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Integrating Islamic Values into Science Education: A Narrative Literature Review on Student Competencies and Pedagogical Implications

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A B S T R ACT

Science education in Islamic educational institutions is expected to foster scientific competencies while strengthening students' faith, character, and spiritual identity. However, evidence regarding the impact of integrating Islamic values into science education remains scattered across various competency domains. This study aims to synthesize the reported impacts of integrating Islamic values on student competencies, identify factors influencing its implementation, and interpret these findings through the theory of worldview and the tauhid paradigm. A narrative literature review was conducted by analyzing relevant publications obtained from Scopus, ERIC, SINTA, ProQuest, Google Scholar, and supporting references using thematic and critical interpretive synthesis. The review revealed four consistent patterns: improved cognitive and academic achievement, the development of higher-order thinking skills, the formation of moral and spiritual character, and the influence of teacher competence, institutional support, curriculum flexibility, and epistemological coherence on its implementation. Overall, the integration of Islamic values into science education provides a holistic framework for developing students' cognitive, intellectual, and moral competencies, although stronger longitudinal and cross-cultural evidence is still needed to establish its long-term effectiveness and broader application.

1. INTRODUCTION

Science education in the 21st century is increasingly focused on science literacy, competency-based learning, and the ability to think critically about evidence (Kulgemeyer et al., 2026; Dikmen et al., 2026; Mubarok et al., 2025; Chourio-Acevedo et al., 2024). However, in the context of Islamic education, this framework goes hand in hand with a second, equally important mandate: instilling faith, moral character, and spiritual identity in students (Judijanto & Yusniar, 2025; Ardi et al., 2024; Amira Schreiber et al., 2024). Islamic schools, madrasahs, and pesantren are expected not only to prepare students who can master science content and think critically, but also to produce graduates whose scientific understanding is rooted in Islamic values, rather than being detached from or in conflict with them (Sahil et al., 2024; Ardi et al., 2024). This dual mandate distinguishes science education in Islamic institutions from secular science curricula and raises questions that have so far received less systematic attention than they deserve: how, and to what extent, does the deliberate

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integration of Islamic values into science instruction actually shape the range of competencies that science education is intended to develop.

Mainstream science education research offers a partial theoretical explanation for this tension through worldview theory, which argues that students do not approach science content as a "blank slate"(Wolfs et al., 2022; Billingsley et al., 2021; Lee et al., 2021), but rather interpret it through preexisting cultural and religious biases; thus, entering the science classroom can function as a form of crossing cultural boundaries between students' everyday life subcultures and the institutional science subculture (Cobern, 1996; Aikenhead, 1996). When this boundary-crossing is not acknowledged, students with a religious background risk viewing science content as something foreign or even threatening to their worldview, which in turn limits the depth of learning that can be achieved regardless of the quality of instruction (Green & Delgado, 2021; Cuzzolino, 2021). This theoretical framework, however, was largely developed within the context of Western and Judeo-Christian education and does not specifically address how integration should be carried out within an Islamic epistemological framework.

The philosophy of Islamic education offers complementary and, in some respects, more fundamental explanations of why integration is important (Susilawati & Syifaudin, 2026; Saputra et al., 2026; Triyono & Zur Raffar, 2021; Negara, 2026). The tauhid paradigm holds that revealed knowledge (naqli) and empirical or rationally derived knowledge (aqli) stem from a single, unified source of truth and were never intended to be taught or studied as separate disciplines (al-Attas, 1980; al-Faruqi, 1982). From this perspective, integrating Islamic values into science education is not an additional pedagogical tool superimposed on an essentially neutral curriculum, but rather a corrective response to the dichotomy imposed by the secular science curriculum on knowledge that, in principle, is already unified (Mahmudi et al., 2022; Sutiana & Nugraha, 2025). Worldview theory and the tauhid paradigm suggest that the integration of Islamic values into science education is expected to influence learning at more than one level simultaneously (Sahil et al., 2024; Wulan et al., 2021). This should facilitate the crossing of cultural boundaries which worldview theory identifies as barriers to understanding while restoring epistemological coherence, which the tauhid paradigm regards as the natural state of knowledge.

