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THE EFFECTIVENESS OF THE READ ANSWER DISCUSS EXPLAIN CREATE LEARNING MODEL IN IMPROVING CRITICAL THINKING SKILLS IN SCIENCE IN GRADE IV OF ELEMENTARY MADRASAH

Yudesta Erfayliana[1]
[1]Universitas Islam Negeri Raden Intan Lampung, Indonesia

Email: yudesta@radenintan.ac.id

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ABSTRAK

Critical thinking skills are very important in the world of education, because they can help students develop a deep understanding of a material and make the right decisions. Critical thinking is a skill that students need to identify problems well. Students' critical thinking skills are still low due to the use of conventional learning methods. As a solution, this study applies the RADEC model which involves active student interaction through various stages, such as reading, answering, discussing, explaining, and creating. The results of the analysis show that the application of this model increases students' posttest scores in the experimental class compared to the control class using traditional methods. The RADEC model not only improves understanding of the material, but also students' critical thinking skills. In conclusion, the RADEC model has proven effective in developing students' critical thinking skills, and is recommended to be applied more widely in various educational contexts to prepare students to face the challenges of the 21st century.

ABSTRAK

Keterampilan berpikir kritis sangat penting dalam dunia pendidikan, karena dapat membantu siswa mengembangkan pemahaman yang mendalam terhadap suatu materi dan membuat keputusan yang tepat. Berpikir kritis merupakan keterampilan yang dibutuhkan siswa untuk mengidentifikasi masalah dengan baik. Keterampilan berpikir kritis siswa masih rendah karena penggunaan metode pembelajaran konvensional. Sebagai solusinya, penelitian ini menerapkan model RADEC yang melibatkan interaksi siswa secara aktif melalui berbagai tahapan, seperti membaca, menjawab, mendiskusikan, menjelaskan, dan mencipta. Hasil analisis menunjukkan bahwa penerapan model ini meningkatkan nilai posttest siswa pada kelas eksperimen dibandingkan dengan kelas kontrol yang menggunakan metode tradisional. Model RADEC tidak hanya meningkatkan pemahaman materi, tetapi juga keterampilan berpikir kritis siswa. Kesimpulannya, model RADEC terbukti efektif dalam mengembangkan keterampilan berpikir kritis siswa, dan direkomendasikan untuk diterapkan lebih luas dalam berbagai konteks pendidikan untuk mempersiapkan siswa menghadapi tantangan abad ke-21.

Kata kunci: *Critical Thinking, Learning Models, Read Answer Discuss Explain Create.*

PENDAHULUAN

Education has a big influence in a person's life, where good education forms good mindsets and attitudes (Kurniawan & Parnawi, 2023). According to Qomarudin, (2021), education is an organized effort to create a pleasant learning environment so that students can actively develop their potential. 21st century learning is learning designed to produce students who are ready to answer the challenges of the times (Ayuwaningsih et al., 2024). One application of 21st century learning is critical thinking. According to Manurung et al., (2023) critical thinking is the ability to use reason, intelligence, and creativity to act, develop, and make decisions in the process of completing tasks or creating value. Critical thinking skills are the ability to analyze, evaluate, and synthesize information and facts obtained from a situation or problem faced (Guntur et al., 2025).

Critical thinking skills involve the ability to understand, evaluate, and make the right decisions based on deep and logical understanding. Critical thinking skills include several things, namely analytical skills, evaluation skills, synthesis skills, and reflection skills (Rahardhian, 2022). Critical thinking skills are very important in the world of education, because they can help students develop a deep understanding of a material and make the right decisions. Critical thinking is a skill that students need to identify problems well (Ariadila et al., 2023), especially problems in Natural and Social Sciences.

In the process of learning science, there are quite a few students who are less motivated and play an active role, resulting in the material being easily forgotten by students because students are less involved in the learning process. This can result in learning objectives not being achieved properly. The lack of active role of students in the learning process can be caused by the use of learning models that are still simple because some learning is only carried out by teachers so that it affects students' critical thinking skills. This is in line with the results of research Yunus & Sukmawati, (2025) which states that the learning process in the classroom is still dominated by teachers, this problem occurs because the learning process rarely uses media and learning models that can foster student skills and conduct observations that involve students' critical thinking skills.

