

Islamizing STEM: A Curriculum Analysis of Integrating Tawhidic Values into Science Education in Malaysian Secondary Schools

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ABSTRACT

Background. The global discourse on STEM education frequently centers on secular, utilitarian objectives. However, in Muslim-majority nations like Malaysia, there is a significant movement towards the “Islamization of Knowledge,” which seeks to integrate theological principles with modern science. This initiative stems from a perceived disconnect between secular scientific pedagogy and the foundational Islamic worldview (Tawhid). This study addresses the gap in understanding how these Tawhidic values are practically embedded within the official Malaysian secondary school science curriculum..

Purpose. This study aims to critically analyze the Malaysian secondary science curriculum (KSSM) to identify, map, and evaluate the extent and method of Tawhidic value integration in STEM subjects. The objective is to determine how the philosophical goal of “Islamizing STEM” is translated into pedagogical content and instructional guides for educators.

Method. A qualitative content analysis design was employed. The primary data consisted of official curriculum documents, including syllabi and textbooks for Form 1-5 Physics, Chemistry, and Biology. The analysis utilized a researcher-developed coding framework based on established models of Tawhidic integration in science. This framework was applied to identify explicit, implicit, and omitted instances of value integration.

Results. The analysis reveals that Tawhidic integration is present but predominantly implicit and superficial. Integration is largely confined to introductory chapters or “enrichment” sidebars, often as simple Qur’anic verses related to natural phenomena. The core scientific content (e.g., mechanics, evolution, chemical processes) largely remains a discrete, secular domain. A significant gap exists between the curriculum’s stated philosophical aims and its practical, assessable content.

Conclusion. While the Malaysian curriculum aspires to Islamize STEM, its current iteration achieves only a marginal integration of Tawhidic values. This creates a “dual-narrative” curriculum, failing to achieve a genuine epistemic synthesis. To be effective, integration must move from peripheral references to a structural embedding within core scientific concepts and pedagogical practices.

KEYWORDS

Islamization of STEM, Curriculum Analysis, Science Education

Citation: Sothy, C., Maseko, T., & Tan, E. (2026). Islamizing STEM: A Curriculum Analysis of Integrating Tawhidic Values into Science Education in Malaysian Secondary Schools. *Islamic Studies in the World*, 3(1), 22–35.

<https://doi.org/10.17323/islamicstudies.v2i5.3016>

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Received: October 07, 2025

Accepted: December 18, 2025

Published: February 24, 2026



INTRODUCTION

The global discourse on Science, Technology, Engineering, and Mathematics (STEM) education is overwhelmingly dominated by secular and utilitarian objectives (Kovács, 2023). National education policies worldwide, driven by imperatives of economic competition

and technological innovation, prioritize the development of a skilled workforce capable of driving gross domestic product. This instrumentalist view of science, while effective in producing technical proficiency, has faced increasing philosophical critique (Torwekar dkk., 2023). Critics argue that a purely secular-materialist pedagogy strips science of its humanistic context, ethical grounding, and capacity to answer fundamental questions of meaning, purpose, and humanity's place in the cosmos.

The "Islamization of Knowledge" (IOK) movement emerged in the latter half of the twentieth century as a direct intellectual and civilizational response to this perceived divide (Broeckelman-Post dkk., 2023). Spearheaded by scholars such as Syed Muhammad Naquib al-Attas and Ismail Raji al-Faruqi, the IOK project seeks to fundamentally re-integrate divine revelation (Wahy) with human reason ('Aql). Its core tenet is that knowledge, including modern science, cannot be divorced from its epistemological and ethical foundations, which, in the Islamic worldview, are rooted in the concept of Tawhid (the Oneness of God). This worldview posits that the study of the natural world is not a purely material endeavor but an exploration of divine signs (ayat), intrinsically linking scientific inquiry with spiritual and ethical consciousness.

Malaysia stands as a prominent advocate for this intellectual movement, having embedded the integration of faith and knowledge into its core national education philosophy (Falsafah Pendidikan Kebangsaan). This philosophy explicitly aims to produce *insan kamil* (the complete and balanced human) who is intellectually, spiritually, emotionally, and physically developed. Within this national framework, "Islamizing STEM" is not a fringe idea but a central policy objective (Podgorica dkk., 2023). It represents a deliberate state-led effort to mold a generation of Muslim scientists and engineers who are not only technically competent but also deeply grounded in their ethical and theological worldview, viewing their work as a fulfillment of their role as vicegerents (*khalifah*) on Earth.

