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Radec model learning for strengthening the learning independence of upper grade students at 001 Barong Tongkok elementary school

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ABSTRACT

The research aims to evaluate the RADEC learning model as strengthening the independent character of upper-class students. The character of independence includes self-confidence, activeness, discipline, and responsibility. The approach uses an experimental non-equivalent control group design. Research instruments were observation, interviews, and questionnaires. The research results show that the application of the RADEC learning model strengthens the character of upper-class students. The increase in pretest and posttest independence in the experimental class was 6.88; in the control class, it was 7.04. The average N-Gain for the experimental class was 0.35, while the average N-Gain for the control class was 0.32. This shows that the effectiveness of RADEC learning is better than control class learning and shows that the effectiveness of the RADEC learning model for experimental class and control class for conventional learning models has satisfying criteria. The N-Gain value is not too different because the RADEC learning model is not the sole factor causing students to have different independence from other learning models. Another factor that influences student independence is the internal factor of self-concept in the form of the concept of individual differences.

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INTRODUCTION

Formal educational institutions, namely schools, play a crucial role in overcoming the problem of student independence by instilling useful values in the formation of children's character and personality. The Permendikbudristek Number 4 of 2022 addresses the Pancasila profile and project-based learning. The main element of the Independent Curriculum is project-based learning, which aims to develop student

character and competence. Minister of Education and Culture Regulation number 7 of 2022 regulates the standards for implementing flexibility in independent curriculum learning.

Independence is a character trait that humans need to develop self-confidence. Sriwilujeng (2019) asserts that independence is a trustworthy attitude that reduces reliance on others to achieve objectives. Self-control is the behavior and attitude of individuals who do not easily depend on other people to complete their tasks. Mustari (2017) explains that independence is necessary so as not to burden other people. Independence is crucial for individuals to develop their own skills and abilities.

Independent learning involves carrying out learning activities independently, driven by personal motivation or encouragement to master specific skills for problem-solving. Regarding independent learning, a student needs to be proactive and without dependence on the teacher. Students' learning independence requires active activities before and after the teaching and learning process takes place. Students who have independence should prepare learning materials (Egok, 2016, hal. 188).

According to Susanti & Putra (2021), there are four key indicators of student independence that play an important role in shaping autonomous learning behavior. The first is self-confidence, which refers to students' belief in their ability to face various challenges during the learning process. The second is activeness, which is seen in students who show initiative and consistent effort in achieving their learning goals. The third indicator is discipline, which can be observed through behaviors that adhere to established rules, regulations, and social norms within the school environment. Lastly, responsibility refers to the willingness and ability of students to complete their tasks diligently and to take ownership of the outcomes, including any risks involved.

The environment in which teaching and learning occur influences student development. In formal education, educators can condition and falsify the learning environment for students to achieve desired learning outcomes, create authentic teaching and learning situations, and create learning experiences (Nggili, 2015). Students can strengthen their character through the application of the RADEC model in teaching and learning.

RADEC is a Read, Answer, Discuss, Explain, and Create learning syntax that makes it easier for students to remember the steps of the learning process (Handayani et al., 2019). The RADEC principle aims to optimize learning by constructing knowledge through the reading of science textbooks prior to learning, thereby equipping students with knowledge capital for their learning (Sopandi, 2017). In addition to reading, students can also cultivate character values such as persistence and responsibility. The character of independence plays a crucial role in shaping the personalities of students. According to Khairunnisa et al. (2023), independence helps students become independent and responsible individual

Surya (2017) emphasised the importance of initiating character education at a young age to ensure proper internalisation of these values. ly. Effective character education will form students who are not only academically intelligent but also have good morals and ethics.

Forming student character through teaching and learning activities (KBM) requires appropriate learning strategies. Mustoip (2023) states that character education must integrate positive values into every aspect of school life. Syafrizal & Sari (2024) also emphasize the importance of implementing character education systematically and continuously. Students can effectively instill character values with the right strategy.

