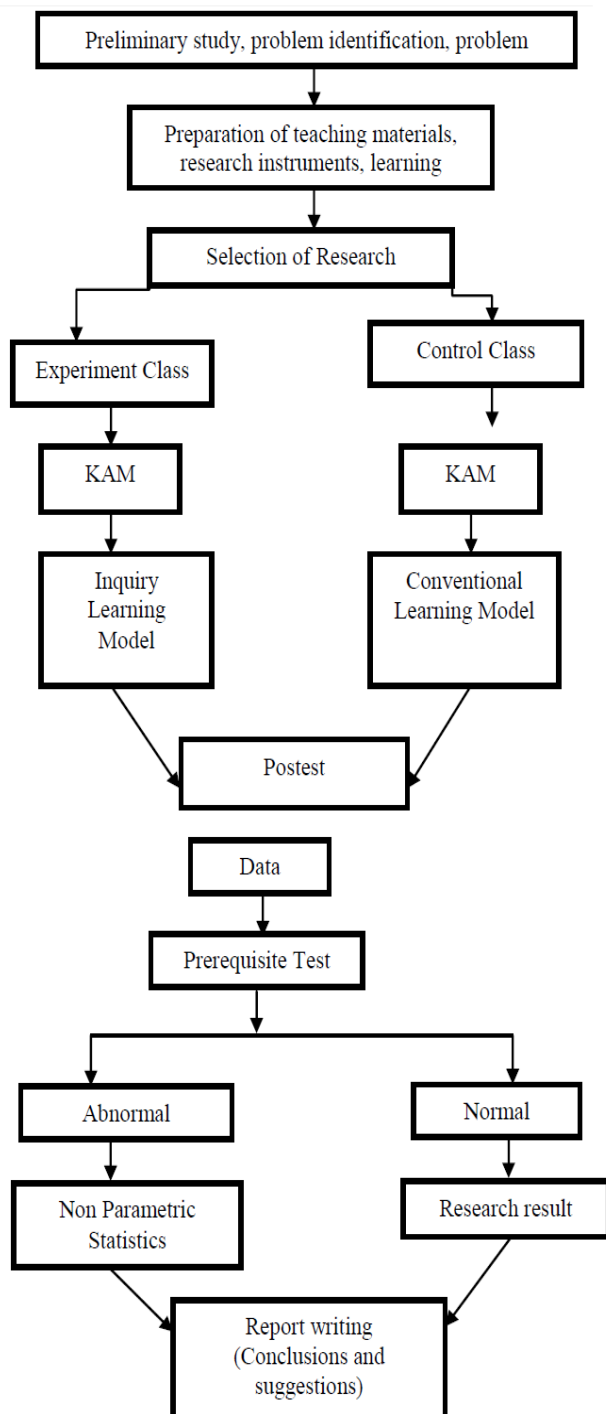


Figure 1. Stages of Research Flow

3. Results and Discussion

3.1. Description of Students' Critical Thinking Ability Test Post Results

Based on the post-test data, the lowest score (X_{min}), the highest score (X_{max}) and the average score (\bar{x}) and standard deviation (s) were calculated for the experimental class and the control class. The data is presented in [Table 2](#) below.

Table 2. Description of the Results of the Critical Thinking Ability Test

Class	Ideal Value	N	x_{min}	x_{max}	\bar{x}	s
Experiment (Inkuiri)	100	32	56,94	97,22	80,03	10,69
Control (Conventional)	100	32	61,11	94,44	75,82	8,69

From [Table 2](#), it can be seen that the minimum values for the experimental class are 56.94 and 61.11 for the control class. The maximum values for the experimental class were 97.22 and 94.44 for the control class. The average post test of mathematical critical thinking skills for the experimental class was 80.03 and for the control class was 75.82. While the standard deviation value for the experimental class is 10.69 and for the control class is 8.69.

The average post test of students' mathematical critical thinking skills based on KAM is presented in [Table 3](#) below.

Table 3. Average of Mathematics Critical Thinking Ability Test Posts Based on KAM

	KAM	Statistics	Class	
			Experiment	Control
Critical Thinking Ability (CTA)	High	N	9	8
		\bar{x}	86,88	85,62
		s	5,44	5,34
	Medium	N	14	17
		\bar{x}	83,78	73,76
		s	6,07	6,27
	Low	N	9	7
		\bar{x}	65,55	67,28
		s	6,50	5,31

[Table 3](#) shows that the average and standard deviation of mathematical critical thinking skills in the experimental class with the high KAM group are 86.88 and 5.44 for the experimental class, and 85.62 and 5.34 for the control class. The mean and standard deviation for the medium KAM group were 83.78 and 6.07, and 73.76 and 6.27. Meanwhile, the mean and standard deviation of the low KAM group were 65.66 and 6.50, and 67.28 and 5.31. From this average, it can be seen that the average of the experimental class is higher than the average of the control class.

3.2. Hypothesis Testing

The hypothesis testing formulated was analyzed using two-way analysis of variance using F statistics with a predetermined formula. The results of the calculation of the analysis of hypothesis testing with the help of SPSS can be seen in [Table 4](#) below.

Tabel 4. Tabel Analisis Varians Dua Arah
Tests of Between-Subjects Effects

Dependent Variable:KBK

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4125.779 ^a	5	825.156	23.302	.000	.668
Intercept	345430.768	1	345430.768	9.755E3	.000	.994
KAM	3279.735	2	1639.868	46.310	.000	.615
Model	147.168	1	147.168	4.156	.046	.067
KAM * Model	430.120	2	215.060	6.073	.004	.173
Error	2053.831	58	35.411			
Total	389805.000	64				
Corrected Total	6179.609	63				

a. R Squared = .668 (Adjusted R Squared = .639).

Based on Table 4 above, it can be seen that the sig model value is 0.046 where the value is smaller than 0.05 ($0.045 < 0.05$), this means that H_0 is rejected.

3.3. The Influence of the Inquiry Learning Model on the Critical Thinking Ability of Class VII Students at the 3 Langsa State Junior High School

Based on the test results, it is found that the sig model value is 0.046 where the value is smaller than 0.05 ($0.045 < 0.05$), this means that H_0 is rejected. So it can be concluded that there is an influence of the inquiry learning model on the critical thinking skills of seventh grade students at the 3 Langsa State Junior High School.

3.4. Interaction between Learning Model and KAM on Critical Thinking Ability of Class VII Students at the 3 Langsa State Junior High School

Based on the test results, it is obtained that the sig value of KAM*Model is 0.004 where the value is smaller than 0.05 ($0.004 < 0.05$), this means that it is sufficient to reject H_0 . Or in other words, there is an interaction between the learning model and KAM on the critical thinking skills of seventh grade students at the 3 Langsa State Junior High School.

4. Conclusions

1. There is an effect of the inquiry learning model on the critical thinking skills of seventh grade students at the Langsa State Junior High School.
2. There is an interaction between the learning model and KAM on the critical thinking skills of seventh grade students at the Langsa State Junior High School.

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