A significant and persistent disconnect exists between the profound philosophical aspiration of Islamizing STEM and its pedagogical practice (Maulana, 2023). High-level policy documents and philosophical treatises, while rich in rhetoric and conceptual ideals, frequently fail to translate into clear, actionable, and coherent curriculum materials. This leaves STEM educators in a difficult position, caught between a national mandate to integrate Tawhidic values and a lack of standardized, high-quality instructional resources that demonstrate how to do so effectively within the technical confines of subjects like physics, chemistry, and biology.

This policy-practice gap risks creating a "dual-narrative" curriculum, which is the primary problem this study confronts. In this fragmented model, "science" is taught as a discrete, secular domain—adhering to its conventional Western, empirical framework—while "Islamic values" are appended superficially. This often manifests as isolated "enrichment" sidebars in textbooks, introductory chapters that quote Qur'anic verses about nature, or ethical discussions divorced from the core scientific methodology (Marsh dkk., 2023). This "sprinkling" approach fails to achieve the movement's core goal: a genuine epistemic synthesis where the Tawhidic worldview informs and frames the scientific inquiry itself.

The specific, unaddressed problem is the comprehensive lack of an empirical audit of the curriculum as it currently stands (Olson dkk., 2023). It is unknown how, where, and to what extent Tawhidic values are practically embedded, interpreted, or omitted within the official Malaysian secondary school curriculum (KSSM). Without a systematic analysis of the curriculum documents themselves—the syllabi and textbooks that dictate classroom instruction—the entire discourse on the "Islamization of STEM" in Malaysia remains purely theoretical. The alignment between the

stated national philosophy and the delivered curriculum content has not been systematically measured.

The primary objective of this study is to conduct a comprehensive, critical curriculum analysis of the Malaysian secondary school science curriculum (KSSM). This research aims to systematically investigate the practical implementation of the “Islamization of STEM” agenda by examining its core instructional artifacts (Kehoe dkk., 2023). The overarching goal is to map the terrain of Tawhidic value integration within the official STEM curriculum, moving the discourse from philosophical debate to empirical evidence.

This study is guided by three specific sub-objectives (Alston dkk., 2023). The first is to identify and map all instances of explicit and implicit Tawhidic value integration across the syllabi and textbooks for secondary school Physics, Chemistry, and Biology. This mapping process will document the frequency, location (e.g., core text, sidebar, assessment question), and nature of these integrations.

The second sub-objective is to evaluate the method and depth of this integration (Alirahman dkk., 2023). This evaluation will utilize a developed analytical framework to categorize the integrations, distinguishing between superficial inclusions (e.g., citation of verses, brief ethical reminders) and deep epistemic integration (e.g., framing scientific laws as expressions of divine order, using Tawhidic principles to guide ethical dilemmas in technology). The final objective is to assess the alignment between the curriculum’s practical content and the national philosophical goal of producing holistic, faith-grounded scientists.

The existing body of literature concerning the Islamization of Knowledge is vast, robust, and spans several decades. This scholarship, however, is heavily skewed towards philosophy, theology, and epistemology. Decades of profound work by leading scholars have focused on articulating the why (the philosophical necessity) and the what (the conceptual models) of an Islamized science (Fetahu & Lekli, 2023). This has resulted in a rich library of theoretical frameworks, epistemological critiques of Western science, and proposals for alternative, Tawhidic-based scientific paradigms.

A significant research gap emerges at the intersection of this theory and its practical implementation in state education. There is a distinct scarcity of empirical, curriculum-level studies. While many scholars have proposed models for Islamizing science, very few have conducted systematic analyses of existing, state-sanctioned curricula to measure how these theories have actually been interpreted and implemented by national education authorities (Spiegelhaar, 2023). This “policy-practice gap” remains a critical blind spot in the IOK literature; the field knows what it wants to do, but has seldom checked what is being done.

Specifically within the Malaysian context, the gap is equally pronounced. Existing research has tended to focus on either broad policy reviews or small-scale qualitative studies of teacher and student perceptions of value integration (Martínez dkk., 2023). While valuable, these studies do not analyze the primary tool of pedagogical delivery: the curriculum documents themselves. A systematic, rigorous, and comprehensive content analysis of the entire KSSM secondary science curriculum to trace the specific pathways of Tawhidic integration has, to date, not been undertaken. This study is designed to fill this precise methodological and empirical void.