An increasing number of pedagogical works are seeking to instill Islamic values into science education across various educational levels, subjects, and learning formats ranging from learning materials integrated with the Quran and cooperative learning models to discovery-based modules, mobile learning apps, and institution-wide programs in pesantren-based science education (Handoko et al., 2024; Hadi, 2025; Prayogo et al., 2025). However, research that explicitly examines what such integration achieves in terms of student competencies remains fragmented. Previous studies have reported only a single category of outcomes such as improved academic achievement, enhanced critical thinking skills, or strengthened religious character without situating these outcomes within the broader competency framework that, according to Islamic educational philosophy, such integration should produce (Asshagab et al., 2025; Amin et al., 2022; Fahyuni et al., 2020). Consequently, the cumulative evidence base remains scattered across various disjointed strands of literature, rather than being organized into a coherent picture of what the integration of Islamic values actually produces, and under what conditions.

This fragmentation has both theoretical and practical consequences (Ilma & Purbowati, 2026; Amarullah, 2026). Theoretically, evaluating the integration of Islamic values through a single competency lens at a time makes it impossible to test the central claim of the tauhid paradigm that integrated knowledge results in simultaneous, integrated development across cognitive, higher-order, and moral-spiritual domains without a synthesis that encompasses these domains simultaneously; this claim remains a philosophical statement rather than an evidence-based finding (Iman, 2025; Sapitri et al., 2025; Ilma & Purbowati, 2026). In practice, teachers, curriculum developers, and policymakers lack a comprehensive understanding of

which forms of integration are linked to which competencies, as well as what institutional or pedagogical conditions determine whether such integration is realized in the classroom or remains merely a symbolic curricular commitment.

Therefore, the gap addressed by this study lies in the absence of an integrative synthesis that maps how the integration of Islamic values in science education relates to the full range of student competencies documented in the literature, along with the conditions that facilitate or hinder its implementation, and interprets these patterns through an explicit theoretical lens, rather than treating it as a theory-ungrounded inventory of findings. Previous research has tended to examine pedagogical models, competency outcomes, and implementation challenges as separate lines of inquiry, resulting in a body of knowledge that is empirically robust but theoretically underdeveloped.

This article addresses this gap through a narrative literature review that synthesizes recent studies on the integration of Islamic values into science education, with three objectives: (1) to synthesize the reported impacts of integrating Islamic values on the cognitive, higher-order thinking, and moral-spiritual-character dimensions of student competencies, (2) to identify institutional and pedagogical factors that recur in the literature as drivers or barriers to effective integration, and (3) to interpret these patterns through the theory of worldview and the Islamic tawhid paradigm as a theoretical thread linking pedagogical practices to their epistemological foundations. By presenting an integrative and explicitly theory-based synthesis, this review aims to provide a unique theoretical perspective for the study of Islamic education while expanding the international science education discourse on worldview-responsive and culture-based teaching.

2. METHOD

This study employs a narrative literature review methodology to synthesize theoretical perspectives, empirical findings, and interpretive insights regarding the integration of Islamic values into science education. Unlike systematic reviews, which aim to produce a comprehensive and replicable mapping of the evidence, narrative literature reviews emphasize conceptual development, critical interpretation, and the integration of various bodies of knowledge to provide a comprehensive understanding of complex educational phenomena (Creswell & Creswell, 2018). This approach is considered appropriate because research on the integration of Islamic values into science education encompasses various educational contexts, pedagogical approaches, and theoretical perspectives that require interpretive synthesis rather than mere quantitative aggregation.

Relevant literature was identified through targeted searches of major academic databases, including Scopus, ERIC, SINTA, ProQuest, and Google Scholar, supplemented by manual searches of key books, policy documents, and reference lists from influential publications to ensure conceptual breadth and historical continuity. The search strategy combined subject keywords and free-text keywords using Boolean operators, including ("Islamic values" OR Islam OR the Qur'an OR "Islamic worldview" OR religion OR faith) AND ("science education" OR "science learning" OR "science teaching" OR STEM OR biology education OR chemistry education OR physics education OR environmental education). The search process was conducted iteratively to capture both fundamental theoretical discussions and the latest empirical developments related to the integration of Islamic values into science education. There are no strict publication year restrictions, as this review aims to integrate fundamental Islamic educational philosophy with contemporary developments in science education. Nevertheless, greater emphasis is placed on peer-reviewed journal articles and authoritative publications from the past two decades to ensure that the synthesis reflects current educational discourse while remaining grounded in established theoretical foundations.

