Improving Critical Thinking Skills of Class VI Students Building Space Materials through the RME Learning Model

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Abstract

This research aims to describe efforts to improve critical thinking skills in building materials by implementing the learning model of realistic mathematics education (RMEl) at SDN Cijambe Tengah Sukaresmi Village, Cisaat District, Sukabumi Regency for the 2023/2024 academic year in the school year. The research method used is Class Action Research (PTK) with The research design uses the Kelmmis and Mc Taggart model which is carried out in two cycles. Each cycle consists of planning, implementation, action and observation, as well as reflection. Participants in this research are 35 class VI students. This research data collection technique uses a type of test. preltelst and polstelst. The initial research techniques take the form of observation, field notes and documentation. The data analysis technique used is descriptive quantitative. In the pre-cycle, this activity still uses the colonial learning model. Students' mathematical critical thinking skills improve after implementing the RMEl learning model. This can be seen from the learning completion of classically educated students who have experienced an increase. Starting with the pre-cycle where this activity still uses the national learning model, namely 29% or 10 students who completed above the KKM (70) out of a total of 35 students. Then, carrying out the first cycle stage by implementing the RM learning model, the ability to think critically in mathematics resulted in an increase in the total level of 49% or 17 students who completed the KKM, then the research continued with the second cycle stage until they achieved a total completion score of 74% or as many as 26 students who completed the KKM. Therefore, the research was stopped classically because it had reached or exceeded the 70% achievement indicator.

Abstrak

Penellitian ini bertujuan mendelskripsikan upaya peningkatan keterampilan berpikir kritis materi bangun ruang dengan penerapan modell pembelajaran realistic mathematics education (RMEl di SDN Cijambe Tengah Desa Sukaresmi Kecamatan Cisaat Kabupaten Sukabumi tahun pelajaran 2023/2024 disemester genap. Metode penelitian yang digunakan adalah Penelitian Tindakan Kelas (PTK) dengan desain penellitian menggunakan model Kemmis dan Mc Taggart yang dilakukan sebanyak dua siklus. Setiap siklus terdiri dari perencanaan, pelaksanaan, tindakan dan pengamatan, serta reflelksi. Partisipan dalam penellitian ini adalah peselrta didik kelas VI sebanyak 35 siswa. Teknik pengumpulan data penellitian ini menggunakan tes berupa *pretelst* dan *postelst*. Sedangkan teknik non tes berupa olbservasi, catatan lapangan dan dolkumentasi. Teknik analisis data yang digunakan adalah kuantitatif deskriptif. Pada pra siklus dimana pada kegiatan ini masih menggunakan model pembelajaran konvensional. Keterampilan berpikir kritis matematika siswa meningkat setelah menerapkan model pembelajaran RMEl. Hal ini dapat diketahui dari ketuntasan belajar peserta didik secara klasikal yang mengalami peningkatan. Diawali dengan pra siklus dimana pada kegiatan ini masih menggunakan model pelmbelajaran konvensiolnal yaitu sebelsar 29% atau 10 peserta didik yang tuntas diatas KKM (70) dari total jumlah keseluruhan 35 siswa. Kemudian dilakukan tahapan siklus I dengan menelrapkan model pembelajaran RMEl kemampuan berpikir kritis matematika mengalami peningkatan sebelsar 49% atau 17 siswa yang tuntas KKM, maka penellitian teltap dilanjutkan ketahap siklus II sampai mempelroleh nilai ketuntasan sebelsar 74% atau sebanyak 26 siswa yang tuntas KKM. Oleh sebab itu, penellitian dihentikan secara klasikal karena telah mencapai atau melelbihi indikator ketercapaian 70%.

Keyword: Upaya Berfikir kritis Siswa kelas VI

INTRODUCTION

National education aims to brighten the life of the nation and develop humans as a whole with Law Regulation Number 20 of 2003 in Chapter 2 article 3 concerning the National Education System. "Education is to develop students' potential to become human beings who believe and are devoted to God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent and become democratic and responsible citizens."

With current advances in science and technology, critical thinking is certainly very necessary. Critical thinking is seen as an attitude of thinking deeply about problems and things that are within the range of one's experience (Pradani & Komalasari, 2022). Critical thinking requires strenuous efforts to examine every belief or assumptive

knowledge based on supporting evidence and conclusions (Anwar & Puspita, 2018).

