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TEACHERS' EXPERIENCES OF SCIENCE–ISLAM INTEGRATION IN MADRASAH IBTIDAIYAH SCIENCE LEARNING: A PHENOMENOLOGICAL STUDY

PENGALAMAN GURU TENTANG INTEGRASI SAINS-ISLAM DI PEMBELAJARAN SAINS MADRASAH IBTIDAIYAH: STUDI FENOMENOLOGIS

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Abstract

Despite growing interest in science–Islam integration in Islamic schools, research on teachers' classroom experiences remains limited. This study explored teachers' experiences of integrating science and Islamic values in science learning at Madrasah Ibtidaiyah (MI) using a descriptive phenomenological approach. Two teachers were purposively selected. Data were collected through in-depth interviews, teaching reflections, and documentation, then analyzed using Colaizzi's method. Teachers viewed science–Islam integration as a unified body of knowledge grounded in tawhid. They used storytelling, group discussions, hands-on activities, and digital technology to connect scientific concepts with Islamic teachings. Challenges included curriculum fragmentation, students' limited relational understanding, and institutional constraints in implementing the Merdeka Curriculum. The study highlights teachers' reflective roles in promoting meaningful science–Islam integration in madrasah and contributes to strengthening holistic Islamic education, even though the findings are context-specific.

Keywords: *Science–Islam Integration, Phenomenology, IPA Learning, Madrasah Ibtidaiyah (MI)*

Abstrak

Meskipun integrasi sains dan Islam di sekolah Islam semakin banyak dibahas, penelitian mengenai pengalaman guru dalam penerapannya di kelas masih terbatas. Penelitian ini bertujuan mengeksplorasi pengalaman guru dalam mengintegrasikan sains dan nilai-nilai Islam pada pembelajaran IPAS di Madrasah Ibtidaiyah (MI) menggunakan pendekatan fenomenologi deskriptif. Dua guru dipilih secara purposif. Data dikumpulkan melalui wawancara mendalam, refleksi pembelajaran, dan dokumentasi, kemudian dianalisis menggunakan metode Colaizzi. Guru memandang integrasi sains dan Islam sebagai satu kesatuan ilmu yang berlandaskan tauhid. Mereka menerapkan kegiatan bercerita, diskusi kelompok, aktivitas praktik, dan teknologi digital untuk menghubungkan konsep sains dengan ajaran Islam. Tantangan yang dihadapi meliputi fragmentasi kurikulum, keterbatasan pemahaman relasional siswa, serta kendala implementasi Kurikulum Merdeka. Penelitian ini menegaskan peran reflektif guru dalam mewujudkan integrasi sains dan Islam yang bermakna di madrasah serta memperkuat perspektif pendidikan Islam yang holistik, meskipun temuannya bersifat kontekstual.

Kata Kunci: *Integrasi Sains–Islam, Fenomenologi, Pembelajaran IPA, Madrasah Ibtidaiyah (MI)*

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1. Introduction

Islamic education in the digital age faces the challenge of integrating science and technology with religious values to shape a generation that excels academically and possesses spiritual integrity. Integrating STEM (Science, Technology, Engineering, and Mathematics) with Islamic teachings is an urgent need to address the demands of globalization and the 4.0 industrial revolution (Aksan, Zein, & Saumur, 2023). Holistic education in Islam emphasizes not only mastery of technical knowledge but also character development, ethical awareness, and social responsibility (Moslimany, Otaibi, & Shaikh, 2024). The concept of monotheism, which underpins Islamic epistemology, holds that all knowledge reflects the greatness of Allah, so that studying science can be understood as a form of worship and an effort to understand His creation. By integrating STEM and the teachings of the Quran, education can encourage students to develop critical thinking, problem-solving skills, and moral values that are in line with Islamic principles (Schreiber, Wagner, & Becker, 2024). Amidst the current global dynamics, madrasas are required to produce graduates who are not only technically competent but also possess a solid spiritual and ethical foundation, capable of contributing positively to society and civilization. Achieving this vision, however, requires first confronting a long-standing structural barrier, namely the dichotomy between religious and general knowledge.