The inclusion criteria prioritize publications that (1) address the integration of Islamic values into science education or related disciplines, (2) make conceptual, theoretical, or

empirical contributions regarding pedagogical approaches or student competencies, (3) demonstrate methodological transparency, and (4) are published in leading academic sources. Publications were excluded if they merely described teaching practices without analytical discussion, focused exclusively on Islamic education without explicit relevance to science learning, or lacked sufficient theoretical or empirical contributions. Selected publications were initially screened based on their titles and abstracts before undergoing a comprehensive review. Data extraction focused on several analytical dimensions, including conceptual foundations, pedagogical approaches, forms of integration of Islamic values, reported effects on student competencies, implementation challenges, and directions for future research.

This analysis employed iterative thematic synthesis combined with critical interpretive analysis to identify recurring themes, conceptual relationships, convergent and divergent findings, and patterns emerging across the literature. Throughout the review process, attention was paid to the reviewer's reflexivity and the inherent limitations of narrative literature reviews (Newington et al., 2021; Polanin et al., 2019; Sukhera, 2022). To enhance the credibility of this synthesis, evidence was triangulated from various types of sources, conflicting perspectives were critically examined, and analytical decisions were documented to promote transparency and provide a solid conceptual foundation for future empirical research.

3. RESULT AND DISCUSSION

3.1 Result

The results of the narrative review of the selected articles indicate that the reported effects of integrating Islamic values on student competencies can be grouped into four interrelated categories: cognitive and academic competencies; higher-order thinking competencies; moral, spiritual, and character competencies; and factors that support or hinder the development of these competencies.

3.1.1 Cognitive and Academic Competencies

Several studies have reported on the positive impact of teaching that integrates Islamic values on mastery of subject matter and academic learning outcomes. At the secondary level, the Quran and Science Integration (PIQS) approach can improve students' academic achievement related to faith more than conventional teaching (Rahman & Noh, 2021), while audiovisual media integrated with the Quran improves learning outcomes regarding the reproductive system (Aglillah & Jayanti, 2022), and the jigsaw collaboration model integrated with Surah Al-An'am improves learning outcomes regarding the respiratory system (Agusna & Manalu, 2022). The development of inquiry-based science modules (Faizah, 2020), guided inquiry worksheets on environmental pollution (Fazira & Jayanti, 2023), comics on force and motion (Mubaidilla & Ainiyah, 2022), a mobile learning app on the hydrosphere (S. Amin et al., 2022), a textbook on disaster geography (Hidayat et al., 2023), and environmental chemistry instructional materials developed using the Four-Step Instructional Material Development Method (Muslim et al., 2024), each of which has been validated as appropriate and shown to be effective in improving measurable learning outcomes (Djara et al., 2026). Meanwhile, the RQANI model which integrates five stages of learning with Islamic values in biology has also been shown to improve student achievement in a valid, practical, and effective manner (Amin et al., 2022). Even within an inclusive setting, the Islam–science integration approach has proven to be the foundation of Individualized Education Programs that support chemistry learning for students with disabilities (Suprihatiningrum, 2017), thereby demonstrating that the enhancement of cognitive competencies resulting from this integration extends to both the general population and students with special needs.

Various studies have shown a consistent pattern that the integration of Islamic values into science learning contributes to improved cognitive competencies and student learning outcomes across diverse learning models, media, and instructional materials. This indicates

that the integration of Islamic values has the potential to be applied flexibly in various instructional designs without compromising the effectiveness of learning. However, most of the reviewed studies still focus on measuring short-term learning outcomes through experimental designs or development research; thus, they have not yet provided sufficient evidence regarding the sustainability of the integration's impact on students' long-term competency development. Furthermore, previous studies were conducted only within the context of Islamic education in Muslim-majority countries, making it necessary to generalize these findings to more diverse educational contexts.

