

## Improving Mathematics Learning Outcomes on Spatial Geometry Using the RADEC Model

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### Abstract

Classroom Action Research was conducted with sixth-grade students at MI Raudlatul Muttaqin in North Jakarta due to low mathematics scores in spatial geometry, averaging 59.06, below the minimum competency criteria (KKM) of 75. The study aimed to improve these outcomes using the RADEC learning model. The research followed a Classroom Action Research (CAR) method over three cycles, each involving planning, implementation, observation, and reflection, with 16 students participating. Data collection included qualitative observations and interviews, as well as quantitative tests using multiple-choice questions. Findings showed that: 1) the RADEC model's implementation was rated very good; 2) student scores in spatial geometry improved in each cycle, surpassing the KKM. Average scores were 70 in cycle I, 73.43 in cycle II, and 75.93 in cycle III. Overall, the RADEC model effectively enhanced learning outcomes and student engagement through interactive methods.

Key word: Classroom Action Research (CAR), Learning Outcomes, RADEC Learning Model

## 1 INTRODUCTION

Learning outcomes represent a tangible change in student behavior, aligned with educational goals encompassing cognitive, affective, and psychomotor aspects. Learning outcomes provide information about students' abilities to understand and grasp the material being taught. These outcomes can be influenced by students' abilities (internal factors) and the quality of the learning process (external factors), which are related to the teacher's expertise and professionalism.

Mathematics is an independent discipline that plays a crucial role in education, as it is encountered in everyday life. By studying and acquiring mathematical knowledge, students can use it to solve daily problems. The primary goal of mathematics education is to train students' thinking and reasoning skills to draw conclusions, fostering creativity by engaging their imagination and curiosity, enabling them to make predictions and hypotheses, which they then test. The knowledge of mathematics enhances analytical abilities, problem-solving skills, and sharpens thinking, reasoning, and imaginative capabilities.

The competency standards for the Mathematics subject are designed to enhance reasoning, critical thinking, and abstract thinking skills. With the continuous and inevitable advancement of science and easy access to a vast amount of information, this can greatly benefit society and the world of education. Proficiency in reasoning, critical thinking, abstract thinking, and the ability to solve everyday problems using mathematical knowledge are skills that students must possess and continuously improve in order to face the 21st century, where they are required to have 4C abilities: Critical Thinking and Problem Solving, Creativity, Communication Skills, and the Ability to Work Collaboratively. The general goal of learning Mathematics is to enable students to develop reasoning

abilities, solve everyday problems, build their personality, and understand the functions of Mathematics itself so as to enhance intellectual capacity through the growth of emotional, rational, and social maturity, which will be useful in their future lives.

Based on the observations conducted by the researcher in August 2023 in the sixth-grade class of MI Raudlatul Muttaqin, with 16 students (10 boys and 6 girls), several issues were found in the learning process. Students were not paying attention to the teacher during the lesson, were actively talking to their friends, and engaging in personal activities such as playing with stationery, tapping on the desk, and doodling on paper. This occurred because the teacher still predominantly used the lecture, assignment, and question-and-answer methods, making the learning process less interactive. The average Mathematics score of the sixth-grade students at MI Raudlatul Muttaqin for the 2023/2024 academic year was below the Minimum Mastery Criteria (KKM). In an interview with the classroom teacher, it was revealed that only 6 students passed the KKM, while 10 students did not, indicating that not all students have achieved mastery in Mathematics, as some scores were still below the KKM threshold of 75.

The low learning outcomes of students in Mathematics subjects in Grade VI of MI Raudlatul Muttaqin indicate that the teaching and learning activities have not been effective, even though Mathematics is one of the core subjects that must be mastered. The observable factors in the field that contribute to the low learning outcomes, with many students not reaching the Minimum Competency Criteria (KKM), include the delivery of lesson materials using less varied teaching models such as lectures, note-taking, and assignments. The teacher does not use concrete media from the students' surroundings when delivering lesson content. During the Mathematics learning process at MI Raudlatul Muttaqin, the teacher rarely uses enjoyable, creative, and innovative teaching models, causing students to quickly become bored.

Interviews with students revealed that almost all of them said Mathematics is a difficult subject. This happens because students do not understand the concepts of the lesson material. The teacher only uses pictures as teaching media. In the learning process, the teacher rarely connects the lesson material to the students' daily lives, making it difficult for them to understand. The teacher does not start teaching from concrete concepts to abstract ones. Therefore, the low Mathematics learning outcomes are due to students perceiving Mathematics as a difficult subject and failing to understand concepts because the lessons do not begin from concrete to abstract, resulting in many test scores being below the KKM.