One of the sciences that can support critical thinking skills is learning mathematics. Mathematics learned at school helps students to be oriented

in the interests of educators. The learning process in schools is usually carried out informatively in discovering concepts and getting examples of questions which causes students' high-level cognitive abilities to be very weak. (Anwar & Puspita, 2018). So far, schools have not trained their students' problem-solving skills enough. This is indicated by the low critical thinking and problem-solving abilities resulting from the assessment of student learning outcomes reported from the results of the PISA (Program for International Student Assessment) study, according to Azizah et al., (2019).

The results of the PISA survey from 2000 to 2015 show that the average score for the level of mathematical literacy is still below the average level in the countries that took part in the survey (Kismiantini et al., 2021). There are several factors that can cause low student mathematics learning outcomes, especially in Building Space material. This is a material that emphasizes understanding and reasoning in students. These internal and external factors are the causes of low student learning outcomes (Pradani & Komalasari, 2022).

The lack of development of critical thinking skills cannot be separated from the learning process which is usually carried out through lectures and does not provide opportunities for students to practice their thinking skills. This is intended to stimulate the ability to think slowly. If this is done often, they will slowly develop basic critical thinking skills. (Pradani & Komalasari, 2022). Learning mathematics can also improve students' critical thinking skills. One way is to get them used to facing problems that require critical thinking (Ariawan, Dahlia, Nufus, & Nurdin, 2022).

Based on the results of observations made by researchers, class VI students at SD Negeri Cijambe Tengah have not been able to solve problems in learning spatial shapes, it can be seen from the students' understanding that they still incorrectly apply the characteristics and formulas used in spatial shapes. From some of the problems above, it can be said that these problems are generally caused by boring learning activities. Teachers as instructors are responsible for increasing the efficiency and effectiveness of the teaching and learning process for optimal results. Learning is recognized as a skill to improve critical thinking abilities by building concepts through learning.

This emphasizes full participation in helping students learn the material and connecting it to their daily lives. (Pradani & Komalasari, 2022). Based on the explanation above, new alternatives are needed during learning activities

teaching where students can improve their critical thinking skills. One of them is using the Realistic Mathematics Education (RME) learning model.

Realistic Mathematics Education (RME) is an approach to learning mathematics that was developed in 1971 by a group of mathematicians from the Freudenthal Institute Utrecht University in the Netherlands. This approach is based on Hans Freudenthal's (1905 – 1990) opinion that mathematics is a human activity. According to this approach, the mathematics class is not a place to transfer mathematics from teachers to students, but rather a place where students rediscover mathematical ideas and concepts through exploring real problems (Wahyudi, 2016).

The same opinion was also expressed by Ardina (2019), Realistic Mathematics Education (RME) was developed based on the thoughts of Hans Freudenthal (1905 – 1990), namely a German/Dutch writer, educator and mathematician who argued that "mathematics is a human activity (human activities) and must be linked to reality". Based on this idea, RME has characteristics, among others, that in the learning process students must be given the opportunity to rediscover mathematics through teacher guidance.

The Realistic Mathematics Education (RME) Learning Model provides opportunities for students to rediscover and

construct mathematical concepts based on realistic problems given by the teacher, because students build their own knowledge, students will not easily forget. Apart from that, the atmosphere in the learning process will be more enjoyable because it uses the reality of life (Chisara et a., 2018).

Papadakis (2021) states that the RME learning model is related to mathematical concepts, critical thinking skills, creative thinking, and problem solving. Warsito et al. (2018) stated that the RME learning model provides the widest possible opportunities for students to build their own knowledge through the problem-solving process provided. On the basis of the problems above and also based on previous research conducted by Adhistami Putri Pradani and Ratna Komalasari entitled "Improving Critical Thinking Ability Through the Realistic Mathematics Education (RME) Approach to Mathematics Learning", with a quantitative type of research, therefore the researcher trying to make learning research using the Realistic Mathematics Education (RME) approach to improve students' critical thinking skills, entitled "Efforts to Improve the Critical Thinking Skills of Class VI Students on Building Materials through the RME Learning Model". The novelty of this research is that it emphasizes aspects of basic mathematics mastery in working on spatial construction problems using the RME model as an end result which is expected to increase critical thinking skills.

RESEARCH METHOD

This research uses the Classroom Action Research (PTK) method. Classroom Action Research (PTK) is action research carried out by teachers as well as researchers in their classes or together with other people (collaboration) by designing, implementing and reflecting on actions collaboratively and participatively with the aim of improving or increasing the quality of the learning process in his class through certain actions in a cycle (Ramadhan & Nadhira, 2022).

