EFFECTIVENESS OF *PROBLEM-BASED LEARNING* MODEL WITH A CONTEXTUAL APPROACH TO STUDENTS' THINKING ABILITY

Asyjarina Fildzah Hakim[1], Yanti Mulyanti[2], Ana Setiani[3]

Mathematics Education Study Program, FKIP, University of Muhammadiyah Sukabumi, Sukabumi, Indonesia[123]

Email : **asyjarina073@ummi.ac.id[1], yantimulyanti@ummi.ac.id[2],anasetiani361@ummi.ac.id[3]**

ABSTRACT

This article is a review literature that aim to provide research on *Problem-Based Learning* (PBL) models with a Contextual Approach to students' critical thinking talent. In this article, we will discuss the PBL learning model with a Contextual Approach to the critical thinking skills of SMP Negeri 1 Cibadak students. This study is a quantitative research with a pseudo-experimental method and *Control Group Pretest and Posttest Design*. The subject of this study is grade VII students of SMP Negeri 1 Cibadak with a total of 91 students, which are divided into two experimental classes and one control class. The data analysis technique used is a one-track anava test with prerequisite tests, normality tests, and homogeneity tests. This research use a tool that tests students' critical thinking skills. The result of this study show that the *problem-based learning* model with a Contextual Approach is better than the *Problem-Based Learning* and Direct Learning models on the critical thinking skills of junior high school students.

Keywords: contextual approach, critical thinking ability, pbl model.

ABSTRAK

Tujuan dari artikel ini adalah untuk memberikan tinjauan literatur tentang model pembelajaran berbasis masalah (PBL) yang menggunakan pendekatan kontekstual untuk meningkatkan kemampuan berpikir kritis siswa. Pendekatan kontekstual ini juga memberikan penjelasan tentang model PBL terhadap kemampuan berpikir kritis siswa SMP Negeri 1 Cibadak. Penelitian ini adalah penelitian kuantitatif dengan metode eksperimen semu dan *Control Group Pretest and Posttest Design*. Subjek penelitian ini ialah siswa kelas VII SMP Negeri 1 Cibadak dengan jumlah 91 siswa, yang tebagi menjadi dua kelas eksperimen dan satu kelas kontrol. Teknik analisis data yang digunakan adalah uji anava satu jalur dengan uji prasyarat uji normalitas dan uji homogenitas. Penelitian ini menggunakan instrumen tes kemampuan berpikir kritis siswa. Hasil penelitian ini menunjukan bahwa model *Problem-Based Learning* dengan Pendekatan Kontekstual lebih baik dibandingkan model *Problem-Based Learning* dan Pembelajaran Langsung terhadap kemampuan siswa SMP untuk berpikir kritis.

Kata kunci : pendekatan kontekstual, kemampuan berpikir kritis, model pbl.

INTRODUCTION

Education in Indonesia has gone through various processes, one of which is the development of the curriculum. The curriculum in Indonesia has evolved and sometimes still changes since independence. The curriculum serves as a foundation for strengthening education. The Independent Curriculum is a self-paced learning approach that allows

students to explore their own talents and interests (Maratusholihah & Madiun, 2023). According to Rahayu et al., (2022) This Independent Curriculum provides freedom to students, as well as develops characters that are reflected by students, so that they are in accordance with the Pancasila Profile. One of the components in the Pancasila profile is critical reasoning which refers to the think ablity critically. At addition, the Ministry of Education with Culture in (Arsanti et al., 2021) informing that the 21st century competencies that must be possessed are commonly referred to as the 4Cs, one of which is *Critical thinking and Problem solving* (critical thinking and problem-solving skills).

According to Christina & Kristin (2016), to achieve 21st century skills, students must have the ability to think critically to solve problems. Critical thinking skills must be nurtured for every child. Every student must acquire critical thinking skills so that they can handle all the challenges that exist in the real world. Critical thinking is the ability to figure out and solve problems by asking yourself questions to get information about the problem. Learning math is a good way to develop critical thinking skills in children (Fadillah, 2016). This shows how important critical thinking skills are in mathematics learning, because the two need each other and complement another high school (Kurniawati et al., 2020).