Judging from these problems, teachers need to have new innovations and make improvements in the learning process, in order to create better learning. One way to balance these problems is by using a student-centered learning model. The learning model is the Read, Answer, Discuss, Explain, Create (RADEC) model, because the RADEC Model has a suitability with its syntax to make it easier for educators to recognize and apply it (Sugiarti et al., 2024). The use of this learning model is based on the results of research Isnaeni, (2025); Latifa et al., (2025); Rohaeni et al., (2023); Wardani & Munir, (2024) which shows that the RADEC learning model is able to improve students' critical thinking skills, with data on the average value of the experimental class of 87.14 while the control class is 80.21.

The RADEC learning model can also develop the potential of students to be used in the 21st century (critical thinking, problem solving, collaboration, relationships and creativity) (Riska et al., 2025). In addition, in the context of science, the RADEC model can stimulate students to learn actively, not only mastering concepts but also improving their skills. In addition, this model can also be applied to various learning implementations (online and offline) (Krisna, 2022). Based on several studies above, it is clear that the RADEC learning model can be used in science subjects because this model can develop the potential of students in improving critical thinking skills in the 21st century and can display student characteristics and can improve skills that stimulate students to learn actively. So the purpose of this study is to analyze the effectiveness.

METODE PENELITIAN

This type of research is quantitative experiment with quasi-experimental design using The Matching Only Pretest-Posttest Control Group Design. The population of the study was all male and female students of grade 4 of Madrasah Ibtidaiyah while the research sample amounted to 55 students, where 27 students as the experimental class and 28 students as the control class. Sampling with Cluster Random Sampling. In this study, researchers took randomly from two classes, namely class IV-A as the experimental class and class IV B as the control class. The location of the research was at Madrasah Ibtidaiyah Negeri 2 Bandar Lampung. The research instrument used a questionnaire and test while data collection was carried out with a pretest and posttest test and documentation. Data analysis used a normality test, homogeneity test, and T test. For the prerequisite analysis test in the normality test using the Shapiro-Wilk test, the homogeneity test using Levene's Test, and the T test using an independent t-test to analyze the difference between the pretest and posttest scores in the experimental and control groups. To test the research instrument using a validity test, reliability test, difficulty level test and discriminatory power test.

HASIL DAN PEMBAHASAN

Hasil

At the first meeting, both classes worked on pretests and pre-learning questions to be worked on at school. The second and third meetings in the experimental class involved group discussions and presentations of results. The fourth meeting in the control class was conducted without the RADEC model, and the fifth meeting was closed by taking posttest scores in both classes. The data collected from this study were then analyzed to see the effectiveness of the learning implemented. The research data were obtained from the results of the pretest and posttest in the form of 30 multiple-choice questions to measure the critical thinking skills of students in grades IV A and IV B in the subject of Natural and Social Sciences. The results of the pretest and posttest can be seen in table 1 below.

Table 1. Pretest and Posttest Results of Experimental Class and Control Class

Information	Experimental Class	Control Class
Pretest	45.45	47.76
Posttest	71.41	55.59

The experimental class had an average pretest score of 45.45, while the control class was slightly higher at 47.76. This indicates that in general, students in the control class had slightly better critical thinking skills before the implementation of the learning model. After the implementation of the RADEC learning model, the experimental class showed a significant increase with an average posttest score of 71.41. On the other hand, the control class only experienced a small increase with an average posttest score of 55.59. The implementation of the RADEC learning model, which involves various activities such as reading, answering, discussing, explaining, and creating, provides students with the opportunity to participate more actively and think critically. This likely contributed to the substantial increase in their critical thinking skills. The control class did not receive the same active and interactive teaching methods. If they were using more conventional learning methods, this could explain the

smaller increase in posttest scores.

Table 2. Validity Test Results

Number of Questions	Valid	Invalid
30	24	6
Question number	1,2,3,4,5,7,8,11,12, 14,15,16,17,19,20, 21,22,23,24,25,26, 27,28,29	6,9,10,13,18,30

Table 2 shows the results of the validity test of 30 questions tested, where 24 questions were declared valid and 6 questions were invalid. Valid questions can be relied on to measure the abilities to be assessed, such as critical thinking and conceptual understanding, because it has been proven through item analysis that students with higher abilities tend to answer these questions correctly. On the other hand, invalid questions include six items that may not be effective in measuring the intended competencies. The causes of this invalidity vary, such as questions that are ambiguous, too easy or too difficult, and less relevant to the material being taught.

Pamungkas, (2018), said that the use of comprehensive item analysis can improve the validity of the questions, with an emphasis on the importance of revising invalid questions. The results of the validity test in table 2, where 24 out of 30 questions met the validity criteria, indicate that the application of this theory and proper item analysis are very important in the development of evaluation instruments, to ensure that the measuring instrument used is effective in assessing the desired abilities.