The dichotomy of knowledge, namely the separation between religious and general knowledge, remains a structural problem that shapes learning in Islamic educational institutions. This problem can be traced to a colonial legacy that historically separated general education from religious education. This influence is still felt in institutional structures today, and that continues to shape how integration is carried out at the curriculum level (Rohman, Muhtamiroh, Imron, & Miyono, 2023). Even when madrasas have formally combined religious and general subjects in the curriculum, the integration that results tends to remain administrative rather than pedagogical, as the subjects are placed side by side in the curriculum document without teaching methods that genuinely connect them (Rizki, 2022). Existing studies, however, differ in where they locate the source of this problem, and taken together, they point to a gap that neither curricular nor mindset-focused approaches have fully resolved.

In one view, the dichotomy is mainly a conceptual gap, as it prevents students from building a comprehensive understanding that bridges the spiritual and rational dimensions of knowledge (Harahap, Arbi, & Yusrianto, 2025). In another view, the problem lies more in teachers' mindset, as many teachers still see religious studies and science as two unrelated fields, a perception that then shapes how they teach in the classroom (Aji, Ziyah, & Mahwiyah, 2023). This distinction carries significant implications: if the dichotomy is mainly curricular, the solution lies in policy and module design; if it is mainly about teachers' understanding, the solution should instead focus on how teachers personally construct and implement integration in their classrooms. Despite these differing diagnoses, both perspectives share a common limitation: neither has examined how teachers themselves experience, interpret, and reconcile this dichotomy in their everyday classroom practice. Within the Islamic educational tradition itself, religious knowledge and science are understood as complementary, as two manifestations of a unified body of knowledge grounded in tawhid (Imran, Anjum, Iqbal, & Ali, 2024). Bridging this conceptual ideal with classroom reality, therefore, requires closer attention to how teachers personally understand and enact integration, not only at the level of curriculum documents or stated beliefs, but in the lived texture of their daily teaching.

The implementation of science and Islamic integration in learning faces complex challenges at three main levels. First, teacher competence is a crucial obstacle because religious teachers lack a grasp of modern scientific concepts. In contrast, science teachers tend to view science as value-neutral and disconnected from religious frameworks (Harahap, Arbi, & Yusrianto, 2025). This challenge is compounded by the demand to master pedagogical, professional, and digital competencies simultaneously in the era of the Industrial Revolution 4.0 (Arif, Aziz, & Ma'arif, 2025). Second, a limited learning infrastructure poses a serious obstacle, where integration is often superficial due to insufficient understanding of how to integrate and a lack of adequate learning modules (Karim, Bakar, & Miswanto, 2023). In practice, many teachers have not received formal training in integration. As a result, the approach is frequently limited to inserting Quranic verses at the opening of a lesson without substantively altering the teaching method (Sutiana & Nugraha, 2025). Access to high-quality literature on best practices in Islamic religious education also remains limited, making it difficult for teachers to find applicable guidance (Tolman, Ferguson, Hubble, Kaloi, Niu, & Jensen, 2021). Third, socio-cultural factors also play a role, with resistance from communities that view science and religion as categorically separate domains remaining considerable (Tambak, Ahmad, Sukenti, & Siregar, 2022). Professional training for teachers is further constrained by geographical and financial barriers and by limited development opportunities (Lundeto, 2023). Taken together, these three levels of challenge, namely competence, infrastructure, and socio-cultural resistance, are not independent obstacles but mutually reinforcing ones. This suggests that policy-level interventions alone are unlikely to succeed without a parallel and deeper understanding of how individual teachers actually navigate these constraints in their daily practice.