The low critical thinking ability of students can also be seen from the results of the initial observation research of grade VII students of SMP Negeri 1 Cibadak where there were 31 students, the number of students with an average of 96%75 and 4%. That way, there are still many students who have not reached the minimum completeness criteria of KKM 75. Based on the results of initial observations conducted in grade VII of SMP 1 Negeri Cibadak. In the exam, students are asked questions about social mathematics. Based on five indicators of critical thinking ability, we found that grade 7 students still lack critical thinking skills in social mathematics class. Of the percentage of observations made by 31 students, 35% did not meet all indicators, 32% only met one indicator, 20% only met two indicators,

---

Question

Mr. Damar is a tomato trader. Mr. Damar buys 50 kg of tomatoes from farmers at a price of Rp6,000.00, per kg, then 30 kg of them are resold at a price of Rp8,000.00 per kg, and the rest are sold at a price of Rp7,000.00 per kg,. Calculate:

a.   What is the overall price of the purchase of tomatoes

b.   What is the overall price of tomato sales

c.   How much is the profit or loss

---

and 9% found 3 indicators met, 4% met 4 indicators and no indicators were met. Students

meet five indicators of critical thinking skills. The following is a sample of the answers of grade VII students.
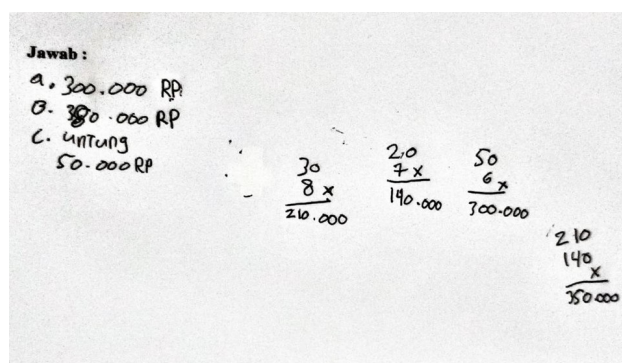
Figure 1. Initial Observation Questions

Figure 2. Student Answer

In figures 1 and 2, it shows that students have not been able to achieve all critical thinking indicators. It can be seen that students are only able to answer questions without first analyzing the problem, but students have not been able to provide solutions, ideas from known elements. So it can be said that students' critical thinking skills in Social Arithmetic material are still low. In fact, the achievement of learning mathematics, especially junior high school students in Indonesia, is still low. There are several data sources that can be used as a reference on this topic. First, the results of PISA (International Student Assessment Program) show that the mathematics ability of 15-year-old Indonesia children is still low. This is evidenced by the results of PISA 2018 which shows that Indonesia's critical thinking in mathematics is ranking 74 out of 79 countries, where the OECD average is 478 (OECD, 2019). When compared to international learning outcomes due to the pandemic. Compared to PISA 2018, Indonesia's mathematics literacy ranking increased by 5 positions in PISA 2022. Indonesia's mathematical literacy score increased by 13 points, surpassing the international average (OECD, 2023). From these two data, it can be seen that students' mathematical skills are not good and need to be improved.

Therefore, the research conducted by Maratusholihah & Madiun (2023) a learning model that is suitable for the Independent curriculum to improve students' critical thinking

skills in mathematics learning is a problem-based learning model, namely *Problem Based Learning*Because mathematics learning will be more efficient and efficient to improve students' critical thinking skills. PBL is a student-centered learning model. Problem-based that focuses on self-reflection between students and teachers (Jonassen, 2011).

Research on problem-based learning models to improve critical thinking skills has been carried out a lot, such as research conducted by Dewi Nurkhasanah (2019) in (Maratusholihah & Madiun, 2023), showing the application of a problem-based learning model to improve the critical thinking skills of grade VII junior high school students. The overall results of the study provide a positive conclusion about the application of problem-based teaching. However, among other studies, there is still no research that discusses the problem-based learning model combined with the Independent program. Of course, with this model, the Independent program aims to strengthen the track record of Pancasila students. According to Sanjaya (2007:219), the problem-based learning model has several weaknesses. These weaknesses are as follows: a) students will not try if they do not believe that the problem they are learning is difficult to solve, b) there needs to be support from books that can be used as understanding in learning activities, c) students cannot participate in learning activities independently.