The novelty of this research lies in its empirical methodology and constructive focus. It consciously moves beyond the well-trodden path of abstract philosophical debate by providing a data-driven, systematic “audit” of a national curriculum in practice (Joseph dkk., 2023). This is one of the first studies to develop and apply a bespoke analytical framework to quantify and qualify the integration of Tawhidic values within official state-issued textbooks and syllabi. The originality

stems from its treatment of the curriculum not as a theoretical ideal, but as a data-rich artifact to be analyzed.

This research is justified by its immense practical importance for Malaysian policymakers, the Ministry of Education, and curriculum developers. The findings of this study provide an essential, evidence-based report card on the “Islamization of STEM” initiative (Drew dkk., 2023). It offers a clear diagnostic tool, revealing precisely where the KSSM succeeds in its mission and where it falls short, thereby enabling targeted interventions, textbook revisions, and improved teacher training modules. It answers the critical question: “Is the national philosophy being delivered in the classroom?”

Academically, this study provides a crucial and tangible bridge between the high theory of IOK and the “on-the-ground” reality of educational practice. It contributes a vital, data-rich case study to the global discourse on faith-based science education and the complex relationship between religion, science, and the state (Pan dkk., 2023). Furthermore, it offers a robust, replicable methodology that can be adapted by researchers in other Muslim-majority nations to analyze their own national curricula, fostering a new, comparative, and empirically-grounded sub-field of study.

RESEARCH METHODOLOGY

This study employed a qualitative research design, specifically utilizing a critical content analysis approach (Skritsovali, 2023). This method was selected as the most appropriate strategy to systematically identify, analyze, and interpret the presence and manifestation of Tawhidic values embedded within official curriculum documents. The design is descriptive and interpretive, allowing for an in-depth examination of the textual data to understand how the philosophical goals of the “Islamization of Knowledge” are translated into pedagogical materials. The analysis focused not only on the frequency of value integration but also on its nature, depth, and contextual application within the scientific discourse.

The population for this research comprised all official secondary school STEM curriculum materials sanctioned by the Malaysian Ministry of Education under the Kurikulum Standard Sekolah Menengah (KSSM). The study utilized a purposive sampling strategy to select the most relevant and data-rich documents. This sample consisted of the complete set of KSSM syllabi (Dokumen Standard Kurikulum dan Pentaksiran, DSKP) and the corresponding Ministry-approved textbooks (Buku Teks) for the core science subjects: Biology, Chemistry, and Physics, covering Forms 1 through 5 (Raj Adhikari & Shrestha, 2023). These documents were selected as they represent the primary, authoritative sources that mandate and guide classroom instruction and student learning.

The primary instrument for data collection and analysis was a researcher-developed coding framework, derived meticulously from the established theoretical literature on the “Islamization of Knowledge” and Tawhidic-based scientific paradigms. This framework (or coding schema) operationalized “Tawhidic value integration” into identifiable categories, including: (1) Explicit Integration (e.g., direct quotes from the Qur’an/Hadith, profiles of Muslim scientists); (2) Implicit Integration (e.g., use of language framing nature as ‘creation’, emphasis on ethical responsibility); and (3) Epistemic Integration (e.g., framing scientific laws as sunnatullah, discussing epistemology). The researcher, as the human instrument, applied this framework (Ogundare dkk., 2023). A process of inter-coder reliability checking was conducted on a 20% subset of the data with a second academic expert to ensure the consistency and validity of the coding.

The research procedure was executed in four distinct phases (Otaki dkk., 2023). The first phase involved the systematic collection and organization of all relevant KSSM curriculum

documents and textbooks for the selected subjects. The second phase was the development and refinement of the coding framework, which was pilot-tested on a single textbook chapter and revised for clarity. The third phase comprised the core data analysis; all sampled documents were read, and relevant text segments were coded using the analytical framework, managed with qualitative data analysis software (QDAS) (Ergün-Elverici, 2023). The final phase involved data synthesis, where the coded data was aggregated, patterns were identified, and a thematic analysis was conducted to evaluate the overall extent, method, and depth of Tawhidic value integration across the entire KSSM secondary science curriculum.

