

# The Effect of RADEC Learning Model on the Ability to Calculate the Perimeter of Flat Buildings in Third Grade Students of Elementary School

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**Abstract.** This study aims to determine the significant effect of using the RADEC model on the ability to calculate the perimeter of flat buildings in grade III students. This research is a pre-experimental research in the form of One Group Pretest-Posttest research. The population of this study was grade III students consisting of one class of 21 students. The research instrument used is the ability to calculate the perimeter of Flat Buildings. The data obtained were then analyzed using descriptive statistical data analysis and inferential statistical data analysis. The results of this study showed that the pretest results, the average value of student learning was 66.67 with a high category of 19.05%, medium 33.33%, and low 47.62% and the average value of posttest results after using the RADEC model was 82.86 with a very high category 47.62%, medium 38.10%, and low 14.29%. This figure shows that there is a significant effect of using the RADEC model on the ability to calculate the perimeter of Flat Buildings. Based on the description above, it can be concluded that the RADEC model is effectively used in calculating the perimeter of flat buildings in grade III students.

**Keywords:** Radec learning model, calculation skills, perimeter of flat buildings.

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## INTRODUCTION

Mathematics is seen as a language and human creativity. Because each student has different abilities, different opportunities, treatment and facilities are needed in order to develop their abilities well. This is recognized by mathematics educators, so they try to develop inclusive and diverse learning methods, which pay attention to students' needs and learning styles. Apart from that, it is also important for students to familiarize themselves with solving mathematical problems, because this ability is needed in everyday life and in the world of work. Thus, learning mathematics does not only focus on theory, but also pays attention to applications in real life. By learning good mathematics, it is hoped that students can develop creativity and logical thinking skills that are useful for their future. In learning mathematics, the teacher acts as a facilitator who helps students learn mathematics. Students are placed at the center of mathematics learning, where they are actively involved in the learning process and the teacher is not the only source of knowledge [1].

Mathematics is a very important subject for students at every level of education, including elementary school. In elementary school education units, Mathematics subjects include several sub-materials such as numbers, geometry, measurement and data processing [2]. Number material includes basic arithmetic operations such as addition, subtraction, multiplication and division. Meanwhile, geometry material focuses on the shape and size of objects, such as flat figures and spatial figures. Measurement material relates to measuring length, weight, time and volume. In studying geometry there is a discussion of various flat shapes. Flat shapes can be found in everyday life, for example: rectangular shapes can be seen in the classroom such as blackboards, doors, etc. Measurement material relates to measuring length, weight, time and volume. Meanwhile, data processing material includes how to collect, organize and present data in the form of tables or graphs. By understanding these materials, students are expected to have a strong foundation in solving everyday mathematics problems and also prepare themselves for further mathematics material at a higher level of education.

Mathematics can help to hone the ability to measure, calculate and use mathematical formulas as solutions to everyday life problems [3]. Measuring can hone measuring skills by

studying concepts such as units of measure, unit conversions, and geometric measurements. For example, when cooking, we use the concept of measurement to determine the weight or volume of the ingredients used. The ability to calculate is very important in everyday life. Mathematics helps in honing these skills through basic mathematical operations such as addition, subtraction, multiplication, and division. For example, when making a financial budget, we need to calculate income, expenses, and determine fund allocation. Meanwhile, using mathematical formulas is also very useful in solving everyday problems. For example, in planning a trip, we can use distance and speed formulas to calculate travel time. In engineering, mathematical formulas are used to design building structures or electronic devices. By mastering this ability, a person can become more efficient in dealing with various situations in everyday life. Mathematics also helps in honing analytical skills, problem solving and logical thinking, all of which are invaluable in everyday life as well as in a professional career.

Mathematics is a field of study that is very important in everyday life. Without mathematics, we would not be able to calculate, measure, or even estimate things accurately. Therefore, it is very important to teach mathematics to children from an early age, starting from elementary school [4]. By studying mathematics from an early age, children will become familiar with basic mathematical concepts, such as addition, subtraction, multiplication and division. This will make it easier for them to understand more complex mathematical concepts in the future. Apart from that, studying mathematics can also help children develop logical and problem-solving abilities. This ability is very important in everyday life, both in completing school assignments and in dealing with problems in real life. Therefore, as parents or educators, we need to ensure that our children receive good mathematics education from an early age. In this way, we can help them to develop the abilities and potential they have in the future.