In addition to the right learning model, the right learning approach is also needed. One approach that can actively involve students is Contextual Approach. According to Johnson (2010) Contextual learning refers to placing academic subject matter in the context of life, namely their personal, social context, social and cultural situation. Contextual learning is a concept that connects material with real-life synonyms and encourages students to apply it in daily life. So it can be concluded that PBL based on a contextual approach is a learning model that involves students in acquiring new knowledge by connecting their knowledge with real-life situations when solving problems, as well as encouraging students to find and develop the concepts they learn on their own.

According to Hutagaol (2013) The Contextual Approach in mathematics learning aims to change the above conditions, especially by creating learning situations that start from the real context of students (daily life). Then the teacher helps students turn the real life object into a mathematical concept, through questions and answers, discussions, and research. So that students can build these concepts in their heads. Thus, students learn by "doing math

and practical activities". Students' skills are significantly representative to contextual learning.

The novelty used in this study is the use of HOTS questions on the research instrument, according to Bahar (2021) students' ability to learn, especially in learning mathematics must be improved. In addition to the quality of teaching materials and teacher readiness. Critical thinking ability is a term that is often used to describe students' learning abilities. Accustomed students to complete tasks with other higher thinking skills, (HOTS). It is one of the ideas that allows skilled students to improve their skills in the classroom. When viewed in general, not all junior high school students have the same ability. Therefore, there may be some students above average in one class. This can be done because one of the characteristics of HOTS is a question-type activity that can be done by students.

Based on the description above, it is felt that it is necessary to conduct critical thinking research on students. This is because critical thinking skills have a very important role in learning mathematics, critical thinking skills can be developed through learning processes or activities that can accommodate students in solving or solving something or mathematical concepts accompanied by a suitable learning model, namely *problem-based learning* accompanied by a contextual approach. It is hoped that the use of models and approaches to mathematics learning can improve students' critical thinking skills.

METHODS

The type of research used here case is in the manner of numbers and statistical data analysis (Sugiyono, 2022). So that the type of research is quantitativetype that uses the quasi-experimental method (Quasi Experimental). A quantitative research method based on the philosophy of positivism, which is used on a particular sample or population, The sampling method is usually carried out randomly. Statistical selection using research tools, data analysis is quantitative or statistical with the aim of testing existing hypothese determined (Sugiyono, 2015).

The research design used in this pseudo-experiment is *Control Group Pretest and Posttest Design*, as a randomly selected experimental class and control class. In this study, there were three classes, namely one control class and two experimental classes.

Experimental Class I received treatment in the form of a learning model *Problem-Based Learning* with a Contextual Approach, Experimental Class II received treatment in the form of a learning model *Problem-Based Learning*, while the control class did not get special treatment. However, usually by providing learning with a direct teaching model. According to Sugiyono (2017), three groups were randomly selected in the design and a pretest was performed to check if there were any differences in the initial conditions between the experimental group and the control group.

In this study, maples were taken from the population of three classes of students in grade VII of SMP Negeri 1 Cibadak. Sampling is carried out by Technique *Random Cluster Sampling*. *Randong sampling cluster* is an area sampling technique used to determine the sample, if the object to be studied (S. Arikunto, 2012). Technique *cluster random sampling* The population in this study is all grade VII students of SMP Negeri 1 Cibadak Sukabumi Regency in 2023/2024 totaling 300 people. Of the 10 VII classes, three classes were randomly selected, drawn through lottery. It was done once and three times. Students in class VII D, consisting of 30 students, were used as experimental class I, using a learning model *Problem-Based Learning* with a contextual approach, the second class, namely class VII E, consisting of 30 students, was used as an experimental class II, and the third class, namely class VII F, consisting of 31 students, was used as a control class using a direct learning model.