Through PTK research carried out in cycles, this research consists of a pre-cycle to determine initial abilities, then cycle I is carried out by applying the RME model to improve critical thinking, but it is still not optimal so cycle II is carried out with the results of the reflection of the previous cycle. By implementing PTK per cycle, deficiencies or weaknesses that occur in the teaching and learning process can be identified and detected, and then appropriate solutions are sought (Nurulanningsih, 2023). This research trains critical and systematic thinking starting from planning, implementing, observing and reflecting. PTK will be able to improve learning processes and products. (Susilowati, 2018).

This research was conducted at the Cijambe Tengah State School, Sukaresmi Village, Cisaat District, Sukabumi Regency. The subjects used in this research were 35 grade VI students at Cijambe Tengah State Elementary School for the 2023/2024 academic year, with details of 18 male students and 17 female students. Data collection here uses observation and document study in the form of results from the Final Summative Assessment (PAS) Even for the 2023/2024 Academic Year.

RESEARCH RESULTS AND DISCUSSION

The implementation of the action is observed by observers consisting of colleagues observe teacher activities, student activities, and carry out documentation During the learning process, it can be seen from the Pre-cycle Results through the Odd Semester Final Summative (UAS) scores for the 2023/2024 Academic Year in the Mathematics subjects that have been completed, students' critical thinking skills are not optimal, and there is still a lot that needs to be improved for the next cycle. Data on the results of classical pre-cycle tests that do not use RME mode can be seen in the following table:

Table 1. Pre-Cycle Learning Completeness Test Results

No	Keterangan	Hasil
1	Nilai Maksimal	100
2	Nilai Terendah	40
3	Nilai Tertinggi	80
4	Rata-Rata Kelas	58
5	Peserta didik Memenuhi KKM (70)	10
6	Peserta didik Belum Memenuhi KKM (70)	25

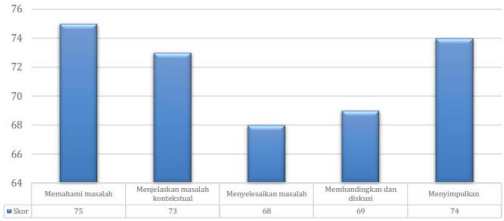
Based on the data presented in Table 1, shows that on average the Pre-cycle class obtained a score of 58. The highest score was 80 and the lowest score was 40. The number of students who achieved the KKM reached29% or 10 students out of 35 students while students who scored below the KKM (70) achieved71% or 25 students. From the results of the implementation of the process in learning efforts to improve critical thinking skills in the pre-cycle have not been optimal. Then after applying cycle I using learning model RME Data on classical completion results from cycle I can be seen in the table as follows:

Table 2. Results of Cycle I Learning Completeness Test

No	Keterangan	Hasil
1	Nilai Maksimal	100
2	Nilai Terendah	67
3	Nilai Tertinggi	86
4	Rata-Rata Kelas	69
5	Peserta didik Memenuhi KKM (70)	17
6	Peserta didik Belum Memenuhi KKM (70)	18

Based on the data presented in Table 2, it shows that the average achievement for class I is value of 69. The highest score is 86 and the lowest score is 67. Total participant of students who achieved KKM reached 49% or 17 students out of 35 students, while students who obtained the value under the KKM (70) reaches 51% or 18 students. The results of observations of student activities in an effort to improve critical thinking skills

Cycle Observation ResultsI



In building materials using the RME model, it can be seen in the following picture:

Figure 1. Graph of Cycle I Observation Results

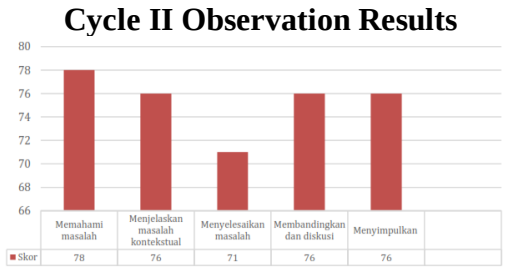
Image of process implementation learning in an effort to improve critical thinking skills through observation using the RME learning model has gone quite well and is available increase, although not yet significant. The weakness of cycle I is that students are not yet accustomed to learning using the RME model. Apart from that, students' concentration is still not good enough, and individual learning also does not provide opportunities for all students to take an active role in learning, besides that not all students have mastered basic mathematics skills so that they tend to be less careful when calculating. After applied cycle II with using the RME learning model and applied improvement from cycle I which was not optimal.