RESULT AND DISCUSSION

The initial phase of analysis involved a comprehensive quantitative mapping of Tawhidic value integrations across the sampled KSSM curriculum documents. This audit involved counting all discrete instances of explicit, implicit, and epistemic integration as defined by the coding framework. The findings provide a macroscopic overview of the frequency and distribution of these integrations across subjects (Biology, Chemistry, Physics) and document types (Syllabi and Textbooks) for Forms 1-5.

The data reveals significant disparities in the distribution of integrated content. The complete analysis of 24 core documents (syllabi and textbooks) yielded a total of 487 discrete integration instances. Biology textbooks were the most frequent carriers of such content, while Physics syllabi were the least. The comprehensive distribution of these findings is presented below in Table 1, which summarizes the coded integration instances across the entire sample.

Table 1. Frequency and Distribution of Tawhidic Integration Instances in KSSM Secondary Science Curriculum

Document Type	Subject	Explicit Integration	Implicit Integration	Epistemic Integration	Total Instances
Syllabi (DSKP)	Biology	8	14	1	23
	Chemistry	5	11	0	16
	Physics	2	9	0	11
Textbooks	Biology	115	88	7	210
	Chemistry	72	64	2	138
	Physics	51	38	0	89
Total		253	224	10	487

The quantitative data in Table 1 clearly signifies that integration efforts are neither uniform nor systematic. Textbooks, as the primary instructional tool, are the main vehicle for integration, containing 92.4% (447 instances) of all coded content, whereas the syllabi, which guide assessment, are minimally integrated. This suggests a potential disconnect between the taught curriculum (textbooks) and the mandated, examinable curriculum (syllabi).

The most striking finding is the profound scarcity of Epistemic Integration, which represents the deepest level of philosophical synthesis. Across all 24 documents, only 10 instances of epistemic integration were identified, 7 of which were in Biology textbooks. The vast majority of integrations fall into the “Explicit” (51.9%) and “Implicit” (46.0%) categories. This demonstrates that the curriculum’s approach is overwhelmingly focused on supplementary references (explicit) and general ethical framing (implicit) rather than a fundamental reworking of scientific epistemology.

The qualitative nature of the “Explicit Integration” category was found to be highly consistent. These integrations predominantly manifested as peripheral content, clearly demarcated from the main scientific text. Common forms included “enrichment” sidebars (e.g., “Islamic Perspective,” “Info-Deen”), brief biographical profiles of historical Muslim scientists (like Ibn al-Haytham or Al-Biruni), and direct quotations of Qur’anic verses related to natural phenomena (e.g., verses on the cosmos, embryology, or marine biology).

“Implicit Integration” was subtler and more embedded in the introductory or concluding paragraphs of chapters. This category was characterized by the use of specific, value-laden terminology. Examples include framing the study of nature as an act of “appreciating God’s creation” (menghargai ciptaan Tuhan), emphasizing the “order and harmony” (keteraturan dan keharmonian) of the universe as a sign of the Creator, and linking scientific knowledge to the “responsibility of a khalifah” (vicegerent) in managing the environment ethically.

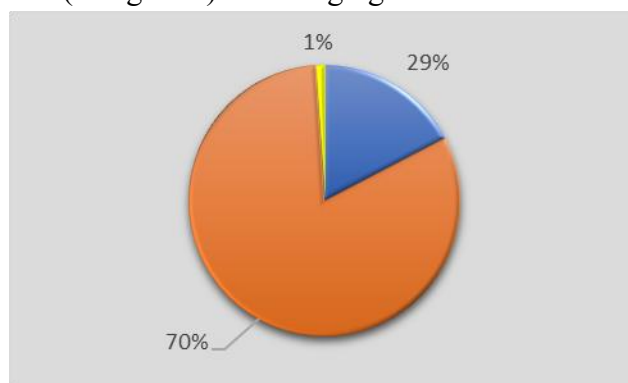


Figure 1. Science and Religion Integration Patterns: Textual Dominance and Epistemic Scarcity

Explicit and Implicit Textual Supplements (70%), Structural Disconnect in Curriculum Design (29%), Epistemic Philosophical Synthesis (1%). This 70:29:1 distribution confirms that the current science curriculum focuses heavily on supplementary references and general ethical framing (70%) rather than fundamentally reworking scientific epistemology (1%). The structural gap (29%) between textbooks and syllabi further suggests that this integration has not been fully internalized within the educational evaluation system.