Since attending elementary school, mathematics is introduced as a basic provision for students to solve everyday problems related to mathematics. One of the mathematical materials that can be applied in everyday life is the perimeter of flat shapes. By understanding the circumference of flat shapes, students can calculate the circumference of objects that have a flat surface, such as a rectangular book or a square table. However, the ability to calculate the perimeter of flat shapes is not only useful in everyday life. This material is also very important in the industrial world, especially in the fields of architecture and construction. Architects and civil engineers must understand the concept of perimeter in order to design and construct buildings or bridges correctly and efficiently. Apart from that, understanding the perimeter of flat shapes is also very much needed in the world of technology. For example, in designing and calculating screen sizes on technology products such as smartphones or laptops. Technology product designers must understand the concept of flat perimeter so that the resulting product has the right size and is comfortable to use. In increasingly advanced times, understanding mathematics, especially the circumference of flat shapes, is very important. This can help individuals to develop the ability to solve problems and prepare themselves to become professionals in fields related to mathematics.

The problem that occurs with learning mathematics in elementary school is that mathematics is still considered a difficult and meaningless lesson for children because it is abstract [5]. Difficulties learning mathematics in elementary school can also be caused by factors from within the child himself and factors from outside himself. children, such as emotional disturbances, feelings of unease, worry, irritability, aggressive attitudes, and disturbances in thought processes. Even though mathematics is an essential subject and has strong relevance for their daily lives [6]. Even though it is often considered difficult, mathematics has a very significant role in everyday life, such as in managing finances, measuring objects, solving problems, and developing problem-solving skills. Therefore, it is important to change children's perception of mathematics so that they can see the value and relevance of this subject in their daily lives. With the right learning approach, such as using concrete examples and practical applications, students can more easily understand and relate mathematical concepts to their daily lives. Apart from that, learning mathematics based on real problems can also help students to see the relevance of mathematics in their daily lives. Thus, it is important to integrate the context of everyday life in mathematics learning in elementary school so that students can understand the value and

relevance of this subject in their lives. So this can influence students' learning outcomes, one of which is the material on the circumference of flat shapes. In fact, student learning outcomes can be used as a benchmark for the success of the learning that has been carried out. Teachers can determine students' level of mastery of material by measuring learning outcomes [7].

So, assuming that student learning outcomes are still inadequate, it appears that students have not mastered the material being taught. Teachers must pay attention to the learning activities provided. There are many possibilities that cause these learning activities to not run well, such as not using the learning model correctly or using activities that do not encourage students to be more active. On the other hand, teachers are more involved in learning activities and use more lecture methods. This can be a problem, because the lecture method tends to only burden students with information without providing opportunities to actively participate in learning. Teachers should consider introducing and using learning methods that are more interactive and actively involve students. For example, by giving students the opportunity to discuss, do group assignments, or make presentations. In this way, students can better understand the material being taught and improve their learning outcomes. In addition, teachers must also provide constructive feedback and continuously monitor student progress to ensure that each student can reach his or her potential in learning.

Meanwhile, students need to understand information about the perimeter of a flat shape because it is part of the information about geometric shapes. If students do not understand information about the perimeter of a flat shape, they will not be able to receive information about the shape of space. Therefore, it is best for the instructor to present the material using an appropriate learning model before measuring student learning outcomes. An appropriate learning model can help students understand information about the perimeter of flat shapes more easily. One of the learning models that can be used is the project-based learning model. In this model, students will be given the task of making a flat shape and measuring its circumference. In this way, students will better understand the concept of the circumference of a flat shape with direct practice. In addition, instructors can also use interesting learning media such as animated videos or simple games. By using interesting learning media, students will be more interested and motivated to learn the material about the perimeter of flat shapes. However, it is not only the instructor who is responsible for making students understand information about the circumference of a flat body. Students also need to have high motivation and a strong will to learn. Therefore, teachers can provide motivation and encouragement to students so that they are more motivated in learning the material about the perimeter of flat shapes. Thus, an understanding of the perimeter of a flat shape will be a strong foundation for students to understand the concept of space and mathematics more broadly.