Instilling character values in education is very important. Dirgantoro (2016) stated that educational institutions have a crucial role in shaping students' personalities and characters. When formulating the teaching and learning process, it is crucial to determine mature teaching and learning strategies for the initial, core, and closing activities. These strategies can assist in forming students' character during the teaching and learning process (Dewi et al., 2022).

Education experts have proven the effectiveness of the RADEC learning model in increasing student independence and improving learning outcomes (Tulljanah & Amini, 2021). This model combines various learning strategies that encourage students to be more independent and responsible for their learning process. You can apply the RADEC teaching and learning method to form and strengthen the profile of Pancasila students in the independent curriculum. This matter is based on assumptions that indicate the RADEC teaching and learning method can enhance the quality of the teaching and learning process, leading to increased learning outcomes in terms of insight, skills, and attitudes (Sopandi, 2017).

Learning model strategies can lead to increased student independence and improved learning outcomes. According to research in the journal Syifani et al. (2024), strategies such as the RADEC learning model have proven effective in instilling the character of independent learning in students. With the right approach, students can develop into independent and accomplished individuals.

Based on initial observations, the implementation of intensive character education at SDN 001 Barong Tongkok aims to integrate character assessment into teaching and learning activities, while also promoting school culture through various familiarization activities. The initial interviews revealed a weakness in the independent learning education at SDN 001 Barong Tongkok, as parents and teachers shared that their children were reluctant to attend school due to a lack of friends, a lack of confidence in their own abilities, and a lack of courage to try something new. At the elementary school level, weak character education manifests as a tendency towards spoiltness and a reliance on others, particularly parents.

Based on the related problems presented by researchers, it is something that needs attention, especially regarding how to implement the RADEC model of learning to strengthen the character of independent learning and whether there is an influence of the RADEC model of learning on the character of high-class students at SD Negeri 001 Barong Tongkok. As a form of implementation, the researcher carried out research activities on the RADEC Model of Learning to Strengthen Students' Independent Character in the High Class at SD Negeri 001 Barong Tongkok.

The purpose of the research is to examine how the RADEC model of learning is implemented to enhance students' independence and to assess its impact on the independent character of high school students at SD Negeri 001 Barong Tongkok school. Carrying out research is useful for providing additional insight into the development of science and knowledge in building Strengthening Character Education (PPK) implementation of teaching and learning using the RADEC method, providing guidance for teachers to incorporate personality values into their learning to strengthen character education through the RADEC learning model, and serving as a source of information on academic progress in schools in Strengthening Character Education (PPK), especially those related to the follow-up of learning in schools so that it can be an inspiration to improve and develop policies that will be implemented.

METHOD

The research conducted in this study adopts a quasi-experimental approach. The researchers applied this concept by utilizing a control group and a comparison group. The research design employed is the Pretest-Posttest Control and Experiment Design, where the experimental group is given a pretest before the treatment and a posttest after the treatment to observe the results. To determine whether there is a significant influence of the RADEC learning model on students' character in the upper grades of SD Negeri 001 Barong Tongkok, the experimental group was provided with a pretest. The pretest consisted of a closed-ended questionnaire distributed to both the experimental and control groups. The questionnaire was developed based on an instrument grid that had been prepared beforehand. The next step involved giving the experimental group a treatment in the form of RADEC model learning, followed by observing the outcomes. The researchers conducted observations during the treatment phase by examining how students participated in each stage of the RADEC learning model. After the treatment, a posttest questionnaire was administered to measure the progress resulting from it. Meanwhile, the control group did not receive RADEC model learning but continued to use the conventional learning model typically implemented in the class. Students in the control group also took a pretest before the learning session and a posttest afterward.

The instruments were developed based on a predefined grid. The questionnaires were prepared for students to measure their level of independence in both the experimental and control classes at SD Negeri 001 Barong Tongkok. The independence questionnaire consisted of 15 items, and the instrument grid is outlined as follows.