Research on the integration of science and Islam in learning has developed with various focuses, but significant gaps remain. Harahap, Arbi, & Yusrianto (2025) argued that, within the monotheistic paradigm that unites revelation and reason, Islamic education must be a vehicle for forming a generation of Muslims who are critical, spiritual, and responsible. Primawan & Roqib (2024) identify academic and theological challenges in integrating Islam, science, and Nusantara culture that require a contextual approach. From a curriculum perspective, Adiyono, Fitri, & Matari (2024) developed a Re-STEAM approach that successfully increased students' motivation and critical thinking skills. Lubis, Purnomo, & Syahrifin (2025) examined the integrative learning model in Madrasah Ibtidaiyah (MI), which effectively connects scientific concepts with Islamic values. However, it has not yet explored teachers' personal reflections on the meaning of integration. These studies collectively suggest that successful integration depends not only on curriculum design but also on how teachers understand and internalize the philosophy of integration in their practice; however, this internalization process has not been examined. Rohman, Muhtamiroh, Imron, & Miyono (2023) demonstrated the positive impact of integrating science learning with Islamic values on student learning outcomes. From a teacher's perspective, Mulyani & Nugraha (2025) examined the epistemological understanding of science and Islamic religious education teachers using a phenomenological approach, identifying differences in inductive and deductive thinking paradigms. Hamdani (2024) highlights the application of the phenomenological method in Islamic education research, although the context remains limited to methodological aspects. Although these studies have made important contributions, none have yet explored in depth how MI teachers experience and interpret the process of science-Islam integration in daily learning practices through a

phenomenological lens. This gap is important to address because a deep understanding of teacher experiences is key to the successful implementation of integration at the primary education level.

What these studies leave unexamined is not merely a methodological absence but a substantive one, how teachers at the Madrasah Ibtidaiyah (MI) level personally construct meaning around science-Islam integration in the lived reality of their classrooms. Curriculum-oriented studies reveal what integration looks like on paper; competence-based studies measure what teachers can or cannot do, but neither addresses what integration means to teachers as they navigate the tension between scientific frameworks and Islamic values within a single lesson. This matters because without understanding how teachers subjectively interpret and reconcile this tension, any curriculum reform or training program remains disconnected from the epistemic foundation that actually drives classroom practice. Phenomenology is not chosen here merely as an alternative method, but because it is the only approach capable of accessing the essential structures of teachers' consciousness about integration, revealing not just what teachers do, but how they understand what they are doing and why it matters to them as Muslim educators.

This study, therefore, aims to explore the lived experiences of Islamic elementary school teachers in constructing the integration of science and Islam in science learning. Specifically, this study seeks to understand how teachers interpret this integration, the pedagogical strategies they develop, and the challenges they face in classroom practice. The phenomenological approach was chosen because it grants access to the subjective meaning structures that underlie teachers' instructional decisions, structures that remain invisible to curriculum analysis or competency measurement alone (Stolz, 2023). Authentic integration can only be realized when teachers do not merely execute technical procedures but genuinely understand the philosophical and spiritual meaning of what they are doing. The theoretical significance of this research lies in its contribution to enriching the literature on the integration of science and Islamic values by offering a conceptual account of how integration is lived and constructed from within, rather than observed from without (Imamah, 2025). In practice, the research findings can guide the development of teacher training programs that are more context-specific and grounded in real experiences, as well as serve as the basis for compiling applicable integrative learning modules. Ultimately, this research contributes to a more foundational understanding of how the dichotomy of knowledge can be overcome, not through policy alone, but through a transformation of how teachers themselves experience, interpret, and enact integration in their daily practice.

2. Research Method

This study employs a qualitative, descriptive-phenomenological approach to examine how MI teachers construct and attribute meaning to the process of integrating science and Islam in science learning. Phenomenology was selected over alternative qualitative approaches for a specific reason: unlike narrative inquiry, which foregrounds the storied construction of identity over time, or case study research, which prioritizes contextual description of bounded systems, phenomenology is uniquely suited to uncovering the essential structures of lived experience as it is consciously encountered.

The research subjects were the principal and vice principal, who both teach science subjects at MI NU Mafatihul Ulum, selected through a purposive sampling

technique based on having at least 2 years of experience teaching science, integrating Islamic values in learning, and playing a strategic role in developing integrative curriculum policies. The selection of these two informants was based on their position in providing a comprehensive perspective on the implementation of science-Islam integration, both from the aspect of learning practices and institutional policies. The research object includes teachers' experiences in integrating science and Islam in science teaching and learning activities, including understanding concepts, developing implementation strategies, and confronting challenges.