Of the many models, the model that seems most suitable is the RADEC learning model. This learning model is an alternative learning model that focuses on mastering competencies and skills so that it is suitable for application to the learning system in Indonesia [8]. The RADEC learning model is an innovative learning model at this time, this model was created in accordance with the Indonesian education system which requires students to be able to understand various concepts and knowledge in a limited time.

This model is likely to be suitable for improving numerical abilities because the syntax of the RADEC (Read Answer Discuss Explain and Create) learning model is in accordance with indicators of numerical ability, namely the ability to think logically, calculate mathematically, the ability to solve problems, and the ability to differentiate numerical patterns and their relationships. Some of the advantages of this learning model include improving verbal skills, group collaboration, and increasing students' conceptual understanding [9]. Based on the advantages of the RADEC model, it is hoped that the RADEC learning model can improve students' abilities, especially the ability to calculate the circumference of flat shapes.

Based on problems that occur in learning activities. Learning should involve mental processes, touching feelings, experiencing and active thinking [10]. This is important to create an effective and satisfying learning experience for students. In the learning process, you don't just memorize lesson material, but also understand and apply it in everyday life. Therefore, educators must be able to create a conducive learning environment and provide challenges that suit the

abilities of each student. In this way, it is hoped that students can develop their potential and achieve their learning goals optimally. In the process, when an individual learns, he will feel changes in behavior and display learning results as a benchmark that he understands the lessons he has received. Therefore, an effective learning model is needed to answer the problems that researchers have described. Based on this description, the aim of the research is to describe "The Influence of the RADEC Learning Model on the Ability to Calculate the Perimeter of Plane Figures in Class III Students".

## **METHOD**

The method used in the research is an experimental research method and the design used in this research is pre-experiment, one-group pretest-posttest design or what is called before-after design [11]. This design is carried out in a pretest before being given treatment to a class using the RADEC model, then to find out the results, a posttest is carried out. The research method used in this study is a quantitative approach, which focuses on data in numerical or numeric form [12]. In quantitative research, data collection is carried out using standardized instruments and produces data that can be clearly measured. The results of quantitative research are usually analyzed using statistical techniques to find relationships between the variables studied. This research method is suitable for use in research that requires a deeper understanding of numerical data, such as in the fields of social sciences, health and technology.

The sample used to conduct this research was class III elementary school students. Because the sample used is one class, this research is population research. With the following procedure:

$$O_1 \rightarrow X \rightarrow O_2$$

### Information:

$O_1$  : Pretest value (before treatment is given)

$O_2$  : Posttest Score (After being given Treatment)

X : Treatment carried out/Treatment in the form of use of the RADEC Model)

Pretest : A test carried out to determine initial abilities before being given treatment

Posttest : Test given after treatment is given

Inferential statistics is a data analysis technique used to test hypotheses, with the Wilcoxon Signed Rank Test being a commonly used method to compare paired samples. Before conducting this test, it is crucial to carry out the normality prerequisite test. To simplify this process, the SPSS version 23.00 for Windows application can be utilized. By following these steps, we can process data and perform statistical analysis with ease. It is vital to pay attention to the prerequisites and techniques used during data analysis to ensure precise and reliable results. With accurate data analysis techniques, we can draw useful and meaningful conclusions in our research or study.

The Wilcoxon Signed Rank Test is a test used to test the differences between 2 groups of paired data and on an ordinal or interval scale but not normally distributed. This test is an alternative to the paired t test or paired t test if the normality assumption is not met. This test is also known as the Wilcoxon Match Pair Test. In carrying out significant tests using non-parametric statistics, the Wilcoxon Sign Rank Test can be a good alternative. By using this test, we can measure the significance of differences between 2 groups of paired data that are not normally distributed accurately. Therefore, the Wilcoxon Signed Rank Test is very useful in analyzing data that differs from the assumption of normality.

## RESULTS

The RADEC Learning Model is a learning model designed to help students understand mathematical concepts more easily and with fun. This model uses a problem-based approach that allows students to solve mathematical problems independently with the help of the teacher as a facilitator. In this research, researchers want to know whether the application of the RADEC Learning Model can improve students' ability to calculate the perimeter of flat shapes. This ability is very important for third grade students because it is one of the basics in studying further geometric concepts. The research method used was experimental by taking a sample of class III students as research subjects. Data was collected using a test of the ability to calculate the circumference of flat shapes before and after being treated with the RADEC Learning Model.

