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Integrating Islamic Values into the 9E Learning Cycle: Effects on Students' Self-Confidence in Science Education

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Abstract
This This study investigates the effects of integrating Islamic values into the 9E Learning Cycle model on students' self-confidence in science education. A quantitative approach with a quasi-experimental pretest–posttest control group design was employed, involving two intact classes of secondary school students selected through cluster random sampling, where the experimental group received instruction using the Islamic-integrated 9E Learning Cycle and the control group was taught using conventional methods. Data were collected using a validated self-confidence questionnaire, observation sheets, and supporting documentation, and were analyzed through descriptive statistics, normalized gain (N-gain), independent samples t-test, Pearson correlation, and linear regression at a significance level of 0.05. The results revealed that the experimental group demonstrated a significantly higher improvement in self-confidence compared to the control group, with a moderate N-gain and statistically significant differences ($p < 0.05$). Furthermore, correlation and regression analyses indicated a positive relationship between the instructional model and students' self-confidence, with the model contributing meaningfully to variance in learning outcomes. These findings suggest that the integration of Islamic values within a structured constructivist framework effectively enhances students' confidence by promoting active participation, reflective thinking, and meaningful engagement in science learning. In conclusion, the study confirms that a value-integrated inquiry-based model can simultaneously support affective development alongside cognitive processes in science education. The implications of this study highlight the importance of designing instructional approaches that integrate cultural and religious values with student-centered learning models to foster holistic educational outcomes, particularly in contexts where character development and academic achievement are equally prioritized.
Keywords: 9E Learning Cycle; Islamic Values Integration; Science Education; Self-Confidence; Student-Centered Learning.

INTRODUCTION

Scientific literacy and self confidence are widely recognized as essential competencies in 21st-century science education, as they enable students not only to understand scientific concepts but also to actively engage in inquiry, problem-solving, and decision-making processes in real-world contexts. Contemporary educational frameworks emphasize that effective science learning should foster higher order thinking skills alongside affective dispositions such as confidence, motivation, and self-efficacy (Artino Jr., 2012; Darling-Hammond et al., 2020; Huang et al., 2025). In particular, self-confidence plays a crucial role in shaping students' willingness to participate in scientific discussions, express ideas, and persist in solving complex problems, which are key elements of meaningful learning experiences (Malureanu et al., 2021; Parveen et al., 2025; Perkins & Bains, 2025). However, empirical evidence continues to show that many students exhibit low levels of self confidence in science learning environments, often due to teacher-centered pedagogies, limited opportunities for active engagement, and a lack of contextual relevance in instructional practices (Amerstorfer & Freiin von Münster-Kistner, 2021; Emiru & Gedifew, 2024; Martin-Alguacil et al., 2024).

To address these challenges, constructivist learning models have been increasingly adopted as effective approaches for enhancing both cognitive and affective learning outcomes. Among these, the Learning Cycle model, particularly its advanced form, the 9E Learning Cycle,

has demonstrated strong potential in promoting active learning, conceptual understanding, and student engagement through structured phases of inquiry-based instruction (Jian et al., 2023; Kassaye et al., 2025; Zviel-Girshin & Rosenberg, 2025). The 9E Learning Cycle extends earlier models by incorporating additional stages such as emendation and e-search, which emphasize reflection, knowledge reconstruction, and digital inquiry, thereby supporting deeper learning and metacognitive development (Pan et al., 2025). Through its systematic scaffolding, this model encourages students to actively construct knowledge, collaborate with peers, and engage in evidence-based reasoning, all of which contribute to the development of self-confidence in learning contexts (Eskiyurt & Özkan, 2024; Ningsih et al., 2025; Novalia et al., 2025).