The improvements in Cycle II are implementing peer tutoring in group learning, integrating questions with story questions related to daily life, being given tricks to calculate quickly and then being given enrichment before working on the questions together to calculate with different numbers from the questions so that students understand and focus more on the teacher's directions. As for data on completion results in a way of classical cycle II can be seen in the table as follow:

Table 3. Results of Cycle II Learning Completeness Test

No	Keterangan	Hasil
1	Nilai Maksimal	100
2	Nilai Terendah	69
3	Nilai Tertinggi	93
4	Rata-Rata Kelas	73
5	Peserta didik Memenuhi KKM (70)	26
6	Peserta didik Belum Memenuhi KKM (70)	9

Based on data of students in Table 3 showed that the average of the second cycle class is 73. The highest score is 93 and lowest is 69. Total of students who achieved KKM reached in 74% or 26 students from 35 students, then the students who have score under the KKM (70) reaches 26% or 9 students. As the result of students' critical thinking skills using the RME model can be seen in the picture as follow:



Gambar 2. Grafik Hasil Observasi Siklus II

From the picture, the implementation of the learning process in improving critical thinking skills using the RME model in cycle II experienced quite a significant increase. As for the improvement graphic from cycle I to cycle II as follows:

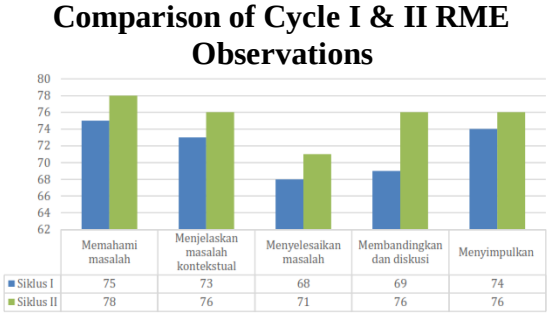


Figure 3. Comparison graph of observation results for each cycle

Syntax of understanding problems in critical thinking indicators from cycle I got a score of 75 then in cycle II got a score of 78, the improvement in this activity only increased by 3 points because in understanding the problem not all students were able to do this, in other words students found learning difficulties because they had not mastered basic mathematics as a whole to the maximum. According to Lilik Sriyanti (2018: 126), learning difficulties are learning problems experienced by students which hinder their efforts to achieve their learning goals. These obstacles can appear around or within themselves. To a certain degree, students can overcome learning disabilities without involving others. Students have not been able to overcome their learning disabilities and may need help from teachers. The syntax of explaining contextual problems in the critical thinking indicator from cycle I got a score of 73, then in the second cycle, they got a score of 78, the improvement in this activity only increased by 5 points because not all students were able to relate the learning material about building space to real life, they were not able to optimally imagine how the concept of the material presented was related to everyday life, such as the opinion expressed. explained by Chisara, Hakim, & Kartika, (2018: 67) Contextual problems are defined as problems where the problem situation is a real experience for students.

The syntax of explaining contextual problems in the critical thinking indicator from cycle I obtained a score of 73 then in cycle II obtained a score of 78, the increase in this activity only increased by 5 points because when given questions related to solving everyday life, each child's learning style was different. , as explained by Zulqarnain and Fatmahanik (2022:1) reveal that contextual problem solving abilities are one of the students' abilities that must be developed in learning because they relate to real life. One of the causes of differences in student abilities is differences in learning styles.

The syntax of comparing and discussing in the critical thinking indicator from cycle I obtained a score of 69 then in cycle II it increased to 76, the increase in this activity was 7 points, because in cycle I students were free to discuss with friends who were close by, this

was in order to discipline students, but it was found The problem is that not all students have the ability to exchange thoughts and opinions regarding the problems they will solve. Then in cycle II group learning was formed with peer tutors. Supported by the opinion of Jediut and Madu (2021: 135), the peer tutoring method is a learning activity in class or outside the classroom that provides students with the opportunity to share their knowledge and skills with other students. The assistance in question is related to difficulties experienced by other friends in learning. Apart from that, you can also use group investigations or investigations in groups, this has been proven to increase student cooperation and understanding (Aprilia, Lyesmaya, and Nurochmah, 2022: 164).