Data collection was carried out through triangulation of three main methods to ensure the depth and validity of qualitative research data. In-depth interviews were conducted with two informants, namely the principal and vice principal, to obtain a reflective overview of teachers' understanding and experiences. At the same time, documentation was used to supplement the data in including lesson plans, teaching modules, and other supporting materials related to the science learning process. Informants' reflections on the implemented learning practices provide data on class dynamics and students' responses to integration. Data analysis follows Colaizzi's phenomenological model which consists of systematic stages starting from reading the entire transcript to understand the general meaning, identifying significant statements, formulating the meaning of each statement, grouping the meaning into main themes, compiling a textural description of "what" the participants experienced and a structural description of "how" the experience occurred, to compiling the essence of the MI teacher's experience in constructing the integration of science and Islam.

The entire analysis process was carried out in depth to produce a comprehensive understanding of the phenomena being studied. In this study, the interview transcripts of the two informants (the principal and vice principal) were read repeatedly to identify significant statements relevant to their experiences in constructing science–Islam integration. The researcher then formulated each significant statement into its underlying meaning, and statements with similar content were subsequently clustered into broader categories. Through this iterative process, four main themes emerged that capture the essence of teachers' experiences, namely their understanding of integration as a unity of knowledge, their pedagogical strategies, the challenges they faced, and the impact of integration on student learning. To strengthen credibility, key findings and interpretations were informally shared with participants via messaging to verify the accuracy of the meanings derived from their accounts, serving as a form of member checking.

3. Results and Discussion

3.1 Results

Based on in-depth interviews with the principal and vice principal of MI NU Mafatihul Ulum and an analysis of learning documents, four main themes were identified that reveal the essence of teachers' experiences in integrating science and Islam. These themes were analyzed through a phenomenological lens to understand the deeper meaning of these experiences.

Table 1 presents a sample of the analytical process following Colaizzi's method, illustrating how significant statements from interview transcripts were formulated into meanings and subsequently clustered into the four themes reported in this study.

Table 1. Analytical Process Using Colaizzi's Phenomenological Method

Significant Statement	Formulated Meaning	Theme
"How to unify the material so children do not think it is compartmentalized, but understand that science has a relationship with the Qur'an."	Teachers strive to help students perceive science and Islamic teachings as interconnected rather than separate domains.	Integration as a Unity of Knowledge
"For example, material about human bones can be combined with a verse related to the process of human creation. We explain it to students and have them practice it."	Teachers connect scientific content with Qur'anic verses to present knowledge as a unified whole.	Integration as a Unity of Knowledge
"I created the teaching modules first. I knew the essential materials (core materials)."	Integration begins with deliberate lesson planning that identifies core content.	Pedagogical Strategies
"The methods used are lectures and stories... with human bones, we tell the story of how Adam and Eve were created."	Storytelling is a primary method for linking scientific topics with Islamic narratives.	Pedagogical Strategies
"If the discussion method isn't engaging enough, we change to a more appropriate method."	Teachers exercise pedagogical flexibility, adapting methods to sustain student engagement.	Pedagogical Strategies
"We use facilities such as laptops, LCDs, and independent AI-based assignments; what interests children most is homework via mobile phone."	Digital tools are integrated to align with students' familiarity with technology.	Pedagogical Strategies
"Teachers created a printed skeleton image; students cut and glued the parts into a movable puppet, then teachers asked about the function of bones in the hands and feet."	Hands-on, tactile media make abstract anatomical concepts concrete and interactive.	Pedagogical Strategies
"We do not focus on a single subject; IPAS collaborates with other subjects."	Coordinating integration across subject boundaries is a persistent institutional challenge.	Challenges in Implementing Integration
"How do I help children understand the connection between science and Islam?"	Teachers struggle to build students' relational understanding between the two domains.	Challenges in Implementing Integration
"IPAS in semester 1, for grade 6 MI, has only used the Merdeka Curriculum this year."	Limited experience with the new curriculum constrains integration at the institutional level.	Challenges in Implementing Integration