In parallel, there has been growing attention to the integration of values-based education within science learning, particularly in contexts where moral, cultural, and religious dimensions are central to educational goals. In Islamic education, the integration of Islamic values into instructional practices has been shown to enhance students' character development, motivation, and identity formation, while also fostering positive attitudes such as responsibility, discipline, and self-confidence (Chowdhury & Alzarrad, 2025; Dwivedi et al., 2021; Sadam Fajar Shodiq, 2023). Specifically, Islamic value-based learning emphasizes holistic education, which integrates cognitive, affective, and spiritual dimensions, thereby enabling students to connect scientific knowledge with ethical and real-life contexts (Goldberg, 2022; Lähteenkorva et al., 2025; Zidny et al., 2020). Furthermore, studies have highlighted that the internalization of Islamic values in learning environments can significantly strengthen students' confidence and engagement by fostering a sense of purpose, identity, and moral responsibility (Lo et al., 2024; Mahfud & Sofiatus Zahriyah, 2025; Tambak et al., 2021).

Despite the growing body of literature on constructivist learning models and value-based education, these two strands of research have largely been explored independently. Most studies on the Learning Cycle model focus primarily on cognitive outcomes such as scientific literacy, conceptual understanding, and critical thinking, with limited attention to affective variables such as self-confidence (Morris, 2025; Riffert et al., 2021; Toni Efriyandika et al., 2025). Conversely, research on the integration of Islamic values tends to emphasize character development and moral education without systematically examining its impact on science learning outcomes or student confidence in academic contexts (Birhan et al., 2021; Muchtarom, 2023; Tian & Tang, 2025). Moreover, although recent studies have begun to explore the integration of values within constructivist frameworks, empirical investigations that specifically examine the combined effect of the 9E Learning Cycle and Islamic values on students' self-confidence in science education remain scarce and context-limited.

This gap indicates the need for an integrative pedagogical approach that simultaneously addresses cognitive engagement and affective development within science learning. In particular, there is limited empirical evidence on how the integration of Islamic values within a structured inquiry-based model such as the 9E Learning Cycle can enhance students' self-confidence as an observable learning outcome. Therefore, this study aims to examine the effects of integrating Islamic values into the 9E Learning Cycle on students' self-confidence in science education. By bridging constructivist learning theory and values-based education, this research seeks to contribute to the development of a holistic instructional model that supports both academic achievement and affective growth, thereby addressing a critical gap in contemporary science education research.

METHODS

This study employed a quantitative approach using a quasi-experimental design, specifically a pretest–posttest control group design, to examine the effects of integrating Islamic values into the 9E Learning Cycle model on students' self-confidence in science education. The research was conducted in a secondary school context involving tenth-grade students, where two intact classes were selected through cluster random sampling to serve as the experimental and control groups. The experimental group received instruction using the Islamic value-integrated 9E Learning Cycle model, while the control group was taught using conventional teacher-centered methods. The intervention was implemented over multiple instructional sessions, during which the experimental group engaged in nine structured phases elicitation, engagement, exploration, explanation, echo, elaboration, evaluation, emendation, and e-search each enriched with Islamic values such as responsibility, discipline, cooperation, and ethical reflection to contextualize scientific concepts within meaningful moral frameworks.

Table 1. Questionnare Blueprint for Self-Confidence

Indicator Self-Confidence	No.Item	
	+	-
Belief in one's own abilities	1,4	2,3,5
Acting independently in decision-making	6	7
Valuing oneself and one's efforts	9	8,10,11
Being enthusiastic when expressing opinions in discussions	12,13	-
Having the courge to face challenges	14	15

Table 2. Observation Sheet Blueprint for Self-Confidence

Indicator	No.Item	Maximum Score
Belief in one's own abilities	1,2,3, dan 4	4
Acting independently in decision-making	5,6,7, dan 8	4
Valuing oneself and one's efforts	9,10,11, dan 12	4
Being enthusiastic when expressing opinions in discussions	13,14,15, dan 16	4
Having the courge to face challenges	17,18,19, dan 20	4

Data were collected using a self-confidence questionnaire, observation sheets, and supporting documentation, all of which were developed based on established theoretical indicators and subjected to content validation by experts and pilot testing to ensure construct validity and reliability, with internal consistency measured using Cronbach's alpha ($\alpha \geq 0.70$). The self-confidence instrument assessed dimensions such as self-belief, participation, persistence, and communication in learning activities. Prior to hypothesis testing, prerequisite analyses including tests of normality and homogeneity were conducted to ensure that the data met parametric assumptions. Descriptive statistics, including mean scores and normalized gain (N-gain), were used to examine the magnitude of improvement in students' self-confidence, while inferential analysis was performed using an independent samples t-test to determine statistically significant differences between groups at a significance level of 0.05. Additionally, Pearson correlation analysis was employed to examine the relationship between the instructional model and students' self-confidence, and linear regression analysis was conducted to assess the contribution of the model to variance in self-confidence outcomes. All statistical analyses were performed using appropriate software to ensure accuracy and reproducibility. This methodological framework ensures rigor, validity, and reliability in evaluating the effectiveness of the Islamic-integrated 9E Learning Cycle model in enhancing

students' self-confidence within science learning contexts.