This research process uses two types of instruments, namely test instruments and non-test instruments. With three data collection techniques, namely tests, observations and documentation. The test instruments used were first tested with validity tests, realism tests, differential ability tests, and difficulty levels. One this content validity, which is carried out by experts in the field, and the orther is construct validity, which links test score for each question with the student's work score. The following are the test results of the test instrument:

Table 1. Test Instrument Test Results

Number	1	2	3
Content Validity	Valid	Valid	Valid
Validity Construction	Valid	Valid	Valid

Realism		Keep	
Power of Difference	Good	Keep	Keep
Difficulty Level	Good	Keep	Keep

Based on the above table, it is clear that the instrument can be used in this study. The test instruments used are expected to produce answers with the following stages of critical thinking:

Table 2. Stages of Critical Thinking

Stages Think Critical	Skills Think Critical	Description
F (*Focus*)	1) Students understand the assignment	Identify problems well
R (*Reason*)	1) At each step of decision-making, students confirmed their decision or conclusion based on appropriate facts/evidence	The reasons given are logical or not to concluded on as determined in the problem
I (*Inference*)	1) Students draw Conclusion 2) Students choose the correct reason (R) to support the conclusion	If the reason developed is correct, then the reason must be sufficient to reach the actual conclusion
S (*Situation*)	1) Students use all information	Compare with actual situation
C (*Clarity*)	1) Students further explain what is meant in the conclusion 2) Shiva can explain the terms in question	For conclusions to be correct, the terms and explanations used in the discussion must be clear.

	3) Examples are provided by students, as indicated in the questions	
O (***Overview***)	1) Students check FRISCO results thoroughly from start to finish	Examination of something that has been discovered, decided, observed, studied, and decided

Testing, observations and documentation are done during the data collection. The test was conducted with three pre-test and post-test questions regarding critical thinking skills. There are three data analysis techniques that are carried out with the aim of analyzing the data obtained from the research results. Three data, analysis techniques are, three-sample balance test, hypothesis, test, and observation sheet data analysis.

1. Three-Sample Balance Test,

The balance test is a pretest score test that must be carried out before the experiment takes place. The purpose of this test is to find out whether the ability of the research sample is comparable. The single-track anava test, which meets the prerequisites for normality and homogeneity, is used to test balance.

2. Hypothesis Test

The hypothesis test used was a one-track anava test that aimed to find out the average difference between the three samples based on the critical thinking ability of junior high school students. Then a post-anava follow-up test with *the Scheffe test* was carried out which aimed to see which learning model was better for junior high school critical thinking skills.

3. Observation Sheet Data Analysis

In this researcher, the observation sheet was prepared based on the treatment steps that will be given in each class, experimental class I, experimental class II and control class. The purpose of this observation sheet is to collect structured information about teacher and student activities during the learning process. The data used for the analysis is the *Likert Scale*.

RESULTS AND DISCUSSION

1. Three-Sample Balance Test

a. Normality Test

The results of the calculation of the normality test with the Liliefors test at the significance level of 5% are as follows.

Table 4. Pretest Data Normality Test Results

Sample	N		
Class Experiment I	30	0,6376	0,1618
Class Experiment II	30	0.0877	0,1618
Control Classes	31	0,1298	0,1591

The results of the normality test calculation using *the Liliefors test* produce an accepted value if . Thus all sample groups are from populations with normal distributions.

b. Homogeneity Test

The following are the results of the homogeneity test calculation using *the Barlett test* with a significance level of 5%.

Table 5. Results of Pretest Data Homogeneity Test

Sample	Variance		
Experimental Class I	143,94	1,4303	0,9331
Experimental Class II	233,91	1,4303	0,9331
Control Classes	266,57	1,4303	0,9331

From the table it can be seen that it is acceptable if . Therefore, it can be said that the three classes have a homogeneous variance.

c. Anava Test

The following are the results of the calculation of the anava test of one cell line is not the same as the significance level of 5%.

Table 6. Anava Test Results One Line Data *Pretest*

Sample	N		
Class Experiment I	30	0,41	3,10
Class Experiment II	30	0.41	3,10
Control Classes	31	0,41	3,10

From the data of the table above, it is determined , then it is accepted. This means that the three sample groups that will be given treatment have the same average. Thus, it can be concluded that students' critical thinking skills are balanced before being given treatment.

2. Hypothesis Test

   a. Normality Test

   The calculation of the normality test with *the Liliefors* test at a significance level of 5% produced the following data.