Table 3. Reliability Test Results

Reliability	Criteria
0.80-1.00	Very high
0.60-0.80	Tall
0.40-0.60	Currently
0.20-0.40	Simple

Table 3 shows the results of the reliability test of the instruments used in the study, with criteria that divide the level of reliability into several categories. High reliability indicates that the instrument is consistent in measuring the intended construct, meaning that the results obtained do not vary much if repeated under the same conditions. Instruments that have high reliability, as measured in this study, provide confidence that the evaluation results are reliable. Good reliability is obtained through proper testing, where the instrument shows consistency in the measurement results. This is important to ensure that the data collected reflects the actual abilities or characteristics, so that the research results are more valid and can be used for proper decision making.

Table 4. Difficulty Level Test

Number of Questions	Difficulty Level
22	Easy
2	Currently
0	Not Difficult

Table 4 shows the results of the difficulty level test of the 24 questions tested, where 22 questions were categorized as "Easy," 2 questions as "Medium," and no questions were considered "Not Difficult." Questions that are too easy are not challenging enough to encourage students to think critically, while questions that are too difficult can cause frustration and reduce students' self-confidence. By providing questions with varying levels of difficulty, teachers can ensure that all students, regardless of their initial ability, have the opportunity to learn and grow. This also helps in measuring students' abilities more accurately, because a good assessment instrument should be able to distinguish between students who have different understandings of the material being taught.

Table 5. Discriminatory Power Test

Number of Questions	Question Number	Category
10	1,6,7,8,11,18,19,20,23,24	Good
6	2,4,10,15,21,22	Very well
6	3,5,9,12,16,17	Pretty good
2	13.14	Not good

Table 5 shows the results of the discriminatory power test of the 20 questions tested, with categories that distinguish between questions that are considered "Good," "Very Good," "Fair," and "Poor." Of the 20 questions, 10 questions were considered "Good," while 6 questions fell into the "Very Good" category. There were 4 questions that were considered "Fair," and 2 questions were declared "Poor." The difference in the discriminatory power of each question reflects the extent to which the question can distinguish between students who understand the material well and those who do not. Good questions have the ability to identify differences in students' levels of understanding, so that the results can provide an accurate picture of their abilities. Questions that are classified as "Very Good" are very effective in distinguishing between high and low achieving students, while questions that are "Poor" are unable to provide meaningful information about student abilities and tend to produce inaccurate data.

Table 6. Normality Test Results

Information	Experimental	Control

	Class	Class
Posttest	0.775	0.450

Table 6 shows the results of the normality test of two groups, namely the experimental class and the control class, with posttest values of 0.775 for the experimental class and 0.450 for the control class, respectively. The difference in normality values between the experimental class and the control class indicates that the data from the two groups have different distribution characteristics. The experimental class, with a normality value of 0.775, indicates that the posttest data tends to be normally distributed, which means that the learning outcomes of students in this group are quite consistent and reliable. In contrast, the control class with a normality value of 0.450 indicates that there is an abnormality in the distribution of the data, which may indicate greater variation in student learning outcomes or other factors that influence the results.

This difference is due to the learning methods applied. The experimental class used the interactive RADEC learning model, which can increase student motivation and understanding, resulting in more uniform results. Meanwhile, the control class used a more traditional approach, which did not have the same impact on students' critical thinking skills. This highlights the importance of effective teaching methods in achieving optimal learning outcomes.

Table 7. Homogeneity Test Results

Statistics	Student Learning Outcomes
P-value	0.835
Homogeneity	p-value 0.5
Conclusion	Homogeneous

Table 7 shows the results of the homogeneity test on student learning outcomes, with a p-value obtained of 0.835. In this case, because the p-value obtained is greater than 0.5, it can be concluded that both groups have homogeneous variances. Student learning outcomes in this study can be analyzed more accurately, providing confidence that the differences found in the posttest results are due to the effectiveness of the learning model applied, not by differences in the variance of learning outcomes.

Table 8. Results of the T-Test for the Experimental Class and Control Class

Information	Experimental Class	Control Class
	84.55	75.71
Significance Value	2-tailed	<0.05

Table 8 shows the results of the t-test for the experimental class and the control class, where the average posttest score for the experimental class was 84.55, while the control class

had an average of 75.71. The significance value (p-value) obtained was <0.05, indicating that the difference between the two groups was statistically significant. This significant difference can be explained by the learning model applied. The experimental class used the RADEC learning model, which emphasizes active interaction and student involvement in the learning process. This model allows students to better understand the material and improve their critical thinking skills. Meanwhile, the control class used a more traditional learning model, which did not have the same impact on student learning outcomes. Thus, the significant difference in the average posttest score between the experimental and control classes indicates that the application of a more innovative learning model can result in better improvements in student learning outcomes.