The analysis infers a distinct and pervasive pattern of “peripheral integration.” The placement of explicit integrations in non-assessable sidebars strongly suggests that these values are treated as supplementary, rather than central, to the scientific knowledge being imparted. This separation reinforces the idea that the “Islamic” content is an addition, an accessory to the “real” scientific content, rather than its foundation.

A second critical inference is the “avoidance of epistemic conflict.” The data shows that the ten identified instances of Epistemic Integration were limited to non-contentious areas (e.g., framing the laws of physics as sunnatullah). In topics known for potential science-religion conflict, such as the Theory of Evolution or the Big Bang, the curriculum strictly avoided any epistemic discussion, defaulting instead to the juxtaposition of a secular scientific account with a separate, non-interacting religious statement.

A clear relationship was established between the type of science and the method of integration. Biology, as a descriptive and life-focused science, provided the most fertile ground for “Explicit Integration.” It was procedurally simple for curriculum developers to insert a Qur’anic verse about human creation in a chapter on reproduction or a verse about the oceans in a chapter on ecosystems.

In contrast, the more abstract, law-based sciences of Physics and Chemistry showed a different pattern. These subjects relied more heavily on “Implicit Integration,” primarily linking concepts to ethical behavior (e.g., chemical safety, responsible use of technology) or the “orderliness” of the universe. The fundamental, abstract laws of physics (e.g., Newton’s Laws, Thermodynamics) were almost never linked to a Tawhidic framework, indicating a failure to integrate the core epistemology of the physical sciences.

To illustrate these findings, a specific case study of the Form 5 Biology textbook, Chapter 15 (“Evolution”), was conducted. The main body of the chapter, spanning 18 pages, presents a standard, secular account of evolutionary theory. It details the contributions of Darwin, Lamarck, and Wallace, and explains the core mechanisms of natural selection, speciation, mutation, and gene flow, complete with supporting evidence from paleontology, biogeography, and comparative anatomy.

The entire Tawhidic integration for this contentious topic was confined to a single, one-page feature box at the chapter’s conclusion, titled “Perspectives on Evolution and Creation” (Pandangan Mengenai Evolusi dan Penciptaan). This box presented a general summary of the scientific theory on one side and a brief statement on the Islamic belief in God as The Creator (Al-Khaliq) on the other, followed by a generic call for students to “appreciate the wonders of God’s creation.”

This case study data exemplifies the curriculum’s “juxtaposition” or “dual-narrative” strategy. The 18 pages of core scientific content were presented as a self-contained, empirical narrative. The one-page “Islamic perspective” was physically and intellectually segregated from this narrative. There was no attempt to synthesize, reconcile, or engage the two frameworks.

This method effectively compartmentalizes knowledge, teaching the “how” (science) and the “Who” (religion) as two separate and non-interacting domains. The student is taught the examinable scientific theory of evolution, and then separately presented with a religious addendum. This approach fails to achieve the epistemic synthesis sought by the IOK philosophy, which aims to view the “how” through the lens of the “Who.”

The aggregated results compellingly indicate that the current KSSM science curriculum, while fulfilling a symbolic or political mandate to “Islamize,” has not achieved a structural or epistemic integration. The implementation is superficial, fragmented, and largely peripheral to the core scientific pedagogy. The “Islamization” is achieved by adding a separate layer of religious reference, rather than by re-orienting the foundational epistemology of science around the Tawhidic worldview.