Table 7. Posttest Data Normality Test Results

Sample	N		
Class Experiment I	30	0,0852	0,1618
Class Experiment II	30	0.0765	0,1618
Control Classes	31	0,0944	0,1591

The results of the normality test calculation with *the Liliefors* test were obtained each sample produced a value, then it was accepted. So it can be concluded that all three classes come from a normally distributed population.

   b. Homogeneity Test

The following are the results of the homogeneity test calculation using *the Barlett* test with a significance level of 5%.

Table 8. Results of Posttest Data Homogeneity Test

Sample	Variance		
Experimental Class I	338,2	1,1420	0,9345
Experimental Class II	303,0	1,1420	0,9345
Control Classes	153,4	1,1420	0,9345

Based on the table above, it is clear that the results of the homogeneity test for the three sample groups show that the value , is accepted. So it can be concluded that the variance of all three homogeneous samples comes from the same population.

c. One-Track Anava Test

The following are the results of the calculation of the anava test of one cell line is not the same as the significance level of 5%.

Table 9. Anava Test Results One Path Posttest Data

Sample			
Class Experiment I	68,70	13,46	3,,10
Class Experiment II	58,02	13,46	3,10
Control Classes	47,04	13,46	3,10

From the data of the table above, it is determined , then it is rejected. This means that the three sample groups that have been given treatment have different averages. Thus, it can be concluded that there is a difference in the critical thinking ability of junior high school students after being given different treatment.

d. Post-Anava Test

The following are the results of the calculation of the post-anava test with *the Scheffe* test.

Table 10. Post-Anava Results of Single Cell Pathway Differs *from Posttest Data*

Comparison	Critical		
	469,19	120,73	113,91
	17,43	17,43	17,71
RKG	256,72	256,72	256,72
	6,54	26,72	6,92
	6,2	6,2	6,2
Decision			
	rejected	rejected	rejected

From the results of the post-anava test with Scheffe in the comparative calculation

, a value was produced, meaning rejected. Therefore, the *problem-based learning* model is a situational approach and is different in quality from the problem-based learning model in terms of students' critical thinking skills. Because on average, the problem-based learning model with a situational approach is better than the problem-based learning model. Therefore, it can be said that the problem-based learning model has a better situational approach compared to the problem-based learning model from the perspective of students' critical thinking skills

The results of the comparative calculation are produced with a value, meaning that it is rejected. Therefore, *the Problem-Based Learning* model has a different contextual approach in quality from the direct learning model on students' critical thinking skills. Because the average *Problem-Based Learning* model with a contextual approach is greater than direct learning. So it can be said that the *Problem-Based Laerning* model is a better contextual approach compared to the direct learning model on students' critical thinking skills.

In addition, in the calculation of comparison, a value is produced , meaning it is rejected. Therefore, *the Problem-Based Learning* model differs in quality from the direct learning model on students' critical thinking skills. Because the average *Problem-Based Learning* model is greater than direct learning. So it can be said that

the *Problem-Based Learning* model is better than the direct learning model for students' critical thinking skills.