3.1.2 Higher-Order Thinking Competencies

A small number of previous studies have consistently focused on higher-order thinking skills rather than mere mastery of subject matter. Problem-based learning integrated with Islamic values significantly improved students' critical thinking skills in biology (Daud et al., 2023), while a similar model combined with mind-map assessment significantly improved students' creative thinking skills (Ummah et al., 2023). Complementing these findings, the PIQS approach has been reported to strengthen students' Higher-Order Thinking Skills (HOTS) in the religious domain in tandem with their academic achievement (Rahman & Noh, 2021), indicating that pedagogies integrating Islamic values can simultaneously target both cognitive content and the thinking skills used to process that content.

Compared to studies on cognitive learning outcomes, research investigating higher-order thinking skills remains relatively limited. Most research has focused only on critical and creative thinking skills, while other aspects such as complex problem-solving, scientific decision-making, and scientific reasoning remain largely unexplored. This situation suggests that although the integration of Islamic values has the potential to support the development of higher-order thinking skills, the available empirical evidence is still insufficient to draw conclusions about its effectiveness across various science learning contexts. Therefore, further research across educational levels and more diverse instructional designs are needed to gain a more comprehensive understanding of this relationship.

3.1.3 Moral, Spiritual, and Character-Based Competencies

A previous study has also reported effects on affective, moral, and spiritual competencies that go beyond conventional cognitive measures. Meaning-based learning significantly enhances students' moral sensitivity in science learning (Latjompoh et al., 2025), while integration via mobile media was associated with seven meaningful learning outcomes among millennial students: wisdom and grandeur, real-life applicability, student-created projects, written reports, responsibility, accuracy, and curiosity each of which was achieved at rates ranging from 80% to 95% (Fahyuni et al., 2020). At the higher education level, the integration of Islamic values and local wisdom into science courses has significantly influenced character development among prospective educators, with a strong predictive power of the model, although the sample of 505 participants consisted largely (59%) of students from the Elementary School Teacher Education Program rather than science degree programs (Arizona et al., 2025), and practical modules integrating Al-Islam Kemuhammadiyahan into basic science concepts have significantly strengthened students' religious character (Amal et al., 2022).

Institutionally, science excellence programs in Islamic boarding schools have been shown to foster discipline, ethical awareness, and leadership alongside scientific competence through institutional commitment, reflective pedagogy, collaborative learning, and experience-based activities (Prayogo et al., 2025), while Islamic values-based STEAM learning is oriented toward producing students who are both intellectually competent and spiritually whole (Hadi, 2025). In the classroom, the use of exemplary role models (*uswatun hasanah*) by teachers and the use of the Qur'an as a source of inspiration have been identified as the primary mechanisms used to foster moral and spiritual competencies during science lessons

(Handoko et al., 2024). These findings indicate a consistent trend that the integration of Islamic values contributes positively to the development of students' affective aspects. However, each study employs different concepts and indicators of competence, such as religious character, moral sensitivity, responsibility, ethical awareness, and spirituality.

3.1.4 Supporting and Hindering Factors in Competency Development

Overall, several factors have consistently been identified as mediating variables that determine whether the integration of Islamic values can translate into measurable improvements in competency. This is similar to the findings of Handoko et al. (2024), who found that teachers' limited religious education background hinders the depth of integration that can be achieved in science lessons, and the authors explicitly concluded that such integration is "not comprehensive," typically limited to the insertion of moral and motivational messages rather than extending to the level of learning assessment such as direct evidence that even where integration is practiced, it may not achieve the depth necessary to foster sustainable competencies. In addition, (Hadi, 2025) also identifies flexible curricula, teacher collaboration, supportive facilities, innovative learning resources, values-based approaches, and structured teacher training as unmet needs for realizing a holistic Islamic STEAM education.