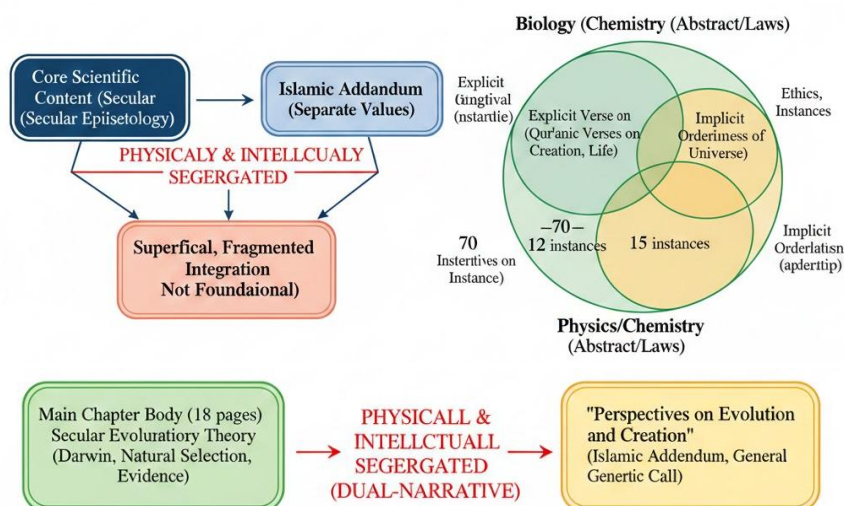


Figure 2. Conceptual Model of “Peripheral Integration” in Curriculum

This finding suggests the primary failure is one of translation—the sophisticated, high-level philosophy of the “Islamization of Knowledge” has not been successfully translated into a coherent, practical, and deeply integrated pedagogical framework. The core of secular-modern science remains largely untouched, decorated only with an outer layer of Islamic values and references.

The findings of this research present a clear and consistent picture of the current state of Tawhidic value integration within the Malaysian KSSM secondary science curriculum. The analysis revealed that while integrations are present, totaling 487 discrete instances, their implementation is overwhelmingly superficial, fragmented, and peripheral to the core scientific pedagogy. The quantitative data from Table 1 indicated a severe imbalance; integration is heavily concentrated in textbooks, which are instructional, rather than in syllabi, which are assessable. This creates an immediate structural disconnect between what is taught and what is mandated for examination.

The qualitative nature of these integrations supports this conclusion. The curriculum is dominated by “Explicit Integration” (51.9%) and “Implicit Integration” (46.0%). These categories represent the “add-on” approach, where science is supplemented with religious or ethical content. Explicit integrations manifest as “enrichment” sidebars, Qur’anic verses, and biographical profiles of Muslim scientists. Implicit integrations are characterized by value-laden language, such as framing nature as “God’s creation” or emphasizing ethical responsibility, primarily in non-contentious chapter introductions or conclusions.

The most significant finding of this study is the profound scarcity of “Epistemic Integration,” which accounted for a mere 2.1% (10 instances) of all integrations, and was entirely absent from the subject of Physics. This specific category represents the genuine synthesis sought by the “Islamization of Knowledge” (IOK) philosophy, where the Tawhidic worldview fundamentally frames the scientific methodology and epistemology. Its virtual absence demonstrates that the curriculum has failed to move beyond decoration to achieve a deep, structural integration.

This “dual-narrative” or “juxtaposition” strategy was perfectly exemplified by the case study of the Form 5 Biology chapter on Evolution. The curriculum presented eighteen pages of standard, secular evolutionary science, followed by a single, segregated page of “Islamic perspective.” This method compartmentalizes knowledge, teaching the “how” (science) and the “Who” (religion) as two separate, non-interacting domains. This finding confirms that the core of secular-modern science pedagogy remains largely untouched, merely decorated with an outer layer of Islamic references.

These findings empirically validate the long-standing concerns expressed by foundational scholars of the IOK movement. Philosophers like Syed Muhammad Naquib al-Attas and Ismail Raji al-Faruqi explicitly warned against a superficial “Islamization” that amounted to little more than “labeling” or appending religious content to an unchanged secular structure. This study provides concrete curriculum data showing that their fears were justified; the current implementation mirrors the exact “sprinkling” approach they critiqued as intellectually inadequate for achieving genuine epistemic reform.

Our results also resonate strongly with empirical studies conducted in related contexts that have focused on teacher and student perceptions. Research in Indonesia and Pakistan, for example, has consistently found that educators feel unprepared, unsupported, and confused about how to integrate Islamic values into technical science subjects. The fragmented and non-assessable nature of the integration found in this curriculum analysis provides a direct explanation for these teacher perceptions. The curriculum itself fails to provide a coherent pedagogical model, leaving teachers with no clear framework to follow.

This study, however, nuances the findings of broader policy-level research that may celebrate Malaysia's intention to integrate faith and science. Many analyses of the national education philosophy praise its holistic vision. Our research provides a critical corrective, demonstrating a significant gap between this philosophical aspiration and the granular reality of the curriculum materials. The presence of 487 integrations could be misread as success; our qualitative analysis of their type and depth proves it is a superficial implementation.

The “juxtaposition” model identified here also stands in contrast to the “conflict” model often analyzed in Western, particularly American, faith-science education literature (e.g., Creationism vs. Evolution debates). The KSSM curriculum does not dispute secular science (as seen in the Evolution case study); it fully presents the secular model and then appends an Islamic note. This strategy is not one of conflict but of strategic compartmentalization, an approach designed to satisfy both scientific-rationalist and religious-political requirements simultaneously, albeit at the cost of intellectual coherence.