3. Observation Sheet Analysis
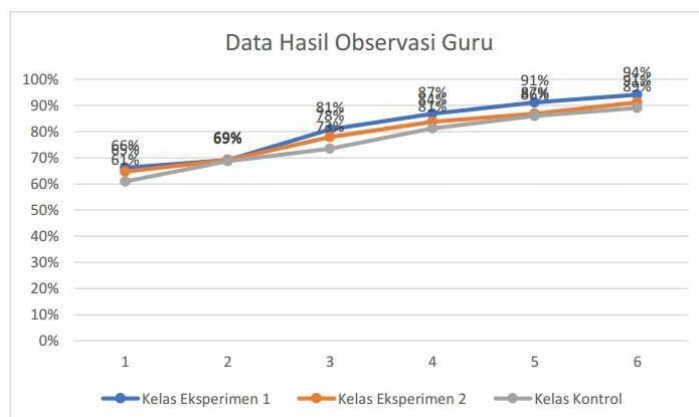
a. Teacher Observation Sheet

Figure 3. Teacher Activity Assessment Graph

Referring to the figure above, it can be seen that there is an improvement in the quality of teacher activities in using *the Problem-Based Learning* model with a contextual approach, *the Problem-Based Learning* model and the direct learning model have improved. That way, it can be interpreted that the researcher can correct the shortcomings that existed in each previous meeting.
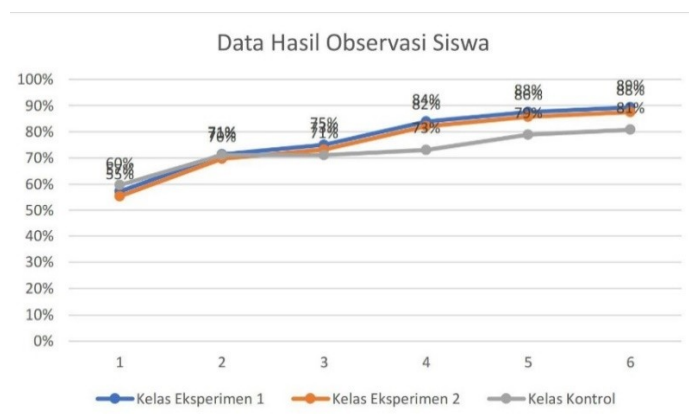
b. Student Observation Sheet

Figure 4. Student Activity Assessment Graph

The above Gambra shows that there is an improvement in the quality of student activities with *the Problem-Based Learning* model with a contextual approach, *the Problem-Based Learning* model and the direct learning model. So it can be said that the students' activity is getting better at every meeting.

Based on the results of the hypothesis test using the anava test of one different cell pathway, it shows that there is a difference in the critical thinking ability of junior high school students who learn using *the Problem-Based Learning* model with the contextual approach of the Problem-Based Learning *model*. This is because the Problem-Based Learning *model* model with a contextual approach triggers students to develop a problem-solving hypothesis assisted by a contextual approach that presents the problem concretely and directs students in understanding the concept of Social Arithmetic. In contrast to the Problem-Based Learning *model* without a contextual approach, students are directed to develop hypotheses without concrete problems such as in the contextual approach. Meanwhile, in the direct learning model, the learning process does not direct students to formulate a hypothesis first, therefore, from the three models given, it has a different impact on students' critical thinking skills.

Because there is an average difference from each sample group, so the test continues with a post-anava test using *the Scheffe* test. This test was carried out to use which learning model has a better impact on students' critical thinking skills, including the *Problem-Based Learning* model with a contextual approach, *the Problem-Based Learning model* and the direct learning model. The discussion of the results of the analysis of the post-anava test using *the Scheffe* test is as follows.

1. ***Problem Based Learning* model with Contextual Approach with *Problem Based Learning model***

     In the model *problem based learning* with the contextual approach, students are asked to formulate problems, make hypotheses, and use contextual approaches to help students make hypotheses. the results show that students who use this approach have better critical thinking skills compared to students who use the *problem based learning*. because in this case, a contextual approach is a type of learning that helps teachers relate the material given to real-world situations. type *problem based learning* is a form of learning model by relating problems that exist in daily life to topics for students and is used as a means to learn to solve problems and think critically. if this problem-based learning model and contextual approach are combined, students will practice solving more physical problems that are relevant to the problems they encounter every day (Mustofa et al., 2016).

     As for the *problem based learning* learning model, the implementation of learning is almost the same as *the problem based learning* model with a contextual approach. however, this learning model does not use any approach to help students learn independently, such as practice questions that ask them to build problems, and make hypotheses to solve problems.

2. ***Problem Based Learning* model with Contextual Approach with Direct Learning model**

     In the *problem based learning* model with a contextual approach, students are asked to formulate problems, make hypotheses, and use contextual approaches to help students make hypotheses. the results showed that students who used this approach had better critical thinking skills compared to students who used the direct learning model.,

     In the Direct Learning model, the implementation of learning begins by informing students about the learning objectives and resources needed. Then, it encourages learners to participate actively and helpfully. The hands-on learning

model is a type of learning model in which the teacher provides further explanations of concepts and skills to a number of groups of students (Prabowo, 2020). because In addition to the right learning model, the right learning approach is also needed. One approach that can actively involve students is the Contextual Approach. The approach lies in a learning system based on cognitive, effective, and psychomotor assessments (Sulianto et al., 2018). The results show that the problem-based learning model with a situational approach has a better impact on students' critical thinking skills compared to the direct learning model. Because critical thinking skills increase when learning with the right learning model and assistance with approaches. This is in line with the opinion (Maratusholihah & Madiun, 2023).