Significant Statement	Formulated Meaning	Theme
"The child's response indirectly is that the child understands more than just knowledge and can also understand religious understanding, and the students are also happy during the learning process."	Narrative-based integration produces positive student responses and dual learning outcomes.	Impact on Student Learning
"The most interesting thing for children is assignments via cellphone (homework)."	Students show a strong preference for digital/technology-based learning tasks.	Impact on Student Learning
"Indirectly, the children understand two subjects, not just one."	Integration produces a "dual understanding," where students absorb scientific and religious knowledge simultaneously without fragmentation.	Impact on Student Learning

3.1.1 Teachers' Understanding of Integration as a Unity of Knowledge

MI teachers understand the integration of science and Islam not as separate entities, but as a unified whole. Both participants converged in their view that science and Islamic knowledge originate from the same source and should be experienced by students as inseparable. The principal articulated this understanding in terms of curriculum coherence:

> *"How to unify the material so that the children do not think that the material is compartmentalized or fragmented, but can think that the science lesson, which is essentially natural science, has a relationship with the Qur'an that we are studying."*

The vice principal expressed a similar conviction, grounding it in concrete instructional practice rather than curricular framing:

> *"Material about human bones can be combined with a verse related to the process of human creation. We explain it to students and have them practice it*."

While the principal's concern was primarily with how students perceive the relationship between subjects at a conceptual level, the vice principal's emphasis fell on the moment of classroom enactment, on making integration visible and tangible for students through explanation and practice. Together, these perspectives reveal that the understanding of integration as a unity of knowledge operates at two complementary levels: the epistemic, concerning how knowledge is structured, and the pedagogical, concerning how that structure is communicated to learners.

The Unity of Sciences paradigm emphasizes that all sciences are in dialogue with one another and lead to one goal: bringing learners closer to knowing and to Allah, al-Haqq. When teachers relate bone material to the surah on the creation of humans, they

not only teach anatomy, but also invite students to reflect on the greatness of Allah through His creation. These two statements, taken together, reveal that teachers do not experience integration as a technical add-on but as a fundamental orientation toward knowledge, one in which science and Islamic teaching are understood as two expressions of a single truth grounded in tawhid. This understanding precedes and shapes every pedagogical decision described in the sections that follow.

3.1.2 Teachers' Pedagogical Strategies in Constructing Integration

MI teachers employ a variety of pedagogical strategies ranging from planning to implementation. Both participants demonstrated a deliberate, structured approach to integration, though their emphases differed: the principal foregrounded the planning stage. In contrast, the vice principal's accounts centred more on in-class execution and student interaction. In the planning stage, the principal described a clear sequence:

> *"I created the teaching modules first. I knew the essential materials (core materials)."*

This finding suggests that integration is not improvised but is built into the lesson architecture from the outset, with the teacher identifying which scientific content carries the strongest potential for connection with Islamic values before instruction begins.

In implementing the learning process, both teachers use storytelling as the primary strategy. The vice principal elaborated:

> *"The methods used are lectures and stories... For example, with human bones, we tell the story of how Adam and Eve were created."*

This narrative approach functions not merely as a motivational device but as an epistemological bridge; it situates scientific content within a framework of divine creation that students already understand from their religious upbringing. Besides storytelling, teachers also use structured group discussions on scientific content as an entry point for integration. The principal described a typical activity:

> *"In a discussion about bones, students might discuss how many bones there are or how bones are classified, then each group presents simply."*

The scientific question, how many bones, how they are classified, serves as the anchor, with the Islamic dimension woven in through the teacher's framing and questioning rather than as a separate segment of the lesson. In practice, teachers use hands-on media. The vice principal described one such activity:

> *"Teachers created a printed skeleton image, students cut and glued the parts into a movable puppet, then teachers asked about the function of bones in the hands and feet."*

This activity demonstrates how tactile, kinesthetic engagement with scientific content can be designed to coexist naturally with reflective questions about creation. Teachers also utilize digital technology:

"We use facilities such as laptops, LCDs, and independent AI-based assignments. What interests children most is homework via mobile phone."