Table 1. Indicator Grid for Student Independence

Variable	Indicator	Statement Items
Student Character - Aspect of Independence (Susanti & Putra, 2021)	Confidence	a. I have the desire to achieve good learning outcomes. b. I have the motivation to achieve good results in learning to make my parents proud. c. I have my own desire to study diligently. d. I have my own way of making learning easier for me.
	Active	a. I strive diligently in the learning process. b. If I do not understand the subject matter, I make an effort to ask the teacher. c. I have the willingness to try solving difficult questions. d. I feel the need to read supplementary books related to the material explained by the teacher to expand my knowledge. e. I study independently without being told by my parents.
	Discipline	a. I listen attentively to the teacher during explanations. b. I study in the classroom wholeheartedly. c. I do not engage in activities that violate the rules.
	Responsibility	a. I complete every assignment given by the teacher on my own. b. I submit homework on time. c. I take responsibility for the answers I provide for the tasks assigned by the teacher.

The study was conducted at SD Negeri 001 Barong Tongkok from September to October 2023. The researchers generalized the population to include objects or subjects with specific abilities and characteristics to be studied, after which they drew conclusions (Sugiyono, 2019). The population studied in this research consisted of sixth-grade students at SD Negeri 001 Barong Tongkok. The sample selection was based on the needs and characteristics of the population (Amin et al., 2023). Two

sample classes were required for the study: a control class and an experimental class. The selection of the sample groups was based on their similar levels of ability. The sampling technique used was total sampling, which refers to a method where the sample size is equal to the population size (Sugiyono, 2019). The sample in this study included 25 students from Class VI B and 25 students from Class VI C at SD Negeri 001 Barong Tongkok. Data collection was carried out using instruments such as questionnaires, observations, and interviews. The data analysis techniques used in this research were data description tests, normality tests, homogeneity tests, and hypothesis tests. Data testing uses SPSS Version 25 as a tool.

RESULTS AND DISCUSSION

Results

The learning process was conducted in the IPAS subject. This study measures students' independence using a questionnaire consisting of 15 statements, tabulates the findings, and analyzes the average score of these 15 questions, resulting in a score ranging from 1 to 5. The table presents an overview of the student independence variable based on the analyzed data.

Table 2. Description of Student Independence Data

Explanation	Experimental Class		Control Class	
	Pretest	Posttest	Pretest	Posttest
Mean	41,12	48	39,08	46,12
SD	7,19	4,6	6,63	4,99
Variansi	51,69	21,16	44,07	24,94
Max	56	59	54	55
Min	31	39	28	33

The table above concludes that there is an increase in scores from the pretest to the posttest in both the experimental and control classes, based on the presentation of student independence data. The pretest score for student independence in the experimental class before using the RADEC learning model was 41.12. After implementing the RADEC learning model, students achieved a posttest score of 48. The mean difference in scores before and after applying the RADEC learning model was 6.88. Therefore, it can be concluded that the RADEC learning model effectively increased student independence by 6.88 points. Meanwhile, in the control class, the pretest score for student independence was 39.08, while the posttest score increased to 46.12. The conventional learning model resulted in a mean score difference of 7.04, indicating an increase in student independence in the control class by 7.04 points. Based on these mean scores, the control class had a higher average score than the experimental class.

Based on the results of the pre-test and post-test scores, there was an increase in students' learning independence in both the experimental and control classes. In the experimental class, the increase was 6.88, while in the control class, the increase was slightly higher at 7.04. Thus, although the control class showed a greater increase by 0.16 points, the difference was not statistically significant.