### Analysis Results Before and After Treatment

Based on the analysis conducted, there was an improvement in the test scores of some students after being exposed to the Radece model in the learning process. The model provides a framework for teachers to design lessons that incorporate hands-on activities, critical thinking exercises, and group discussions. By using this model, teachers can create a learning environment that is both stimulating and challenging, encouraging students to take an active role in their education. This is evident in the recapitulation table of the analysis results pre and post-treatment as follows:

**Table 1. Table of Analysis Results Before and After Treatment**

No	Intervals	Category Learning outcomes	Pretest		Posttest	
			f	(%)	f	(%)
1	≤ 60	Low	10	47.62	3	14.29
2	61-80	Currently	7	33.33	8	38.10
3	81-100	Tall	4	19.05	10	47.62
Amount			21	100.00	21	100.00

Looking at the table above, it can be concluded that before being given the RADEC Learning Model treatment, the pre-test result categories consisted of 19.05% high, 33.33% medium, and 47.62% low, while the percentage was 50%. After being given the RADEC Learning Model treatment, the percentage of pre-test results increased to 47.62% in the very high category, 38.10% moderate, and 14.29% low. The results of the research above show that the RADEC Learning Model has a significant impact on student pre-test results. Before being given treatment, the majority of students were in the low category. However, after being given the RADEC Learning Model, students' pre-test results improved significantly, with the majority of students being in the very high and medium categories. Therefore, the RADEC Learning Model can be used as an effective alternative in improving student learning outcomes.

### Wicoxon Test Results

The Wilcoxon test was employed to determine the impact of the RADEC learning model on the ability of Grade III students to calculate the perimeter of two-dimensional shapes. A non-parametric statistical analysis was conducted, resulting in the following Wilcoxon test results:

**Tabel 2 Ranks**

		N	Mean Rank	Sum of Ranks
Posttest - Pretest	Negative Ranks	0 <sup>a</sup>	.00	.00
	Positive Ranks	15 <sup>b</sup>	8,00	120,00
	Ties	6 <sup>c</sup>		
	Total	21		



- a. Posttest < Pretest
- b. Posttest > Pretest
- c. Posttest = Pretest

Based on the above table, the Negative Rank or the difference (negative) between the pre-test and post-test results is 0, including the N value, Mean Rank, and Sum Rank. This value of 0 indicates that there is no decrease in the post-test score compared to the pre-test score. On the other hand, the Positive Rank or the difference (positive) between the pre-test and post-test is evident. There are 15 positive data (N), which means 15 students have shown improvement from the pre-test to the post-test. The Mean Rank or the average of this improvement is approximately 8.00, while the total positive Rank and Sum of Rank are 120.00. Ties refer to the instances where the pre-test and post-test scores are identical, and in this case, the Ties value is 6.

### Hypothesis Testing

The presented research posits the following hypothesis:  $H_1$  = the implementation of the RADEC model has a significant impact on the ability of third-grade students to calculate the perimeter of two-dimensional shapes, while  $H_0$  = there is no significant impact on students' ability to calculate the perimeter of two-dimensional shapes when implementing the RADEC model. The results of the hypothesis test using the Wilcoxon test are presented below:

**Table 3 Test Statistics <sup>a</sup>**

	Posttest - Pretest
Z	-3,690 <sup>b</sup>
Asymp. Sig. (2-tailed)	,000

- a. Wilcoxon Signed Ranks Test
- b. Based on negative ranks.

Based on the table above, the statistical test output results show that Asymp.Sig (2.tailed) has a value of 0.000. because the value  $0.000 < 0.050$ , it can be concluded that  $H_1$  is accepted and  $H_0$  is rejected, which means that there is an influence after using the RADEC model on the ability to calculate the circumference of Flat Figures in class III students.

### CONCLUSION

Based on the research findings, the implementation of the RADEC model in teaching has been proven to have a positive impact on the ability of third-grade students to calculate the perimeter of flat shapes. This fact is supported by the increase in pre-test and post-test scores after applying the RADEC model. Therefore, the RADEC model is considered effective in enhancing the ability of third-grade students to calculate the perimeter of flat shapes. The results of this study are expected to provide benefits and serve as a reference for future research.

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