The vice principal noted that digital assignments extend integration beyond the classroom: students are encouraged to use AI, YouTube, and social media not simply to find information, but to explore material within a framework that the teacher has already connected to Islamic values during the lesson.

Throughout all of these strategies, both teachers emphasized pedagogical flexibility. As the principal stated:

"Learning also depends on the child's situation and condition... we spontaneously change methods that are more interesting for the child. So, a plan can also change after implementation."

This adaptive stance suggests that teachers do not treat any single strategy as definitive; rather, the method is always subordinate to the goal of meaningful, integrated understanding.

3.1.3 Challenges for Teachers in Implementing Integration of Science and Islam

Implementation in the field faces significant challenges in three main dimensions. Both participants acknowledged these challenges, and notably, their accounts pointed to the same three domains (conceptual, pedagogical, and institutional), suggesting that these difficulties are structural features of integration practice rather than individual experiences. In the conceptual dimension, teachers face the problem of curriculum fragmentation. The principal stated:

"We don't focus on just one subject, but rather collaborate, for example, on science and other subjects. We need to integrate the material so that children don't perceive it as siloed or fragmented."

This challenge reflects the broader structural tension in Islamic education between a curriculum that organizes knowledge into discrete subject boundaries and a pedagogical vision that seeks to present knowledge as unified. In the pedagogical dimension, teachers face challenges in building students' relational understanding:

"How do I help children understand the connection between science and Islam?"

This question, posed as a genuine pedagogical dilemma rather than a rhetorical one, reveals the gap between the teacher's own integrated understanding, internalized through years of practice and reflection, and the difficulty of transferring that understanding to students who have been socialized to treat science and religion as separate school subjects. This challenge is more complex than simply transferring knowledge; it involves building new cognitive schemas that enable students to see meaningful connections between empirical knowledge and spiritual values.

In the institutional dimension, challenges include collaboration among subjects and adaptation to the Merdeka Curriculum. An informant stated:

"IPAS in semester 1, for grade 6 MI, has only used the Merdeka Curriculum this year."

The one-year implementation means that teachers are simultaneously navigating a new policy framework while attempting to deepen an integrative practice that itself requires long-term development. Both participants' accounts implied that institutional support, shared planning time, integrated module development, and consistent evaluation systems remain insufficient to sustain the level of integration they envision.

3.1.4 Integration Impact and Transformative Meaning

Teachers' experiences integrating science with Islamic values have shown a significant impact on student responses and understanding. Both participants described student responses in terms that went beyond cognitive achievement, emphasizing affective engagement and the naturalness with which students absorbed dual learning outcomes. The vice principal observed:

"The child's response indirectly is that the child understands more than just knowledge and can also understand religious understanding, and the students are also happy during the learning process, the students unknowingly get other material."

The word "unknowingly" is significant here: it suggests that effective integration does not feel to students like two subjects being taught simultaneously, but rather like a single, coherent learning experience in which the religious and scientific dimensions are inseparable.

The principal noted a parallel observation regarding student engagement with digital tasks:

"The most interesting thing for children is assignments via cellphone (homework)."

This preference for technology-based tasks points to an additional dimension of the integration experience. When students independently search for material using AI or social media within a class framework already aligned with Islamic values, the integration extends beyond the lesson itself. It becomes part of how students habitually explore knowledge. The use of concrete media, such as the movable *wayang rangka puppet*, further illustrates the teacher's creativity in designing learning experiences where scientific and spiritual understanding reinforce each other. The vice principal described how, after students physically assembled the skeletal model, the teacher asked reflective questions about the function of bones. These questions implicitly invited students to consider the purposiveness of the human body as a sign of divine design.

The most significant finding across both participants was the phenomenon of "dual understanding". As the vice principal stated:

"Indirectly, the children understand two subjects, not just one."