This insignificant difference may be attributed to several factors. First, the initial levels of learning independence in both classes were relatively similar, resulting in comparable progress regardless of the teaching model applied. Second, while the experimental class used the RADEC learning model, the control class might have also engaged in structured learning activities that supported student autonomy, albeit unintentionally. Third, the implementation of the RADEC model may require more time

and consistency to produce a more pronounced effect on students' independent learning. Additionally, extrinsic factors such as students' motivation, teacher classroom management, and the learning environment may have influenced the overall outcomes. The average N-gain values for the experimental class and the control class are as follows.

Table 3. Average Normalised Gain (N-Gain) of Experimental and Control Classes

Class	Mean	N	Std. Deviation
Experimental class	.3460	25	.15858
Control Class	.3237	25	.15464

Further analysis of the average normalized gain (N-gain) values also supports this conclusion. As shown in Table 3, the experimental class obtained an average N-gain of 0.3460 (SD = 0.15858), while the control class achieved a slightly lower average of 0.3237 (SD = 0.15464). These N-gain values are categorized as moderate and indicate that both instructional approaches had a positive impact on students' learning independence, with only a minimal difference in effectiveness between them.

This study aims to assess students' learning independence in the experimental class based on four main indicators from Susanti and Putra (2021): self-confidence, activeness, discipline, and responsibility. Data were collected through a questionnaire with 15 items categorized by these indicators. Analysis was done by calculating the average score for each indicator to profile students' learning independence. The average scores per indicator are as follows:

Table 4. Average Scores per Learning Independence Indicator in the Experimental Class

Indicator	Average Score
Self-Confidence	3.04
Activeness	10.14
Discipline	2.49
Responsibility	2.82

Self-confidence is in the range of 3.04, indicating that most students responded Agree to the related statements, which means they are fairly confident in the learning process. Activeness has a relatively high score as it consists of five items, with a total average around 10.14 (or an average of approximately 2.03 per item), indicating that quite a number of students are actively initiative in their learning. Discipline and Responsibility also reflect a fairly good level of independence, although their scores are slightly lower compared to the other indicators, they are still categorized as moderate to high.

The RADEC model aligns well with the conditions and needs of teachers during its implementation. The use of interview instruments provides additional perspectives from respondents about their experiences or the reasons behind their answers in the questionnaire. Here are the results of the researcher's interview with a teacher from SD Negeri 001 Barong Tongkok

> *"The RADEC learning model that I implemented in the class I received is suitable for the conditions and needs of my class. A few students fell behind, but most followed each stage."(Teacher)*

The RADEC model of learning has several steps in its implementation process. The stages in the RADEC model include reading, answering, discussing, explaining, and creating. The following excerpt from the interview demonstrates that the students at SD Negeri 001 Barong Tongkok can effectively follow and accept the RADEC learning model.

"Can follow along well. The teacher's actions are unique and unfamiliar to us, which piques our curiosity and prompts us to pay closer attention. However, there are still friends who fail to pay attention to the teacher during class. (Student)

Other students who can similarly follow the teacher's RADEC learning model also support this statement. The student also added that the RADEC learning model can indirectly encourage students to read diligently, especially during pre-learning. Here are the results of the researcher's interview with another student.

The RADEC learning model has several steps in its implementation process. The stages in the RADEC model include reading, answering, discussing, explaining, and creating. The steps of the RADEC learning model implemented by the teacher at SD Negeri 001 Barong Tongkok align with the steps or stages that the students have achieved, as shown in the following interview excerpt.

"Very clear indeed." A day before the lesson starts, the teacher asks us to read first and then prepare questions. Upon entering the class, we pose questions to the teacher, who at times responds, and at other times requests a response from a student. As a result, the class evolves into a dialogue. Next, they asked us to summarize the main points of the discussion. Finally, they asked us to create a mind map based on the lesson we had just completed. (student)

Based on the interview results, the classroom learning process at SD Negeri 001 Barong Tongkok clearly reflects the application of the RADEC learning model, as students are required to read the material before learning begins. Then, students engage in discussions (discuss) with the teacher and other students. This result aligns with the researcher's observation that student participation in each stage of the learning process, filled with student discussion activities, is quite active and enthusiastic. The RADEC Model of Learning implemented by the teacher at SDN 001 Barong Tongkok has some obstacles. The constraint is that not all students can follow the stages of the RADEC learning model well. Here are the results of the researcher's interview with the teacher from SD Negeri 001 Barong Tongkok.

