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Fostering Critical Thinking Through Project-Based Learning: A Novel Approach to Creed and Moral Instruction

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Abstract:

This study aims to analyze the impact of project-based learning (PBL) on the critical thinking skills of Grade XI students in the subject of Akidah Akhlak at MAN 1 Majene. Employing an ex-post facto research design, the study involved a population of 138 students, from which a sample of 103 was selected using simple random sampling. Data were collected through a questionnaire and analyzed using both descriptive and inferential statistical methods. A simple linear regression test was employed for hypothesis testing. The findings revealed that the use of PBL contributed 24% to students' critical thinking skills, while the remaining 76% was attributed to other unexamined variables. Although the 24% contribution signifies an initial success in fostering students' critical thinking, further enhancement may be achieved by integrating PBL with other instructional approaches such as technology-based learning, simulations, or experiential activities aligned with real-life contexts. Future research is recommended to explore alternative methodologies and additional variables influencing critical thinking development.

Abstrak:

Penelitian ini bertujuan untuk menganalisis pengaruh penggunaan model pembelajaran berbasis proyek terhadap kemampuan berpikir kritis peserta didik kelas XI pada mata pelajaran Akidah Akhlak di MAN 1 Majene. Jenis penelitian adalah penelitian ex-post facto. Populasi sebanyak 138 di ambil dari seluruh kelas XI yang ada di MAN 1 Majene, sedangkan sampel sebanyak 103 responden dengan menggunakan teknik *simple random sampling*. Metode pengumpulan data yang digunakan yaitu angket atau kuesioner. Angket disebarkan kepada responden kemudian dianalisis menggunakan analisis deskriptif dan analisis statistik inferensial. Pengujian hipotesis dilakukan dengan cara parsial melalui uji regresi linear sederhana. Hasil penelitian menunjukkan bahwa pengaruh penggunaan model pembelajaran berbasis proyek terhadap kemampuan berpikir kritis peserta didik berkontribusi sebesar 24% dan sisanya sebesar 76% dipengaruhi oleh variabel lain yang tidak dimasukkan dalam penelitian ini. Pengaruh sebesar 24% telah mencerminkan keberhasilan awal dalam mengembangkan keterampilan berpikir kritis peserta didik. Namun, pengaruh ini masih dapat ditingkatkan dengan mengintegrasikan model ini dengan metode pembelajaran lain yang melibatkan teknologi, simulasi, atau praktik langsung yang relevan dengan kehidupan nyata. Jika ingin melakukan penelitian yang serupa sebaiknya menggunakan metode penelitian yang berbeda, serta lakukan penelitian terkait dengan faktor-faktor lain yang mempengaruhi kemampuan berpikir kritis peserta didik.

Keywords:
Project Based Learning, Critical Thinking, Beliefs, Morals

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Introduction

Education plays a vital role in preparing a generation capable of competing in the era of globalization. In the 21st century, educational systems must undergo significant transformation – from traditional learning methods to modern, student-centered approaches – to ensure students acquire essential knowledge, learning and innovation skills, technological literacy, and life skills for adaptability and resilience (Kumalasari, Ritonga, & Hasanah, 2023). Schools must therefore equip students with these competencies to thrive in an increasingly complex global context. To address these challenges, the Ministry of Education and Culture of the Republic of Indonesia has introduced the Independent Learning Curriculum (Kurikulum Merdeka), which integrates three core concepts of 21st-century education: 21st-century skills, a scientific approach to learning, and authentic assessment. The 21st-century learning framework emphasizes the development of the 4Cs – communication, collaboration, critical thinking, and creativity – as core objectives (Maulidia, Nafaridah, Ahmad, Ratumbuysang, & Sari, 2023). Voogt and Roblin (2012) published in Educational Research Review conducted a systematic review of the literature on the implementation of 21st century skills in the curriculum. They found a strong consensus that critical thinking, collaboration, and communication were the skills most frequently identified and attempted to be integrated. This confirms that the emphasis on the 4Cs, particularly in the domain of learning and innovation, is a global effort to prepare students for future challenges. Furthermore, three major domains of 21st-century skills include: life and career skills, learning and innovation skills, and information, media, and technology skills. Among these, learning and innovation skills specifically highlight critical thinking, communication, collaboration, and creativity as key components that must be cultivated across all core subject areas and learning themes (Ariana, 2016).