The syntax of concluding in the critical thinking indicator from cycle I obtained a value of 74 then in cycle II it increased to 76, the increase in this activity was 2 points, because from the beginning of the cycle to cycle II, students were quite good at concluding activities, this was because students had fairly good reasoning skills. Even though students' reasoning abilities are quite good, improvements are needed during implementation so that the conclusion activity is more focused. Supported by the explanation from Agustin (2019: 123) reasoning activities are the process of learning to think logically and systematically on empirical facts that can be observed to obtain conclusions in the form of knowledge. Existing reasoning will make students study harder to develop their thoughts and ideas in implementation.

Apart from that, in cycle II students are able to find connections between information and discover various patterns of these connections, then together in a group, or individually, make conclusions. However, in future implementation, teachers should make plans or learning patterns that are more interesting so that students' critical reasoning power to draw conclusions is better developed.

The implementation of cycle II of critical thinking skills in Mathematics using the RME model has increased significantly. The following percentage increase in Pre-Cycle, Cycle I and Cycle II in learning completeness can be presented in the following figure:

Percentage of critical thinking completeness each cycle

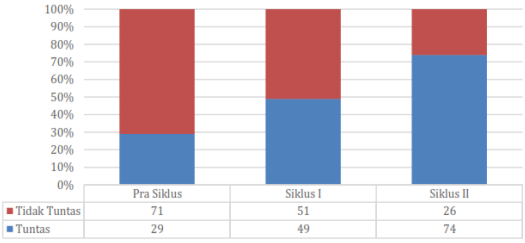


Figure 4. Graphic of Completeness of Critical Thinking Learning Results

Based on the explanation and graphic presentation of the improvement for each cycle above, the author compares the results from pre-cycle, cycle I and cycle II. The results obtained from the implementation of cycle I was stated to be quite good with completeness of critical thinking skills in mathematics, namely with an average value is 70% classically then this research will be completed. From the pre-cycle, learning completion only achieved 29% because they still used the learning model conventional activities such as lectures, exercises, and questions and answers. After implementing the learning model RME in cycle I was proven to have increased, although it did not yet appear significant, completed as big as 49%, then from the results of the evaluation of the previous cycle, the research was continued in cycle II by adding improvement, completeness of critical thinking skills learning outcomes increased by 74%. So, in accordance with the previously determined criteria for completeness of critical thinking in mathematics using the RME learning model, this is given followed and considered successful for application in mathematics learning school base.

This success is in line with the support of opinion. According to Freudenthal in (Ardina, Fajriyah, & Budiman, 2019: 153) the development of RME (Realistic Mathematics Education) is based on two views, namely that mathematics must be linked to things that are real for students and must be viewed as a human activity. Mathematics as a human

activity means that humans must be given the opportunity to "rediscover" mathematical ideas and concepts with adult guidance. The "rediscovery" view means that students are given the opportunity to discover mathematical concepts for themselves by solving various contextual problems. Based on these contextual questions, students build a model of (model of situation) the problem situation, then construct a mathematical model to (model for formal mathematics) solve it until they gain formal knowledge of mathematics.

CONCLUSION

Based on the results of research carried out at Cijambe Tengah Elementary School, Sukaresmi Village, Cisaat District, Sukabumi Regency, academic year 2023/2024, students' learning outcomes after implementing the realistic Mathematics Education learning model (RME)ıshows satisfactory results in improving critical thinking skills through Classroom Action Research (CAR).

As the Indicators of Critical thinking skills are (a) basic clarification or Basic Clarification, (b) giving reasons for a decision or The Bases for a decision, (c) concluding or Inference, (d) further clarification or Advanced Clarification, conjecture and integration or Supposition and integration. With model syntax learning RME; (a) understanding the problem/context, (b) explaining contextual problems, (c) solving contextual problems, (d) comparing and discussing answers, and (e) concluding.

The process of implementing Critical Thinking skills in mathematics of the students are improved after implement the model of RME learning by implementing a learning cycle consisting of a pre-cycle, data taken from Odd UAS results as initial data taken and research carried out in the even semester of the 2023/2024 academic year by applying cycles I and II, this can be seen in students' classical learning completeness which has increased. Starting with the pre-cycle where this activity still uses a learning model conventional, namely 29% or 10 students who completed above the KKM (70) out of a total of 35 students. Then the cycle 1 stage was carried out by applying the RME learning model. Critical thinking skills in mathematics increased by 49% or 17 students who completed the KKM, the research continued to the second cycle stage until a completion score of 74% was obtained or as many as 26 students completed the KKM. Because of Therefore, research is classically stopped because it has reached or exceeded the achievement indicators 70%.

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