3. *Problem-Based Learning* model with Direct Learning model

In the model *problem based learning*, the implementation of learning begins with providing explanations related to learning objectives and the necessary facilities and then motivating students to be more active and helping students in organizing learning tasks, both individually and in groups. as with the opinion mareti & hadiyanti (2021) by utilizing direct observation and group work, problem-based learning models can help students improve their critical thinking skills through problem-solving. in addition, this model provides an opportunity to increase students' natural curiosity, encouraging them to participate in active activities. and improve their ability to ask questions and seek answers based on existing information. this will improve their critical thinking attitude and problem-solving skills.

Implementation of learning in a direct learning model begins by informing students about the learning objectives and resources needed. then, it encourages learners to participate actively and helpfully. the hands-on learning model is a type of learning model in which the teacher provides further explanations of concepts and skills to a number of groups of students (prabowo, 2020). in the direct learning model, students are more required to listen to explanations from the teacher who then at the next stage students do practice questions independently. this causes a lack of student participation in teaching activities, besides that because this concept of direct learning is teacher-centered, so students do not play an active role in learning which results in students' critical thinking skills. this statement is supported by the results of the anava post-test using the *scheffe* test. The results of the study show that the situational approach-based learning model has a more positive impact on students' critical thinking skills compared to the direct learning model. Because critical thinking skills increase when learning with the right learning model and assistance with approaches. this is in line with the opinion (Maratusholihah & Madiun, 2023).

INFERENCE

The conclusion from the research and discussion that has been carried out is that the critical thinking ability of junior high school students with the provision *of the problem-based learning* model with a contextual approach, *the problem-based learning model* and the direct learning model. in addition, the critical thinking ability of junior high school students after being given *the problem-based learning* model with a contextual approach has improved.

Therefore, the *Problem-Based Learning* model with a contextual approach is expected to be one of the options for mathematics learning in schools. As previously explained, the model supports the improvement of students' critical thinking skills with the help of a contextual approach that makes lessons more concrete and directed.

REFERENCES

Arsanti, M., Zulaeha, I., Subiyantoro, S., & Haryati, N. (2021). Prosiding Seminar Nasional Pascasarjana ISSN 26866404 Pascasarjana Universitas Negeri Semarang Tuntutan Kompetensi 4C Abad 21 dalam Pendidikan di Perguruan Tinggi untuk Menghadapi Era Society 5.0. *Arsanti, M., Zulaeha, I., Subiyantoro, S., & Haryati, N. (2021). Prosiding Seminar Nasional Pascasarjana ISSN 26866404 Pascasarjana Universitas Negeri Semarang Tuntutan Kompetensi 4C Abad 21 Dalam Pendidikan Di Perguruan Tinggi Untuk Menghadapi Era Societ*, 319–324. http://pps.unnes.ac.id/prodi/prosiding-pascasarjana-unnes/

Bahar, F. (2021). Upaya Meningkatkan Kemampuan Berpikir Kritis Siswa SMP Kelas VII dengan Pola Pembelajaran Matematika Berbasis HOTS pada Topik Bilangan. *Jupendik: Jurnal Pendidikan*, *5*(1), 6–11. https://jupendik.or.id/index.php/jupendik/article/view/68

Christina, L. V., & Kristin, F. (2016). Efektivitas Model Pembelajaran Tipe Group Investigation (Gi) Dan Cooperative Integrated Reading and Composition (Circ) Dalam Meningkatkan Kreativitas Berpikir Kritis Dan Hasil Belajar Ips Siswa Kelas 4. *Scholaria : Jurnal Pendidikan Dan Kebudayaan*, *6*(3), 217. https://doi.org/10.24246/j.scholaria.2016.v6.i3.p217-230

Fadillah, A. (2016). Analisis Minat Belajar Dan Bakat Terhadap Hasil Belajar Matematika Siswa. *M A T H L I N E : Jurnal Matematika Dan Pendidikan Matematika*, *1*(2), 113–122. https://doi.org/10.31943/mathline.v1i2.23

Handayani, R., Kashardi, & Destania, Y. (2021). Soal Essay Materi Aritmatika Sosial Untuk Kemampuan Berpikir Kritis Matematis Siswa Kelas VII. *Indiktika : Jurnal Inovasi Pendidikan Matematika*, *4*(1), 92–102.