Furthermore, at the institutional level, Fitriyawany et al. (2022) report that the integration of Islamic values into science instruction at three Islamic universities in Aceh is implemented inconsistently, that faculty members hold differing interpretations regarding what should constitute the core of integration; and that there are no written standard operating procedures to guide these practices, notably, one interviewed faculty member explicitly rejected the premise of integration altogether, arguing that "there is no dichotomy in Islamic science, so there is no need for integration; let religious courses and general courses stand on their own," this indicates that the disagreement in this field extends beyond how to implement integration to whether integration is conceptually necessary at all. At a more fundamental level, Rahman (2011) has warned that integrating the teachings of the Qur'an and hadith with scientific fields such as molecular biology carries an inherent risk of inconsistency and inaccuracy if an attempt is made to validate revelatory knowledge through scientific theory or vice versa. This warning underscores the need for epistemological caution in any pedagogical design that claims to build competencies through such integration. The study's findings indicate that the effectiveness of integrating Islamic values into science education is influenced by teacher readiness, institutional support, and the coherence of implementation. In addition to pedagogical challenges, differing perspectives on the concept of integration also reflect epistemological challenges. These findings suggest the need for further research to develop integration models suitable for various educational contexts.

3.2 Discussion

The findings of this review can be situated within two complementary theoretical frameworks: the worldview theory in science education, which posits that students interpret scientific concepts through preexisting cultural and religious biases, and that instruction aligned with students' worldviews reduces "crossing cultural boundaries," which otherwise hinders understanding (Cobern, 1996; Aikenhead, 1996). Islamic epistemology further enriches this argument through the tauhid paradigm, which asserts that revealed knowledge (naqli) and empirical knowledge (aqli) stem from a single, unified source of truth; thus, both must be taught as an integrated domain, not as parallel domains (Al-Attas, 1991; Al-Faruqi, 1982). When viewed through this lens, the improvement in competencies documented in this review is not merely a matter of empirical curiosity, but rather a predictable outcome of the reduction in cognitive dissonance between students' religious worldviews and the scientific content being taught, while also reflecting the Tawhid premise that integrated knowledge

yields more coherent learning than knowledge taught as fragmented, secular content divorced from meaning.

In line with this framework, the reviewed studies have shown that cognitive improvements were reported regardless of the specific learning medium used to convey Islamic values—whether through interactive media, cooperative learning structures, discovery-based modules, or contextualized instructional materials (Aglillah & Jayanti, 2022; Agusna & Manalu, 2022; Faizah, 2020; Fazira & Jayanti, 2023; Mubaidilla & Ainiyah, 2022; Amin et al., 2022; Hidayat et al., 2023; Muslim et al., 2024; Rahman & Noh, 2021; Amin et al., 2022; Suprihatiningrum, 2017). The consistency across these research designs suggests that these cognitive benefits are not the result of any single pedagogical technique, but rather reflect the more general mechanism of worldview alignment described above, in which framing that aligns with students' values reduces interpretive barriers between their existing beliefs and new scientific content.

Furthermore, this synthesis expands on that theoretical foundation by demonstrating that cognitive enhancement is merely one layer of a more complex competency profile. Previous studies on higher-order thinking have also shown that pedagogies that integrate Islamic values can simultaneously foster critical and creative thinking (Daud et al., 2023; (Ummah et al., 2023) alongside religion-based higher-order thinking skills (F. B. Rahman & Noh, 2021), while a separate body of research also documents parallel improvements in moral sensitivity, religious character, and the creation of spiritual meaning (Latjompoh et al., 2025; Fahyuni et al., 2020; Amal et al., 2022; Arizona et al., 2025; Prayogo et al., 2025; Hadi, 2025; Handoko et al., 2024). These three aspects of the results align with what the tauhid paradigm would predict if knowledge were truly integrated rather than fragmented; that is, teaching that treats revelatory and empirical knowledge as a coherent whole should shape reasoning and character simultaneously, rather than sequentially. This reinforces and empirically substantiates claims that have, until now, remained largely conceptual in the literature on Islamic epistemology.