RESULT AND DISCUSSION

Improvement of Students' Self-Confidence

The analysis of students' self-confidence revealed a substantial difference between the experimental group, which was taught using the Islamic value-integrated 9E Learning Cycle model, and the control group, which received conventional instruction. Descriptive statistics indicated that both groups started from relatively comparable baseline levels; however, the experimental group demonstrated a markedly higher increase in posttest scores.

Table 3. Mean Scores and N-Gain of Students' Self Confidence

Group	Pretest Mean	Posttest Mean	N-Gain	Category
Experimental	58.21	81.34	0.62	Moderate
Control	57.89	70.12	0.31	Low

As presented in Table 3, the experimental group achieved a higher posttest mean score (M = 81.34) compared to the control group (M = 70.12), with an N-gain of 0.62 categorized as moderate, while the control group remained in the low category (N-gain = 0.31). This indicates that the integration of Islamic values within the 9E Learning Cycle contributes to a more meaningful improvement in students' self-confidence. Furthermore, the reduced variability in the experimental group suggests increased consistency in students' confidence levels following the intervention.

Hypothesis Testing Results

To determine whether the observed differences between groups were statistically significant, an independent samples t-test was conducted.

Table 4. Independent Samples t-Test Results

Variable	t-value	Sig. (2-tailed)	Interpretation
Self Confidence	5.12	0.000	Significant Difference

As shown in Table 4, the significance value ($p = 0.000 < 0.05$) indicates a statistically significant difference between the experimental and control groups. This confirms that the Islamic-integrated 9E Learning Cycle model has a significant effect on students' self-confidence.

Correlation and Contribution Analysis

Further analysis was conducted to examine the relationship and contribution of the learning model to students' self-confidence.

Table 5. Regression Analysis Results

Variable	R	R^2	Contribution
Learning Model → Self Confidence	0.385	0.148	14.8%

The Pearson correlation analysis revealed a moderate positive relationship between the instructional model and students' self-confidence ($r = 0.385$, $p < 0.05$). Additionally, regression analysis indicated that the learning model contributed 14.8% to the variance in self-confidence outcomes, suggesting that while the model plays a significant role, other factors such as prior knowledge, learning environment, and individual differences also influence students' confidence.

Discussion

The findings of this study indicate that the integration of Islamic values into the 9E Learning Cycle significantly enhances students' self-confidence in science learning, a result that is consistent with and extends prior research in both constructivist pedagogy and affective learning domains. First, the observed improvement aligns with studies demonstrating that inquiry-based learning models, including the Learning Cycle framework, foster student engagement and self-efficacy by promoting active participation and knowledge construction (Adam et al., 2025; Anchunda & Kaewurai, 2025; Zviel-Girshin & Rosenberg, 2025). In particular, Ningsih et al. (2025), Zamiri & Esmaeili (2024), and Duyag et

al. (2025) reported that student-centered and collaborative learning environments significantly increase learners' confidence by allowing them to articulate ideas, test hypotheses, and receive feedback in supportive settings. The present study confirms these findings while showing that the extended 9E phases especially reflection (emendation) and inquiry expansion (e-search) provide deeper scaffolding that further strengthens confidence development.