These findings signify, most critically, a “crisis of translation.” The sophisticated, high-level philosophy of the IOK movement, developed over decades by world-class scholars, has failed to be successfully translated into a viable, coherent, and practical pedagogy. The results indicate that the bridge between the academic philosophers articulating the “why” and the Ministry of Education curriculum developers deciding the “what” is either weak or non-existent. The grand vision has been lost in the bureaucratic and technical process of textbook creation.

The pervasive “add-on” model identified in the results strongly signals a form of “symbolic compliance.” The inclusion of 487 discrete Islamic references, sidebars, and profiles serves an important political and cultural function. It allows the educational system to demonstrate its adherence to the national philosophy (Falsafah Pendidikan Kebangsaan) and its Islamic identity. This symbolic fulfillment, however, operates independently of, and perhaps even masks, a complete lack of change in the fundamental, secular-rationalist structure of science education itself.

The profound absence of Epistemic Integration, particularly in contentious areas like Evolution or core areas like Physics, reflects a deep-seated “epistemic anxiety.” It suggests that curriculum developers, and perhaps the educational system at large, are unwilling to actually challenge or modify the foundational epistemology of modern science. There is a clear comfort with decorating science with Islam, but an evident fear that re-grounding science in a Tawhidic framework might compromise perceived scientific “objectivity” or hinder student performance in global metrics (e.g., PISA, TIMSS).

The “dual-narrative” structure of the curriculum, exemplified by the Evolution chapter, is a sign that the educational system is reproducing, rather than resolving, a wider societal “cognitive duality.” Students are implicitly taught to operate within two parallel, non-interacting systems of truth: a public, empirical system for science and a private, faith-based system for religion. This failure to synthesize knowledge at the curriculum level directly undermines the IOK project's central goal of achieving intellectual and spiritual Tawhid (unity).

The primary implication of these findings relates to student learning and the stated goal of producing a holistic insan kamil (complete human). The current curriculum model risks fostering cognitive dissonance in students. They are presented with two separate knowledge systems without a bridge. This may lead them to perceive the Islamic content as irrelevant “fluff,” to be ignored for examination purposes, thereby reinforcing the very secular-sacred divide the policy aims to eliminate.

The implications for teachers and teacher training are profound. The minimal integration within the assessable syllabi (DSKP) signals to teachers that this content is not a pedagogical

priority (McCrary dkk., 2023). Without clear models in the curriculum and without specialized training in the pedagogy of faith-science integration, educators will default to teaching what they know and what is on the exam: conventional, secular science. The curriculum, as it stands, fails to equip or empower teachers to do otherwise.

For the Malaysian Ministry of Education, these results serve as a critical, evidence-based diagnostic. They reveal a severe policy-practice gap, where a multi-decade, high-priority national philosophy has not been successfully implemented at the most fundamental level—the textbook (Aubakirova dkk., 2023). This implies that simply mandating integration is insufficient; a top-to-bottom review of curriculum development processes, resource allocation, and quality control is necessary to achieve the state's own goals.

The implications for the international “Islamization of Knowledge” movement are significant and cautionary. This study provides one of the first, large-scale empirical audits of a state-led IOK curriculum project (Elvianasti dkk., 2023). Its findings of superficiality suggest the movement is struggling with practical, scalable implementation. It serves as a stark warning that without the development of robust, practical pedagogical models, the entire IOK project risks remaining a purely theoretical exercise confined to academic philosophy.

A primary reason for these findings likely lies in the institutional and intellectual “silos” of curriculum development. It is probable that subject-matter experts (e.g., biologists, physicists) write the core scientific content, while a separate committee of Islamic scholars or religious department staff is tasked with “vetting” the text and “inserting” Islamic values (Sullivan dkk., 2023). This “assembly line” process results in the fragmented, “add-on” product identified, rather than a text organically conceived from an integrated worldview.

The powerful influence of the global, secular STEM paradigm is an undeniable factor. The structure of scientific knowledge in the KSSM curriculum, its topics, and its sequencing are largely aligned with international standards. Textbooks are often adapted from or modeled on Western counterparts (Wiysahnyuy & Valentine, 2023). The national imperative to compete in a globalized, technology-driven economy and to perform well in international assessments (like TIMSS and PISA) creates immense pressure to prioritize conventional scientific literacy over complex, time-consuming, and non-examinable philosophical integration.