One effective approach for fostering these skills is Project-Based Learning (PjBL). This model allows teachers to engage students in real-world project work, where learners actively participate in creating tangible products or solving complex problems. Through PjBL, students are encouraged to become active learners, think critically, and develop their creativity and problem-solving abilities (Arlina, Pane, Sitorus, Jerohmi, & Munazah, 2023). PjBL emphasizes student-centered learning through meaningful projects that are focused on essential questions or challenges. Previous studies have shown that PjBL supports the development of critical thinking, independence, rationality, and a sense of responsibility among students (Imaduddin, Sholikhati, & In'ami, 2021). To ensure effective learning, all

components in the educational process – particularly teachers and students – must be well aligned. If any component is weak or unsupported, it may hinder learning goals and outcomes (Salsabila, 2024). As in the study conducted by Chen and Yang (2019) found that the implementation of PjBL significantly improved students' critical thinking and problem-solving abilities. They argued that the investigative nature of authentic projects in PjBL encourages students to analyze information, evaluate solutions, and make informed decisions, which are the essence of critical thinking.

In this regard, student-centered learning promotes not only individual engagement but also positive peer interaction and group collaboration, leading to more effective and meaningful learning experiences (Nababan, 2018). Slavin comprehensively reviews the evidence that cooperative learning (a key form of student-centered learning) consistently results in increased academic achievement. Slavin explains that the mechanisms behind this increase involve cognitive elaboration through peer explanations, shared motivation, and opportunities to practice social skills in an academic context (Rosiah, 2019).

In the context of Islamic Religious Education (PAI), teachers of Aqidah Akhlak face unique and demanding responsibilities. In addition to fostering students' intellectual potential, they are tasked with nurturing students' moral and spiritual development. The goal is to help students grow into well-rounded individuals – physically, spiritually, emotionally, socially, and intellectually. This moral-spiritual foundation is expected to be reflected in students' behavior, such as respect for teachers and positive interpersonal conduct (Sholeh, 2022). The subject of Aqidah Akhlak holds particular significance at the senior secondary level (Madrasah Aliyah), as students are in adolescence – a stage marked by experimentation and identity formation. Supporting students during this period requires attention from both family and school environments. Morality (akhlak) encompasses one's character, behavior, and disposition. As noted by Al-Ghazali, akhlak is a deeply rooted trait within the soul that gives rise to actions effortlessly and spontaneously, without the need for intellectual deliberation (Zainudin, 2013). In daily life, morality influences individuals' relationships with others, their environment, and their connection with Allah SWT. The research is intended to explore how this innovative, student-centered learning model can contribute to the development of higher-order thinking skills in moral and religious education contexts.

Research Method

This study employed a quantitative ex post facto design. Salkind (2012) in Exploring Research also emphasized that in non-experimental research, including ex post facto, researchers have no control over the independent variables. Researchers only observe the relationship between variables as they exist in the natural environment or after the event. The main goal is to investigate the possibility of a cause-and-effect relationship without direct intervention on the causal variables. The quantitative nature of this study is evident in the use of numerical data across all stages, including data collection, interpretation, and analysis. A statistical approach was utilized to ensure objectivity and accuracy in determining the relationship between the variables under investigation.

The research was conducted at MAN 1 Majene, chosen based on preliminary observations and considerations. The researcher identified that no prior studies had investigated the use of project-based learning and its effects on critical thinking skills within this particular institution. MAN 1 Majene is also recognized as one of the leading madrasahs in Majene Regency, making it a relevant and strategic setting for the study. Additionally, the researcher's status as an alumnus of the school facilitated strong psychological and professional connections with the teachers and administrators, particularly with educators responsible for the subject of Aqidah Akhlak. This connection helped establish trust and cooperation, which in turn supported the smooth implementation of the research activities within the school environment.

The research design adopted a simple variable paradigm consisting of one independent variable – project-based learning – and one dependent variable – students' critical thinking skills. The study involved the entire population of Grade XI students at MAN 1 Majene, which totaled 138 individuals. From this population, a sample of 103 students was selected using the Slovin formula to ensure appropriate sample size. The sampling method used was simple random sampling, in which all members of the population had an equal chance of being selected. This method is described as simple because the selection process does not consider sub-group divisions or strata within the population, thus making the procedure straightforward and unbiased (Arikunto, 2010).

Data collection was carried out using a structured questionnaire based on a Likert scale, aimed at capturing quantitative data from the students regarding the use of the project-based learning model and their critical thinking abilities. The questionnaire assessed six key components in the implementation of project-based learning: determining essential questions, designing project plans, scheduling, monitoring project progress, assessing project outcomes, and evaluating the learning process. Meanwhile, students' critical thinking skills were measured across three dimensions: reflective thinking, productive thinking, and evidence-based evaluation. These indicators were selected to provide a comprehensive assessment of both the instructional model and the cognitive outcomes it aimed to influence.