Pembahasan

Several empirical studies have shown that the implementation of the RADEC model has a positive impact on students' critical thinking skills. Research by Pratiwi & Helsa, (2025) concluded that students who participated in learning with the RADEC model experienced significant improvements in the aspects of analysis, evaluation, and inference. The study also revealed that the Read and Answer stages effectively trained students' ability to understand and process information, while the Discuss and Explain stages encouraged students to express opinions and build arguments logically. Another study by Pratama et al., (2020) stated that RADEC-based learning was able to improve higher order thinking skills (HOTs).

In the study, students were not only involved in understanding the material, but also in creating learning products that showed their understanding and reflection on the material being taught. The products were in the form of thematic posters, illustrated stories, or creatively arranged presentations. Research by Yudin et al., (2020) also supports previous findings. In their study, students who were guided with the RADEC model showed an increase in their ability to ask critical questions and provide in-depth answers. In addition, RADEC was also able to increase student involvement in group discussions, which resulted in increased self-confidence, ability to work together, and sensitivity to the opinions of others.

In line with the opinion Sugiarti et al., (2024) that states that the RADEC learning model is the answer to realizing 21st century skills, especially critical thinking skills. In improving critical thinking, there are also difficulties for students in participating in learning, namely students are not confident in asking when there is something they do not understand, then students are not able to propose new ideas and make conclusions in discussions. This is because students are not optimal in pre-learning activities, namely reading from various sources so that students do not clearly understand the material being taught. Through a lot of reading, students will have new and broad knowledge (Rohman, 2022).

Other Ramdoni et al., (2022) studies show that the use of the RADEC (Read, Answer, Discuss, Explain, Create) model in learning in class VI A and VI B SDN 1 Lambheu, Aceh Besar Regency resulted in a better increase in critical thinking skills compared to conventional methods. Posttest data showed that the experimental class had the highest score of 95 and an average of 77.32, while the control class only achieved the highest score of 74 and an average of 50.32. This is in line with research Fitri, (2025), which also found a significant increase in pretest and posttest scores in the experimental class compared to the control class. The RADEC model encourages students to be active in identifying problems, gathering information, and generating creative solutions.

The opinion Romdoni & Salam, (2024) also supports this finding, stating that the RADEC model is able to develop 21st century skills, such as collaboration, critical thinking,

communication, and creativity. In addition, this model provides freedom of thought for students, allowing them to connect different concepts and apply creative thinking in solving problems. In the experimental group, students collaborated and exchanged ideas more often, which helped them build a deeper understanding of the material. Thus, the RADEC model is proven to increase student engagement and understanding of the learning material. The RADEC model provides greater encouragement for students in developing critical and innovative thinking skills.

They find it easier to connect concepts, explore various solutions, and improve communication skills through group discussions. This model can also be an alternative for teachers in overcoming the low critical thinking skills of students. In addition, the RADEC approach can be widely applied because it not only improves understanding of the material but also teaches students to think more analytically and reflectively. During the learning process, students in the experimental class looked more active compared to the control class which still applied conventional methods. With its advantages, the RADEC model can be one of the innovations in the world of education that focuses on developing students' critical thinking skills.

Therefore, this model is worthy to be adopted in various subjects to improve the quality of learning and students' readiness to face academic and real-life challenges. According to Yulianti et al., (2022) also said that the RADEC learning model can improve students' abilities in the 21st century, because students learn independently so they are able to think critically, creatively and can improve student learning outcomes. Both the RADEC learning model as an experimental class and the PBL learning model as a control class both have a positive influence on students' critical thinking skills. The significant increase in the RADEC learning model is because the syntax of the RADEC learning model is in accordance with the characteristics of Indonesian students.

This is in line with the opinion Imran & Amal, (2024) that the RADEC learning model is designed based on the conditions of students and the curriculum in Indonesia. The first stage is the Read stage, this stage makes the RADEC learning model different from other learning models. Furthermore, to see student feedback at the Read stage, the next stage is Answer. At this stage, the teacher gives pre-learning questions to students to distinguish between students who read and those who do not. The pre-learning questions given by the teacher are intended to help students understand the material and concepts that they will learn so that they can provide basic or simple explanations of the topics that have been read.