Second, the results are in line with research emphasizing the role of values-based education in enhancing affective outcomes. Studies by Gamage et al. (2021), Ordóñez-Carabaño et al. (2025), and Steć & Kulik (2021) found that integrating moral or religious values into instruction fosters positive attitudes, motivation, and self-belief, as students perceive learning as more meaningful and relevant to their personal and social identity. This study advances these findings by empirically demonstrating that Islamic values, when systematically embedded within an inquiry-based model, not only support character development but also directly contribute to academic self-confidence. Third, the findings resonate with research on holistic education, which argues that cognitive and affective domains are interdependent and should be developed simultaneously (Darling-Hammond et al., 2020; Kuo et al., 2024; Schneider et al., 2022). Unlike prior studies that treated these domains separately, the present study provides evidence that integrating both dimensions within a single instructional framework yields more comprehensive learning outcomes.

Fourth, the moderate contribution of the model to self-confidence (R^2 = 14.8%) is consistent with broader educational research indicating that instructional models are important but not exclusive determinants of affective outcomes. Studies by Tang (2025), Ma & Wei (2022), and Xu et al. (2025) emphasize that variables such as prior knowledge, classroom climate, and teacher support also significantly influence students' confidence levels. This suggests that while the Islamic-integrated 9E Learning Cycle is effective, its impact may be optimized when combined with conducive learning environments and pedagogical support systems. Fifth, compared to studies that applied constructivist models without value integration, this research demonstrates a stronger affective impact, indicating that the addition of value-based elements enhances not only engagement but also internal psychological constructs such as confidence.

The novelty of this study lies in its integrative and empirical approach, combining an advanced constructivist learning model (9E Learning Cycle) with Islamic values to simultaneously address affective development specifically self confidence within science education. While previous studies have explored the Learning Cycle model or value based education independently, this study uniquely positions self-confidence as a measurable outcome of their integration, supported by statistical evidence. Furthermore, the study contributes to the conceptualization of self-confidence as a construct that can be systematically developed through structured instructional design rather than treated as a secondary or incidental outcome. This positions the research within a growing body of literature advocating for holistic and contextually responsive pedagogies in science education.

The implications of this study are both theoretical and practical. Theoretically, it supports the extension of constructivist learning theory by demonstrating that the integration of cultural and religious values enhances affective learning outcomes, thereby reinforcing the need for multidimensional instructional frameworks. Practically, the findings suggest that educators, particularly in Islamic educational contexts, should adopt integrative pedagogical models that combine inquiry-based learning with value internalization to foster not only academic competence but also student confidence and engagement. Additionally, curriculum developers may consider embedding value-oriented components into science instruction to create more meaningful and contextually relevant learning experiences.

However, several limitations should be acknowledged. The study employed a quasi-experimental design with a relatively limited sample size, which may restrict the generalizability of the findings to broader educational contexts. The focus on short-term intervention outcomes also limits the ability to assess the long-term sustainability of improvements in self-confidence. Furthermore, although

the study identified a significant contribution of the instructional model, it did not comprehensively examine other influencing variables such as students' prior knowledge, socio-emotional background, or teacher-related factors. Future research is therefore recommended to adopt longitudinal and multi-site designs, incorporate mixed-method approaches, and explore additional variables to provide a more comprehensive understanding of the mechanisms underlying the development of students' self-confidence in science education.

CONCLUSION

This study concludes that the integration of Islamic values into the 9E Learning Cycle model produces a statistically significant and pedagogically meaningful improvement in students' self-confidence in science education. The structured, inquiry-based phases of the 9E model facilitate active engagement, collaborative interaction, and reflective thinking, while the incorporation of Islamic values provides a moral and contextual foundation that enhances students' sense of purpose, responsibility, and belief in their own abilities. Theoretically, this study contributes to the advancement of holistic science education by empirically demonstrating that self-confidence can be systematically developed through the synergy of constructivist pedagogy and value-based learning. Methodologically, it confirms the effectiveness of a quasi-experimental approach in capturing affective learning outcomes and highlights the moderate explanatory power of instructional models in shaping student confidence, indicating the influence of additional contextual factors. Practically, the findings suggest that educators and curriculum designers should adopt integrative instructional frameworks that combine inquiry-driven learning with value internalization to foster both cognitive and affective competencies. Nevertheless, the study is limited by its contextual scope, sample size, and short-term measurement, thereby necessitating further research employing longitudinal designs, diverse populations, and broader analytical variables to enhance generalizability and deepen understanding of self-confidence development in science learning contexts.

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