Hutagaol, K. (2013). Pembelajaran Kontekstual Untuk Meningkatkan Kemampuan Representasi Matematis Siswa Sekolah Menengah Pertama. *Infinity Journal*, *2*(1), 85. https://doi.org/10.22460/infinity.v2i1.27

Johnson. (n.d.). No Title. *Johnson, T. E., Archibald, T. N., & Tenenbaum, G. (2010). Individual and Team Annotation Effects on Students' Reading Comprehension, Critical Thinking, and Meta-Cognitive Skills. Computers in Human Behavior, 26, 1496-1507.*, *2010*.

Jonassen, D. (2011). Supporting Problem Solving in PBL. *Interdisciplinary Journal of Problem-Based Learning*, *5*(2), 9–27. https://doi.org/10.7771/1541-5015.1256

Kurniawati, D., Ekayanti, A., Keguruan, F., Pendidikanuniversitas, I., & Ponorogo, M. (2020). Pentingnya Berpikir Kritis Dalam Pembelajaran Matematika. *PeTeKa*, *3*(2), 107–114. http://jurnal.um-tapsel.ac.id/index.php/ptk/article/view/1892

Maratusholihah, A., & Madiun, U. P. (2023). *Implementasi Kurikulum Merdeka melalui Penerapan Model Problem Based Learning untuk Meningkatkan Ketrampilan Berpikir Kritis Siswa pada Pembelajaran Matematika Kelas V*. *2*(2), 634–641.

Mareti, J. W., & Hadiyanti, A. H. D. (2021). Model Problem Based Learning Untuk Meningkatkan Kemampuan Berpikir Kritis dan Hasil Belajar IPA Siswa. *Jurnal Elementaria Edukasia*, *4*(1), 31–41. https://doi.org/10.31949/jee.v4i1.3047

Mustofa, Z., Susilo, H., Heni, M., & Al Muhdhar, I. (2016). Penerapan Model Pembelajaran Problem Based Learning Melalui Pendekatan Kontekstual Berbasis Lesson Study Untuk Meningkatkan Kemampuan Memecahkan Masalah Dan Hasil Belajar Kognitif Siswa Sma. *Jurnal Pendidikan*, *1*(2502-471X), 885–889.

Nurkhasanah, D. (n.d.). *No Title*.

Prabowo, A. &. (2020). No Title. *Auliyah, F., & Prabowo. (2020). Validitas Perangkat Pembelajaran Langsung Berbantuan Gravity Ralling Ball Pada Materi Getaran Harmonis. IPF : Inovasi Pendidikan Fisika, 9(1), 14–17. Retrieved from*

Https://Jurnalmahasiswa.Unesa.Ac.Id/Index.Php/Inovasi-Pend.

Rahayu, R., Rosita, R., Rahayuningsih, Y. S., Hernawan, A. H., & Prihantini. (2022). Implementation of Independent Curriculum in Driving School. *Jurnal Basicedu*, *6*(4), 6313–6319.

S. Arikunto. (2012). Prosedur Penelitian.Jakarta:n Rineka Cipta.

Sugiyono. (2015). Metode Penelitian Kuantitatif. Bandung:Alfabeta

Sugiyono. (2017) Metode Penelitian K*uantitatif, Kualitatif, dan R&D*. Bandung:CV.Alfabeta.

Sugiyono. (2020). Metode Penelitian K*uantitatif, Kualitatif, dan R&D*. Bandung:CV.Alfabeta.

Sulianto, J., Cintang, N., & Azizah, M. (2018). Analisis Korelasi dan Regresi Berpikir Kritis Terhadap Kemampuan Pemecahan Masalah Matematika Siswa SD Kota Semarang. *Mengembangkan Kompetensi Pendidik Dalam Menghadapai Era Disrupsi*, *2009*, 237.