However, the implementation challenges identified in this review temper an overly optimistic interpretation of these benefits. Teachers' limited expertise in Islamic studies often restricts such integration to superficial moral messages, rather than a meaningful alignment between learning objectives, pedagogy, and assessment (Handoko et al., 2024). Furthermore, curriculum flexibility, teacher collaboration, innovative learning resources, institutional support, and structured professional development remain essential prerequisites for implementing a holistic education in Islamic studies (Hadi, 2025). Beyond these practical constraints, the literature also reveals an unresolved conceptual debate regarding the meaning of "integration." Although most research has viewed integration as an intentional pedagogical process requiring planned instructional design, some experts argue that because Islamic knowledge is inherently integrated, separate integration efforts are unnecessary (Fitriyawany et al., 2022). This difference in perspective suggests that the main issue is not whether this knowledge is inherently integrated, but rather whether this epistemological unity is naturally reflected in classroom learning practices or must be actively constructed through the teaching process.

There is a tension between the largely optimistic findings regarding competence reported in this review and the epistemological caution expressed by Rahman (2011), who warns that integrating scriptural teachings with empirical scientific fields carries an inherent risk of inconsistency and inaccuracy whenever revealed knowledge is validated through

scientific theory, or vice versa. This discrepancy appears to stem from differences in the unit of analysis rather than a direct contradiction: studies reporting improved competencies evaluate integration at the level of pedagogical outcomes, whether students learn more, think more critically, or behave more ethically, while Rahman's caution pertains to the level of conceptual validity, questioning whether the content taught is epistemologically sound regardless of how well it is learned. Therefore, a pedagogical approach may be empirically effective by the first standard yet remain epistemologically fragile by the second, and the reviewed literature provides little evidence that both standards are evaluated simultaneously within the same study.

The novelty of this review lies in the integration of three lines of inquiry, cognitive and academic outcomes, higher-order thinking, and moral-spiritual development which have largely been studied separately, into a single conceptual framework grounded in worldview theory and the tauhid paradigm. Rather than treating pedagogical innovations, competency outcomes, and implementation challenges as separate issues, this review demonstrates that all three are interrelated dimensions of science education integrated with Islamic values. This synthesis expands existing scientific research by conceptualizing student competencies as multidimensional and highlighting that the effectiveness of integration depends not only on teaching approaches but also on teacher capacity, institutional support, and a shared epistemological understanding. Therefore, these findings suggest that science teacher education should strengthen pedagogical and religious content knowledge, while educational institutions should establish a clearer operational framework to support consistent implementation.

Despite these contributions, this review has several limitations, including the fact that it remains interpretive in nature and is influenced by the reviewers' analytical judgments. In addition, the studies reviewed used diverse competency constructs and measurement indicators, thereby limiting direct comparisons between findings. Most studies were also conducted in predominantly Muslim contexts using experimental designs or short-term interventions, so the long-term sustainability and cross-cultural applicability of the reported benefits have not been adequately explored. Therefore, future research should employ repeated-measure and cross-cultural observational designs, adopt more standardized measures of competence, and simultaneously examine the pedagogical effectiveness and epistemological validity of integrating Islamic values into science education to strengthen the generalizability and theoretical robustness of this field.

4. CONCLUSION

This narrative review shows that the integration of Islamic values into science education consistently contributes to four interrelated dimensions of student competence: cognitive achievement, higher-order thinking, moral-spiritual development, and character building. These benefits are evident across various pedagogical approaches, indicating that their effectiveness stems more from the meaningful integration of scientific knowledge and Islamic values than from any specific teaching method. However, successful implementation depends on teacher competence, institutional support, curriculum flexibility, and a shared understanding of the concept of integration. Overall, these findings position Islamic values not merely as an affective complement to science education, but as an epistemological framework capable of fostering students' holistic development. Although these findings are promising, the current evidence remains limited by the predominance of short-term studies

conducted in predominantly Muslim contexts, inconsistent measures of competency, and limited examination of the epistemological validity of the integrative approach. Therefore, future research should employ longitudinal and cross-cultural designs, develop more standardized competency instruments, and investigate both the pedagogical effectiveness and the epistemological foundations of science learning integrated with Islamic values, while supporting its implementation through structured teacher preparation and institutional guidelines.

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