At this stage, students are also trained to develop curiosity to find information based on what they have read (Fathiara et al., 2019). Then at the Discussion stage (explaining), students are active because previously students have mastered enough material to discuss a problem, in this case covering the theme of how we live and grow. Definitions, concepts, examples of respiration, digestion of food and growth stages have been understood by students so that the discussion process runs well. This is in line with research conducted by Darwati & Purana, (2021) which states that the discussion stage can train and develop students' knowledge and thinking skills in understanding a concept.

This step also stimulates indicators of critical thinking skills to develop basic skills and make conclusions (Prasetiyo & Rosy, 2021). In classes that use the RADEC model, there is more readiness because students are equipped with pre-learning questions compared to classes that use conventional models. This is in line with the opinion Setyawan et al., (2023) that in terms of content, students who learn using the RADEC model are more prepared and mature in discussing. This increase in critical thinking skills can also be supported at the Explain stage.

At this stage, students explain the results of the answers they have agreed upon with their group members in front of the class.

The goal is for all students to know the answers from the results of other group discussions and if they are not quite right or have different opinions, each group can exchange ideas. This is in line with research conducted by Rizal et al., (2024) which states that the purpose of the explanation stage is to verify the understanding of students who have been taught and to help teachers ensure that the explanation given is correct or not. Students will feel and understand a material better by communicating it again. At this stage, classes that use the RADEC learning model are more interactive and communicative compared to classes that use conventional models.

This is because, in the control class, they have not fully understood only with an investigation process, in contrast to students in the experimental class using the RADEC model who from the initial stage have been equipped with knowledge and are more prepared in the learning process. This is in line with research conducted by Nurjannah et al., (2023) that presentation activities in inquiry learning tend to be less enthusiastic, in contrast to students using the RADEC learning model who have previously been provided with teaching materials. In the last stage, namely the Create stage. At this stage, students create a work that has been agreed upon with their group members. This stage teaches students how to be cooperative, collaborate and communicate.

They learn to understand creative ideas, identify ideas that will be realized and implement those ideas (Ramadani & Siregar, 2024). This is in accordance with research conducted by Nurmitasari et al., (2023) that the RADEC learning model reflects several aspects of learning, namely that students are active in exploration, discussion and application. However, from several advantages, the RADEC model also has several disadvantages in the research conducted, namely that to go through all stages in the syntax of the RADEC learning model takes longer, students also feel burdened by pre-learning questions and there is a sense of shame for students to speak in front of the class when explaining so that some students are just silent.

To overcome this, researchers provide a solution, namely educators and students must utilize study time so that learning runs optimally, educators must adjust learning hours so that they are not too busy to do the tasks given and continue to motivate students to be confident. Although there are several shortcomings in the application of the RADEC learning model, the advantages are far greater than the disadvantages and this model is very suitable for use in science learning S in improving critical thinking skills and has a positive effect compared to other learning models. This is in accordance with research conducted by Andini & Fitria, (2021) which shows that there is an increase in students' critical thinking skills before and after treatment using the RADEC learning model. In addition, research also conducted by Yulisdiva et al., (2023) which shows that the RADEC learning model has a more positive effect than the inquiry learning model on students' high-level thinking skills.

KESIMPULAN

The implementation of the Read Answer Discuss Explain Create (RADEC) learning model significantly improved the critical thinking skills of fourth grade students of Madrasah Ibtidaiyah in the subject of Natural and Social Sciences (IPAS). The pretest results showed that students in the control class had a slight initial advantage, but after the implementation of the RADEC model, the experimental class showed a substantial increase in posttest scores. The average posttest score for the experimental class reached 84.55, while the control class was only

75.71. Further analysis through validity and reliability tests showed that the instruments used in this study were effective and consistent. By involving students in various interactive activities, the RADEC model not only improves their understanding of the material but also strengthens their critical thinking skills. Although there are some challenges in implementing this model, its advantages in increasing student engagement and analytical skills make it a viable method to be applied in learning. This study underscores the importance of using innovative approaches in education to prepare students for the challenges of the 21st century. The implication of these findings is that the implementation of interactive and collaborative learning methods can be an effective strategy in improving student learning outcomes, especially in the subject of IPAS. Further researchers are advised to develop variations of the RADEC learning model by integrating technology, such as the use of digital learning applications, to further enhance student engagement. Conducting experiments in various schools with different student characteristics to test the generalizability of the findings and the effectiveness of the RADEC model in a broader context.

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