One effort that the researcher plans to develop to improve the Mathematics learning outcomes of Grade VI students at MI Raudlatul Muttaqin is by applying the RADEC (Read-Answer-Discuss-Explain-Create) learning model. This is expected to enhance Mathematics learning outcomes and student learning activities by having students start by reading, answering, discussing, evaluating, and creating. With increased student engagement, it is expected that learning outcomes will improve as a result of a more enjoyable learning process using the RADEC (Read-Answer-Discuss-Explain-Create) model. The results of previous research conducted by Muchlis Septiadi Ismail, et al. (2022) on the impact of the RADEC (Read-Answer-Discuss-Explain-Create) learning model on the ability to calculate the area of a triangle in Grade IV students at MI AL-MOURKY concluded that the RADEC learning model had an effect on the students' ability to calculate the area of a triangle. This was due to the RADEC model making students more engaged and active in their learning. Similarly, the research results of Khairunnisa Ramadhani, et al. (2023) on the influence of the RADEC (Read, Answer, Discussion, Explain, and Create) learning model on Mathematics learning outcomes, particularly on volume problems in Grade V students at SDN 194 Pekanbaru, concluded that the RADEC learning model had an impact on improving the students' Mathematics learning outcomes on the topic of volume.

The similarities between this study and the previous ones are that they all researched the improvement of Mathematics learning outcomes by implementing the RADEC learning model. The populations in both prior studies and the present one are the same—elementary school students. The differences between the previous studies and this one lie in the type

of research. The first study used descriptive quantitative research, the second study applied quasi-experimental quantitative methods, while this study uses Classroom Action Research (PTK).

From various studies that have been conducted, the RADEC learning model has proven to enhance Mathematics learning outcomes. This improvement can be seen from the ease with which the RADEC learning steps can be implemented in teaching, and it also fosters higher-order thinking skills. Based on these previous studies, this research on improving the learning outcomes in the topic of volume for Grade VI students at MI Raudlatul Muttaqin during the second semester of the 2023/2024 academic year is relevant.

The research to be conducted is classroom action research (CAR) carried out in Grade VI. Action research is oriented toward implementing actions aimed at improving quality or solving problems for a subject, observing the level of success or the effects of the actions, and then providing follow-up actions to refine or adjust the actions based on conditions and situations to achieve better results. Mulyasa explains that CAR is an effort to study the student learning process through planned actions by the teacher to analyze the impact of these actions, with the goal of improving the quality of teaching. Similarly, Zainal Aqib and Ahmad Amrullah state that CAR is research conducted by a teacher in the classroom (school) where they teach, focusing on improving or enhancing the teaching process and practice. Therefore, CAR can be concluded as research aimed at overcoming the challenges faced by a teacher in the teaching process to improve the quality and learning outcomes through continuous actions.

The research will take place in Grade VI of MI Raudlatul Muttaqin, North Jakarta, involving 16 students as subjects. The model used is the Kemmis & McTaggart model. In each cycle of the Kemmis & McTaggart classroom action research model, there are 4 steps: planning (plan), action (act), observation (observe), and reflection (reflect). The research will be conducted in 3 cycles, with each cycle comprising two meetings.

The data collection techniques and instruments are carried out through 4 stages: observation, interviews, tests, and documentation. A test will be given to students after the second meeting in each cycle. The test will be an individual test consisting of 20 multiple-choice questions. Data analysis in this Classroom Action Research will go through three stages: data reduction, data description, and data verification. The indicator for measuring students' learning success is the Minimum Competency Criteria (KKM), which is set at 75 or higher, or at least a minimum achievement of 80% for classical mastery.

## 2 RESEARCH METHODS

The research to be conducted is classroom action research (CAR) conducted in class VI. Action research is research oriented towards the application of action, with improving the quality or solving problems in a subject that is thorough and observing the level of success or consequences of its actions, then given further actions that are in the nature of improving the action or adjusting to conditions and situations so that better results are obtained. Mulyasa explained that CAR is an effort to research the student learning process by means of a planned action by the teacher to obtain an analysis of the influence of the action which aims to improve the quality of learning. In line with the above, Zainal Aqib & Ahmad Amrullah said CAR, namely research conducted by teachers in the class (school) where they teach with an emphasis on improving or improving the learning process and practice. So it can be concluded that the type of CAR research is research to overcome the obstacles faced by a teacher in the learning process in order to improve the quality and learning outcomes through continuous action. The place of this research is in class VI MI Raudlatul Muttaqin North Jakarta. The subjects of this research were 16 students.

The model used is the Kemmis & Mc Taggart model. Each cycle of the Kemmis & Mc Taggart model classroom action research consists of 4 steps, namely planning (plan), action (act), observation (observ), and reflection (reflect). The research was conducted in 3 cycles where each cycle was held twice. Data collection techniques and instruments were

carried out through 4 stages, namely observation (Observation), interviews, tests, and documentation. Tests were given to students after the implementation of the action at the second meeting in each cycle. The test carried out was an individual test in the form of 20 multiple choice questions. Data analysis in this Classroom Action Research was carried out through three stages, namely data reduction, data description, and data verification. The indicator for determining the success of student learning is by using the Minimum Completion Criteria (KKM), which is above 75 or a minimum achievement of classical completion value of 80%.