"The challenge is that not all students can follow this stage well. Additionally, there are students who lack interest in participating in activities students who are less enthusiastic so this becomes a general note for me as a teacher." (teacher)

Teachers at SD Negeri 001 Barong Tongkok can overcome obstacles by encouraging students to ask questions and engage in discussions. These teacher interventions can make the students more active. The teacher of SD Negeri 001 Barong Tongkok conveyed this in the following interview excerpt.

"If it's me, I usually encourage the quiet students to speak up, and I have also given rewards to the most active students. This also creates competition among the students." (teacher)

The students of SD Negeri 001 Barong Tongkok also shared their strategies for overcoming these obstacles. The students communicated that in order to overcome the challenges of adhering to the RADEC learning model, they must overcome their lack of enthusiasm for participating in the lessons, and the teacher should encourage students to ask questions. Students eliminate classroom boredom by fostering self-motivation to learn. Here are the statements from the students of SD Negeri 001 Barong Tongkok.

"It means eliminating the lack of enthusiasm and excitement in lessons and being actively engaged in discussions." Before engaging in a discussion, the teacher often provides motivation to encourage participation. If the teacher doesn't

stimulate the students, they may remain silent, particularly if the subject matter lacks interest. (student)

Discussion

The descriptive data show that student independence increased in both the experimental and control classes. In the experimental class, the increase in student independence was 6.88, while in the control class, it was 7.04; thus, the increase in the control class was slightly higher than in the experimental class. However, the final post-test scores of the experimental class were higher than those of the control class. Several factors explain why the conventional class showed a greater raw score increase, yet the experimental class ultimately achieved better outcomes. In conventional learning, teaching tends to be more teacher-centered, where the teacher serves as the primary source of information. Content is directly presented, with clear explanations and structured examples. This approach aligns with students who prefer passive learning, enabling them to quickly absorb information and demonstrate short-term gains. The familiarity of the method may also contribute to a sense of ease and immediate understanding, which can reflect in a sharp rise in scores after instruction.

However, the RADEC model used in the experimental class encourages students to read independently, answer questions, engage in discussion, explain concepts, and create something new. This process fosters deeper cognitive engagement and requires active participation. Although the increase in raw scores may appear smaller, the higher post-test results suggest that students in the experimental class achieved a deeper level of understanding and retained more meaningful knowledge. Furthermore, the RADEC model promotes long-term development of learning independence, critical thinking, and self-regulated learning habits, which are not always immediately reflected in short-term score improvements. Other contributing factors to the higher final achievement in the experimental class may include the development of metacognitive strategies, increased student motivation through active learning, and a more personalized learning process that addresses different student needs. These factors support the effectiveness of the RADEC model in fostering not just improvement, but sustained and higher-quality learning outcomes.

The findings of this study reveal that students in the experimental class exhibited a relatively high level of learning independence, as assessed through four primary indicators: self-confidence, activeness, discipline, and responsibility. A mean score of 3.04 for self-confidence suggests that students demonstrated a strong belief in their learning abilities, which corresponds with Sa'diyah (2017), who posits that self-confidence is a crucial factor in fostering autonomous behavior. The indicator of activeness attained a notably high score of 10.14, reflecting students' proactive engagement in learning activities an essential trait of independent learners, as emphasized by Atieka and Budiana (2022). Although the average scores for discipline (2.49) and responsibility (2.82) were slightly lower, both still indicate the students' capacity to regulate their learning behavior, which, according to Ramadhani et al. (2020), constitutes a fundamental component in the development of learning independence. Consequently, the instructional approach applied in the experimental class can be considered effective in promoting students' autonomy in learning.