The collected data were analyzed using both descriptive and inferential statistical techniques. Descriptive analysis was employed to provide summaries of the data and describe the characteristics of the sample. This included measures such as mean, percentage, and standard deviation (Pallant, 2020). Inferential statistical analysis was then used to examine the relationship between the independent and dependent variables (Sugiyono, 2016). In particular, a simple linear regression analysis was conducted to determine the extent to which the use of project-based learning influenced students' critical thinking skills. This method allowed the researcher to identify the strength and significance of the relationship, thereby providing empirical evidence on the effectiveness of project-based learning in enhancing higher-order thinking among students in the subject of Aqidah Akhlak.

Results and Discussion

Based on the research conducted on Grade XI students at MAN 1 Majene involving a total of 103 respondents, the researcher collected data through the distribution of questionnaires. These questionnaires were completed by the students and subsequently scored according to each item in the instrument. The scores obtained were then used to analyze the implementation of the project-based learning model. Following the scoring process, a descriptive statistical analysis was conducted to interpret the level of utilization of the project-based learning model among students. The analysis was based on responses provided by the 103 student participants. The results of this analysis are presented in the following table, which summarizes the descriptive statistics regarding the use of project-based learning at MAN 1 Majene:

Table 1. Descriptive Statistics of the Use of Project-Based Learning Models at MAN 1 Majene

Number of Samples	103
Maximum Score	103
Minimum Score	54
Mean	78
Standard Deviation	9
Range	49

Based on the table above, the results of the descriptive analysis of the questionnaire data regarding the use of project-based learning models at MAN 1 Majene reveal several key statistical findings. The range of scores is 49, with a minimum score of 54 and a maximum score of 103. The mean score is 78, indicating the average level of implementation perceived by students, while the standard deviation is 9, reflecting the variability of responses among the 103 participants. These results suggest a generally positive perception of the application of project-based learning within the classroom, though with some degree of variation among students. The detailed categorization of these findings is presented in the following table:

Table 2. Categorization of the Use of Project-Based Learning Models at MAN 1 Majene

No.	Category	Interval	Frequency	Percentage
1.	Low	$X < 69$	13	12%
2.	Medium	$69 \leq X < 87$	82	80%
3.	High	$X \geq 87$	8	8%
	Number		45	100%

Based on the categorization table above, the analysis of the use of project-based learning models at MAN 1 Majene shows that 13 respondents (13%) fall into the low category, 82 respondents (80%) are in the medium category, and 8 respondents (8%) are

categorized as high. These findings indicate that the majority of students perceive the implementation of project-based learning to be at a moderate level. This is further supported by the average score of 78, which falls within the medium category, suggesting that while the model has been moderately applied in classroom practice, there is still room for improvement to reach a higher level of implementation. The following table presents the descriptive statistics of students' critical thinking skills:

Table 3. Descriptive Statistics of Critical Thinking Skills of Grade XI Students at MAN 1 Majene

Number of Samples	103
Maximum Score	113
Minimum Score	67
Mean	84
Standard Deviation	8
Range	46

Based on the table above, the results of the descriptive analysis of the critical thinking skills questionnaire scores for Grade XI students at MAN 1 Majene indicate a range of 46, with a minimum score of 67 and a maximum score of 113. The mean score is 84, suggesting a moderate level of critical thinking ability among the students. The standard deviation is 8, indicating a relatively low level of score dispersion around the mean, which implies a moderate degree of consistency in students' responses. These findings reflect that, on average, students possess a fair level of critical thinking skills. The detailed categorization of students' critical thinking abilities is presented in the following table:

Table 4. Categorization of Critical Thinking Skills of Class XI Students at MAN 1 Majene

No.	Category	Interval	Frequency	Percentage
1.	Low	$X < 76$	13	13%
2.	Medium	$76 \leq X < 92$	78	76%
3.	High	$X \geq 92$	12	12%
	Number		103	100%

Based on the categorization table above, the analysis of the critical thinking skills of Grade XI students at MAN 1 Majene shows that 13 students (13%) fall into the low category, 78 students (76%) are in the medium category, and 12 students (12%) are in the high category. These findings suggest that the majority of students demonstrate a moderate level of critical thinking ability. This conclusion is further supported by the mean score of 84, which places the overall critical thinking skill level in the medium category. The distribution of scores indicates that while some students exhibit high critical thinking abilities, targeted efforts may still be needed to enhance these skills more broadly across the student population. The results of the normality test are presented in the following table:

Table 5. Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		103
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	6.59867501
Most Extreme Differences	Absolute	.077
	Positive	.070
	Negative	-.077
Test Statistic		.077
Asymp. Sig. (2-tailed)		.142[c]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Based on the table above, the significance (Sig.) value obtained is 0.142, which is greater than the threshold value of 0.05. This indicates that the data is normally distributed. The results of the normality test confirm that the Sig. value exceeds the α level (0.05), suggesting that the distribution of data related to the use of project-based learning models and the critical thinking skills of Grade XI students in the subject of Aqidah Akhlak at MAN 1 Majene meets the assumption of normality. This finding supports the validity of conducting further parametric statistical analyses. The results of the linearity test between variable X (project-based learning) and variable Y (critical thinking skills) are presented in the following table:

Table 6. Results of Linearity Test of Variables X and Y

ANOVA Table							
			Sum of Squares	df	Mean Square	F	SSig.
Critical Thinking Skills * Project Based Learning	Between Groups	(Combined)	3120.294	29	107.596	2.814	.000
		Linearity	1470.664	1	1470.66	38.45	.000
		Deviation from Linearity	1649.630	28	58.915	1.541	.073
	Within Groups		2791.706	73	38.243		
	Total		5912.000	102			

Source: Analysis of linearity test data for variables X and Y using the SPSS version 26 application

Based on the table above, the Significance (Sig.) value for Deviation from Linearity is 0.073, which is greater than 0.05. This result indicates that the assumption of linearity is met, and therefore, a significant linear relationship exists between the use of project-based learning models (variable X) and students' critical thinking skills (variable Y). In other

words, changes in the implementation of project-based learning are linearly associated with changes in students' critical thinking abilities. These results justify the use of simple linear regression to further examine the influence of variable X on variable Y. The findings of the regression analysis are presented in the following table:

Table 7. Results of Simple Linear Regression Test of Variables X against Y

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
	Design	B	Std. Error	Beta	T	Sig.
11	(Constant)	49.657	5.974		8.312	.000
	Project Based Learning	.440	.076	.499	5.783	.000
a. Dependent Variable: Critical Thinking Skills						

Source: Simple linear regression data analysis of variables X and Y using the SPSS 26 application

Based on the SPSS output, the Coefficients Table shows a constant value of 49.657 and a regression coefficient for the use of project-based learning models of 0.440. This yields the regression equation: Y = a + bX, or Y = 49.657 + 0.440X, where Y represents the students' critical thinking skills and X represents the use of project-based learning models. The hypothesis testing results indicate a significance level (α) of 5% (0.05) with degrees of freedom (df) calculated as 103 – 1 – 1 = 101. The t-count value obtained was 8.312, while the t-table value at α = 0.05 is 1.66008. Since t-count > t-table (8.312 > 1.66008), and the significance value of 0.001 is less than 0.05, it can be concluded that there is a significant influence between the use of project-based learning models and the critical thinking skills of Grade XI students at MAN 1 Majene.

In addition, further analysis produced a t-count value of 2.56, compared to a t-table value of 1.701. Because 2.56 > 1.701, this reinforces the conclusion that the use of project-based learning models has a positive and statistically significant effect on students' learning outcomes at MAN 1 Majene. The strength of this influence is further confirmed through the coefficient of determination (R^2) test, as shown in the Model Summary table. The R Square value reflects the proportion of variance in students' critical thinking skills that can be explained by the use of project-based learning models. These details are presented in the following table:

Table 8. Results of Hypothesis Determination Coefficient Test

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.499[a]	.249	.241	6.63126
a. Predictors: (Constant), Project Based Learning				
b. Dependent Variable: Critical Thinking Skills				

Source: Analysis of hypothesis determination coefficient test data using SPSS 26 application

Based on the table above, the correlation coefficient (R) is 0.499, indicating a moderate positive relationship between the use of project-based learning models and students' critical thinking skills. The coefficient of determination (R Square) is 0.249, which means that 24% of the variance in the critical thinking skills of Grade XI students at MAN 1 Majene can be explained by their experience with project-based learning. The remaining 76% is influenced by other variables not examined in this study. While the 24% influence may appear modest, it reflects a meaningful initial success in enhancing students' critical thinking skills through this instructional model.