### 3 RESULT AND DISCUSSION

From the research that has been carried out, the results of the study on the results of learning mathematics on the material of the volume of spatial figures for grade VI students in the second semester of the 2023/2024 academic year at MI Raudlatul Muttaqin, North Jakarta, are as follows:

#### 3.1 Sub Result

Based on the results obtained in the pre-cycle, where the average student mathematics score is still below the minimum completion criteria (KKM) which is 59.06 with details of student scores, as many as one student with a score of 35, three students with a score of 40, four students with a score of 50, one student with a score of 55, five students with a score of 75 and two students with a score of 80, while the minimum completion criteria (KKM) score is 75. This shows that 56% of students are still unable to understand the material and 44% of students are able to understand the material.

Cycle I actions were carried out in 2 meetings. In cycle I, the average class test results for mathematics lessons on spatial geometry material as a whole were still below the minimum completion criteria (KKM), with the number of students who had not completed as many as 7 students (43.75%) while the class average was 70 while the minimum completion criteria (KKM) was 75.

Cycle II actions were carried out in 2 meetings. In cycle II, the learning outcomes of cycle II have increased where the average class value is 73.43 and there are 5 students (31.25%) who have not completed. With the change in learning media using concrete media, there is a fairly good increase in learning outcomes in line with the increasing enthusiasm of students. The actions of cycle III were carried out in 2 meetings. In cycle III, the learning outcomes of cycle III showed that there was an increase in learning outcomes using the RADEC learning model through concrete media, much better than using image media drawn on the board. From these data, it is known that the test results in cycle III average class for mathematics lessons on spatial geometry material above the minimum completeness criteria (KKM) which is 75.93, with the number of students who have not completed as many as 2 students (13%) and students who have completed as many as 14 students (87%). With this data, it shows that 87% (14 students) have been able to understand the material.

#### 3.2 Sub Discussion

From the research that has been conducted on grade VI students of MI Raudlatul Muttaqin consisting of three cycles, there is an increase in mathematics learning outcomes in each successive learning process from the first cycle, second cycle and third cycle, through the RADEC learning model. as seen in the percentage of student learning achievement. The average student score and teacher and student observation scores between the first cycle and the second cycle, as seen in the following table:

Table 3.1 Results of Learning Mathematics of Spatial Buildings

| Kategori                    | Siklus I | Siklus I | Siklus II |
|-----------------------------|----------|----------|-----------|
| Learning Outcomes           | 70       | 73,43    | 75,93     |
| Teacher Observation Results | 80       | 87,5     | 90        |
| Student Observation Results | 70       | 85       | 90        |

The table above shows that there is an increase in the percentage of student achievement in learning the average value of students in succession from students from cycle I, Cycle II and cycle III, namely the percentage of student learning achievement in cycle I of 56.25% with an average value of 70. Increased in cycle II by 68.75% with an average value of 73.43 and increased in cycle III by 87% with an average value of 75.93. The increase in the percentage of student learning outcomes with the average student is in line with the increase in the learning process. Both teachers and students. From the first cycle, teacher activity obtained a score of 80 with a good category, in cycle II obtained a score of 90 with a good category and in cycle III obtained a score of 95 with a very good category. While student activity obtained a score of 70 with a good category, in cycle II obtained a score of 85 with a good category and in cycle III obtained a score of 90 with a very good category. Based on the comparison of student learning outcome data in the pre-cycle, cycle I, cycle II and cycle III, it can be concluded that the use of the RADEC learning model can improve student learning outcomes in Mathematics subjects for grade VI students of MI Raudlatul Muttaqin. As can be seen in the following graph:

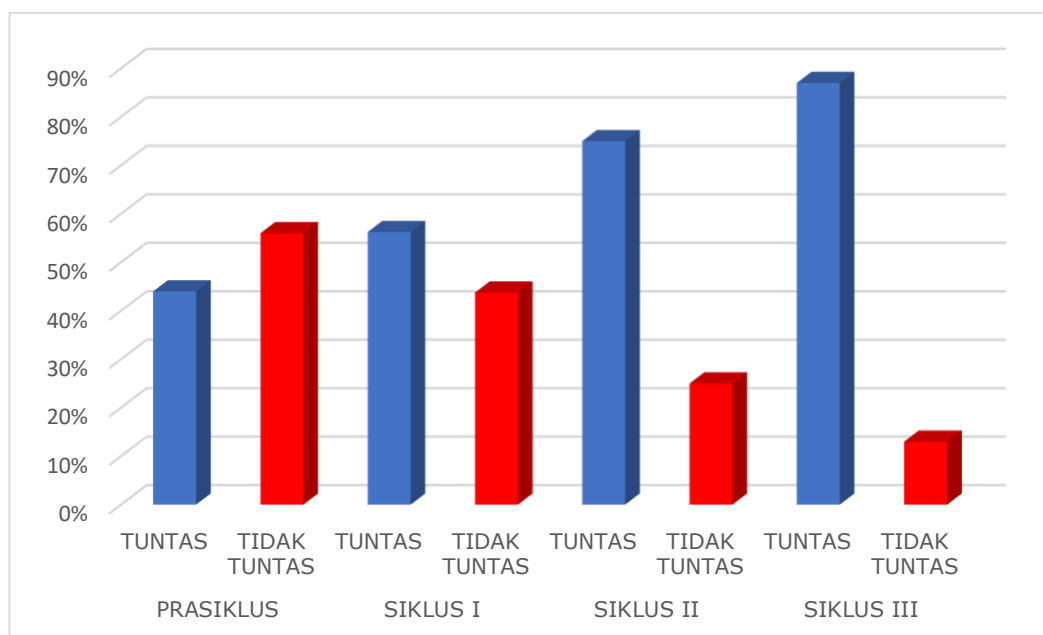


Figure 3.1 Presentation of Completion from Pre-Cycle to Cycle III

The graph above shows that there is an increase in student learning outcomes in learning successively according to the comparison of learning outcome data from pre-Cycle, Cycle I, Cycle II and Cycle III. Pre-Cycle by 44%, increased in Cycle I by 56.25%, increased in Cycle II by 68.75% and increased again in Cycle III by 87%. With the increase in student learning outcomes in learning, the application of the RADEC Model can improve student learning outcomes, especially in Mathematics subjects on the volume of geometric shapes at MI Raudlatul Muttaqin North Jakarta. Based on the interview results in cycle I, the score was 67.71 with good criteria, in cycle II, the score was 75.62 with good criteria, and in cycle III, the score was 85 with very good criteria. It can be concluded that in the learning process, there is an increase in learning outcomes related to students' enjoyment

of the implemented learning model. The RADEC learning model is one alternative that can be implemented to improve mathematics learning outcomes.

The results of previous research conducted by Muchlis Septiadi Ismail, Ismail Pioke, and Asni Ilham (2022) related to the influence of the RADEC (Read-Answer-Discuss-Explain-Create) learning model on the ability to calculate the area of triangles in grade IV students of MI AL - MOURKY, concluded that there is an influence of the RADEC learning model on the ability to calculate the area of triangles of grade IV students, this happens because the RADEC learning model makes students more involved and active in their learning. Likewise, the results of the research by Khairunnisa Ramadhani, Gustimal Witri, and Muhammad Fendrik (2023), regarding the influence of the RADEC (Read, Answer, Discussion, Explaining and Create) learning model on the learning outcomes of Mathematics on debit material for grade V students of SDN 194 Pekanbaru. The results of this study concluded that there was an influence of the RADEC (Read, Answer, Discussion, Explaining and Create) learning model on improving the learning outcomes of grade V students of SDN 194 Pekanbaru in debit material.

The research by Sri Ardianti, Hana Lestari, and Joko Trimulyo (2023) conducted in 2023 aimed to apply the RADEC learning model to improve students' numeracy literacy skills conducted in 2023. Numerical ability is a person's competence in operating numbers, and also basic arithmetic skills consisting of the ability to subtract, add, multiply, and divide numbers to smallness, so that it will make it easier for someone to solve problems in the field of mathematics. The results of Sri Ardianti's research conclusions, that the application of the RADEC learning model can improve students' numeracy literacy skills in mathematics learning. In this study, Sri Ardianti limited mathematics learning to grade V of elementary school/MI. From various studies that have been carried out, the RADEC learning model can improve mathematics learning outcomes. This improvement can be seen from the RADEC learning steps that are easy to implement in learning and can improve high-level thinking. Based on the results of previous studies, the study of improving mathematics learning outcomes for volume of geometric shapes in grade VI students at MI Raudlatul Muttaqin in the even semester of the 2023/2024 academic year is relevant.

## 4 CONCLUSION

The implementation of the RADEC learning model in class IV MI Raudlatul Muttaqin, Koja District, North Jakarta, Even Semester of the 2023/2024 Academic Year can improve student learning outcomes in learning. This can be seen in the learning outcome scores in each cycle where the completion results at the beginning of learning (pre-cycle) were 44% increasing in cycle I by 56.25%. The percentage continued to increase in cycle II by 68.75% and in cycle III to 87% with a Minimum Completion Criteria (KKM) of 75. Send feedback.

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