Conventional learning often emphasises individual assignments and personal responsibility, which can encourage students to become more independent. This learning model expects students to manage their own time, complete tasks with minimal guidance, and study independently outside of class. This approach trains students to rely

on themselves in understanding the material and solving problems, which ultimately can enhance their independence. On the other hand, the RADEC learning model places more emphasis on collaboration and group discussions. Although RADEC is very effective in enhancing critical thinking skills and deep understanding, this model tends to provide more support and guidance during the learning process.

Although RADEC is effective in enhancing critical thinking skills and understanding through group discussions and collaborative projects, not all students develop in the same way(Handayani et al., 2019) Students who prefer to work alone may find it difficult to develop their independence in a highly collaborative context. As a result, they may become more dependent on the help of groupmates or the guidance of teachers compared to students who are more suited to individual learning methods. The researcher also observed that not all students were able to express their opinions comfortably and confidently during the discussion stage.

These individual differences could explain why the implementation of the RADEC learning model did not significantly alter the differences in N-Gain scores, despite the increase in student independence. Students who are more accustomed to and comfortable with independent learning in a conventional learning environment might show an increase in independence that is almost the same as students who learn in the collaborative context of RADEC.

Previous research by Triansari & Widayati (2019), which concluded that personality, family environment, school environment, and peer interaction, both individually and collectively, are the factors of independence, also supports the results of this study. Another factor that influences student independence is the perseverance of a student in achieving the desired results, which is the motivation to excel.

Immature application of the learning model can lead to unclear material delivery and reduce the effectiveness of the learning process (Isma et al., 2023). If teachers do not have a deep understanding of each stage of RADEC or are unable to integrate them effectively, the learning process can become suboptimal. Therefore, teachers require training and support to comprehend the RADEC concept and effectively incorporate it into their daily learning activities.

Lack of preparation can also be seen in the management of group discussions at the "Discuss" stage. When the facilitator fails to facilitate the discussion effectively, students often become passive and rely solely on a few more dominant members. This can reduce the opportunities for quieter or less confident students to participate actively and develop their independence. Teachers need to ensure that all students are equally involved and have the opportunity to express their opinions and ideas. Without effective strategies to encourage active participation from all students, the discussion stage will not provide maximum benefits in building independence.

Overall, a poorly developed RADEC model implementation can impede the development of student independence. Teachers need to understand each component of the RADEC model in depth and apply it with effective strategies. This includes ensuring that students are actively and independently involved at every stage, providing constructive feedback, and creating an environment that allows students to innovate and learn independently. With thorough preparation and implementation, the RADEC model can achieve the main goal of maximizing student independence and understanding.

Teachers found that encouraging students to be active and preparing lessons more effectively are effective ways to overcome obstacles in the implementation of the RADEC learning model. One way that teachers can stimulate student activity, according

to Susanti and Darmasnyah (2023), is by asking questions. These questions serve as a medium to stimulate students' curiosity, build critical thinking skills, and encourage active participation in the learning process. Well-designed questions can enhance students' understanding of the material, prompt them to reflect, and encourage dialogue among students.

CONCLUSION

The upper grades at SD Negeri 001 Barong Tongkok have implemented the RADEC learning model in accordance with its syntax. However, there are still several obstacles to overcome, including the need for more preparation from both teachers and students to effectively follow this learning model, as well as the students' lack of willingness to try. This means that not all students can effectively follow the RADEC learning model. The teacher's approach to overcoming these obstacles involves engaging students in active learning by asking interesting questions. The experimental class's average N-Gain score was 0.35, while the control class's average score was 0.32. This indicates that the effectiveness of learning using RADEC surpasses that of the control class, and both the RADEC learning model in the experimental class and the conventional learning model in the control class meet good criteria.

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