Nonetheless, the effectiveness of the model can be improved. The integration of project-based learning with other contemporary approaches – such as digital learning technologies, simulations, and experiential, real-life practices – has the potential to create richer, more engaging learning experiences. Such hybrid models may deepen students' understanding and stimulate more complex reasoning and reflective thinking. To sustain and enhance the model's effectiveness, continuous and structured evaluation is essential. Teachers should monitor student progress throughout each project, provide constructive feedback, and help learners recognize their strengths and areas for improvement. This ongoing process can significantly enhance motivation and metacognitive awareness, which are critical for developing higher-order thinking skills.

These findings align with the research conducted by Moh. Darwis, Azizah, and Rofiqoh (2025), who emphasized that Project-Based Learning (PjBL) is an effective strategy for improving not only critical thinking but also student independence and collaborative abilities. PjBL places students at the center of the learning process and immerses them in solving real-world problems. However, the success of PjBL depends heavily on the teacher's role. As facilitators, mentors, and learning designers, teachers are responsible for developing meaningful and curriculum-aligned projects, inspiring student engagement, and ensuring productive interaction with learning resources. Teacher support and continuous professional development are therefore vital to optimizing the implementation of PjBL. Ultimately, project-based learning prepares students to face real-world challenges with stronger analytical and problem-solving capabilities, and stands out as an innovative and effective response to the demands of 21st-century education.

In addition, a systematic review or meta-analysis provides comprehensive evidence that PjBL generally promotes students' critical thinking skills. They found that PjBL outperforms traditional learning at various educational levels. This indicates that the intrinsic features of PjBL, such as the emphasis on exploration, problem solving, and collaborative work, effectively trigger and hone critical thinking skills (Tafakur, Heri Retnawati, 2023).

Conclusion

Based on the results of this study, the use of project-based learning models in the Aqidah Akhlak subject for Grade XI students at MAN 1 Majene—assessed through responses from 103 students—is categorized as moderate, with a percentage of 80% and a mean score of 78. This suggests that while the implementation of project-based learning

has been relatively consistent, it remains at a level that requires further enhancement to reach optimal effectiveness. Similarly, the critical thinking skills of the students are also categorized as moderate, with a percentage of 76% and a mean score of 84. These findings indicate that students demonstrate an average level of critical thinking but still have significant room for growth.

The analysis revealed a statistically significant influence of the use of project-based learning models on students' critical thinking skills, as shown by an R Square value of 0.249. This means that 24% of the variance in students' critical thinking skills can be attributed to the implementation of project-based learning, while the remaining 76% is influenced by other variables not explored in this study. Although this percentage reflects a meaningful impact, it also points to the need for further development and innovation in instructional design.

To improve this influence, it is recommended that project-based learning be integrated with other pedagogical approaches that involve technology, simulations, or real-life applications. Such integration can create a more engaging and contextually relevant learning experience. For future researchers, it is advisable to employ alternative research methods and explore additional variables that may contribute to the development of students' critical thinking abilities. By enhancing aspects such as project design, teacher training, and supportive learning environments, the effectiveness of project-based learning can be significantly increased. This will contribute to nurturing a generation of students who are not only capable of thinking critically but also creatively and innovatively, in line with the demands of 21st-century education.

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Ethical Statement

This research was conducted in accordance with established ethical standards for educational research. Prior to data collection, the researcher obtained permission from the school authorities at MAN 1 Majene and coordinated closely with the teachers of Aqidah Akhlak to ensure the study aligned with the institution's academic environment and values. Participation in the study was voluntary, and all respondents – Grade XI students – were informed about the purpose and procedures of the research. Informed consent was

obtained from the participants, and they were assured of their right to withdraw from the study at any time without any academic consequence.

Confidentiality and anonymity were strictly maintained throughout the research process. The data collected were used solely for academic purposes and were analyzed in aggregate form to ensure individual responses could not be traced back to any participant. No identifying information was disclosed in any part of the study or its publication. The researcher also ensured that the content of the questionnaire and the research procedures did not cause psychological or emotional distress to the participants. This study did not involve any form of physical experimentation, and no personal or sensitive data beyond academic perceptions and experiences were collected. All ethical principles related to honesty, integrity, and respect for the dignity of individuals were upheld in every stage of the research, from planning to reporting.

CRediT Author Statement

- **Author 1:** Conceptualization, Methodology, Investigation, Writing – Original draft preparation.
- **Author 2:** Supervision, Methodology.
- **Author 3:** Marjani Alwi: Investigation, Formal analysis.

Conflict of Interest

The authors declare that there are no competing financial interests or personal relationships that could have influenced the work reported in this article.

Data Availability

The datasets generated and analyzed during the current study are available upon reasonable request.

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