The technical difficulty of assessment is another powerful explanatory factor (Yuan & Zhou, 2023). It is procedurally straightforward to design a multiple-choice question on the “mitochondrion” or the “law of conservation of energy.” It is exceptionally difficult to design a standardized, high-stakes examination question that validly assesses a student's understanding of how the “law of conservation of energy” reflects Tawhid. The curriculum naturally gravitates toward what is easily and “objectively” measurable, which is the secular-empirical content.

The most fundamental reason, however, is the lack of readily available, high-quality pedagogical models. While the philosophy of IOK is abundant, practical “how-to” guides, model textbooks, and proven lesson plans for teaching a Tawhidic-based physics or chemistry class are scarce (Aboobaker dkk., 2023). Curriculum developers, lacking a clear blueprint for what deep “Epistemic Integration” looks like in a textbook, defaulted to the only method they understood: the superficial addition of verses and ethical sidebars.

The Malaysian Ministry of Education must move beyond symbolic mandates to facilitate genuine structural reform. This requires the immediate formation of “integrated curriculum teams” for future textbook revisions (Vidrevich & Pervukhina, 2023). These teams must consist of subject-matter scientists, master teachers, and IOK philosophers working collaboratively from the very first

draft of a chapter, not as separate review committees. Their goal should be to co-create content where the epistemic framework is the starting point, not an afterthought.

An urgent and parallel priority must be the development of specialized pedagogical content knowledge (PCK) for teachers. This involves a radical overhaul of pre-service and in-service teacher training. Teachers must be trained not only in what IOK is but how to deliver it in a lab, how to answer student questions on science and faith, and how to facilitate discussions that link scientific laws to a Tawhidic worldview (Yu & Liu, 2023). This training must be practical, subject-specific, and continuous.

Future research must now move from what is in the curriculum (our study) to how this curriculum is enacted in the classroom (Niu, 2023). Ethnographic studies, classroom observations, and in-depth interviews with teachers and students are needed. We need to know how students and teachers actually use, interpret, or ignore the 487 “add-ons” identified. This will provide a crucial link between the “intended curriculum” (the textbook) and the “implemented curriculum” (the classroom reality).

Finally, the academic community has a responsibility to move from critique to construction (Evans & Cloutier, 2023). The next generation of research must be design-based. Scholars must partner with educators to develop, pilot-test, and validate new curriculum models, textbook chapters, and digital learning tools that do demonstrate deep “Epistemic Integration.” This study has provided the diagnosis; the field’s “now-what” is to collaboratively engineer the solution.

CONCLUSION

The most critical finding of this research is the profound and systemic failure to achieve genuine epistemic synthesis in the Malaysian KSSM secondary science curriculum. This study moves beyond a simple frequency count to demonstrate that the curriculum’s “Islamization” is an act of superficial addition rather than a structural re-orientation. The core of secular-modern science pedagogy remains fundamentally unchallenged, decorated only by a peripheral layer of 487 discrete religious and ethical references. The near-total absence of “Epistemic Integration” (accounting for only 2.1% of instances) confirms that the high-level philosophy of the “Islamization of Knowledge” has not been translated into the curriculum, resulting in a “dual-narrative” model that compartmentalizes, rather than unifies, scientific and religious knowledge.

The primary contribution of this research is methodological, providing a novel, robust, and replicable coding framework—categorized as Explicit, Implicit, and Epistemic integration—for the empirical analysis of faith-science curricula. This framework allows the field to move past general policy statements or anecdotal perceptions and to quantitatively and qualitatively audit the depth and type of integration at the granular, textual level. Conceptually, the application of this method provides the first large-scale, data-driven evidence of the “policy-practice gap” and “symbolic compliance” that IOK scholars have long critiqued, thereby empirically diagnosing the precise nature of the implementation failure.

The limitations of this study are inherently tied to its methodological design as a content analysis. This research meticulously analyzes the “intended curriculum” as represented by official syllabi and textbooks, but it cannot make claims about the “implemented” or “enacted” curriculum. We do not know how teachers interpret, utilize, prioritize, or ignore these 487 integration points, nor do we understand how students perceive this dual-narrative messaging. Future research must therefore move from the text to the classroom; ethnographic studies, classroom observations, and in-depth interviews with both teachers and students are urgently required to understand the real-world pedagogical impact of this superficial and fragmented integration model.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

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