The principal's account of storytelling, recounting the creation of Prophet Adam while teaching bone structure illustrates how this dual understanding is produced: not by

juxtaposing two bodies of content, but by presenting a single narrative in which scientific and religious knowledge are already fused. This moment gives genuine meaning to the teaching experience: learning becomes worship, and science becomes a path to divine awareness. Students acquire scientific knowledge and religious understanding simultaneously without feeling overwhelmed or experiencing cognitive fragmentation.

3.2 Discussion

The findings reveal a profound structure of meaning underlying teachers' experiences of science–Islam integration in MI. Rather than viewing science and Islam as two separate domains that must be connected, both participants perceived them as an inherent unity. For these teachers, integration was not an instructional task but an epistemological reality that already existed. Their role was to make this unity visible to students accustomed to learning within subject-based boundaries. This distinction shifts the focus from asking how teachers integrate science and Islam to understanding how they communicate a unity that they already inhabit.

This experience is best understood through the concept of tawhid as an epistemological rather than merely theological foundation. When the principal emphasized the importance of preventing students from perceiving science as compartmentalized, and when the vice principal cited a Qur'anic verse on human creation while teaching bone structure, neither was merely following curriculum requirements. Instead, both expressed a worldview in which all knowledge originates from a single divine source. This perspective is consistent with the unity of sciences paradigm, which positions revelation as the foundation that unifies all branches of knowledge (Junaedi & Wijaya, 2021). The present findings extend this perspective by illustrating how that epistemological commitment is experienced in everyday teaching practice. Integration, therefore, is not merely a pedagogical strategy but the epistemic foundation from which teachers design and deliver instruction.

The findings also extend previous critiques of administrative integration, in which science and religious subjects are combined only at the curriculum level without meaningful pedagogical connections (Fitri, Fitriani, & Putri, 2024). The participants' experiences demonstrate that authentic integration begins with teachers' own understanding of knowledge as inherently unified. Consequently, integration is shaped not simply by instructional methods but by teachers' epistemological orientation. As argued by Desfita, Salminawati, & Usiono (2024), a deep internalization of Islamic values influences not only what teachers teach but also how they understand the nature of knowledge itself.

Building on this epistemological orientation, the participants translated their understanding of the unity of knowledge into classroom practice through a variety of pedagogical strategies. Rather than relying on a single instructional approach, they employed multiple learning methods that enabled students to experience scientific concepts and Islamic values within a single, meaningful learning process.

Building on their epistemological understanding of the unity of knowledge, the participants translated this perspective into classroom practice through a variety of pedagogical strategies. The use of storytelling, group discussions, hands-on activities, digital technology, and flexible instructional approaches may initially appear to represent good general teaching practice. However, the participants' experiences suggest that this pedagogical diversity was not incidental but reflected the unique demands of science–Islam integration. Scientific concepts and Islamic values operate through different modes

of understanding: science emphasizes empirical inquiry, whereas Islamic values emphasize narrative, relational, and spiritual meaning. Consequently, no single teaching strategy was considered sufficient to communicate both dimensions effectively.

Within this context, storytelling functioned not merely as a motivational technique but as a means of constructing meaning. When the vice principal explained the structure of human bones through the story of the creation of Prophet Adam, the narrative did not simply accompany the scientific explanation. Still, it provided the framework within which the scientific concept became meaningful. As the vice principal explained, *"the methods used are lectures and stories, for example, with human bones, we tell the story of how Adam and Eve were created"*. Rather than connecting two separate bodies of knowledge, the lesson presented scientific concepts and Islamic teachings as parts of a single narrative. This finding supports previous research showing that storytelling strengthens conceptual understanding in science learning while further illustrating its role in facilitating science–Islam integration (Gürsoy, 2021).

A similar pattern emerged through hands-on learning media. The *wayang rangka* activity required students to assemble a movable skeletal model and then reflect on the functions of different bones. As described by the vice principal, *"teachers created a printed skeleton image, students cut and glued the parts into a movable puppet, then teachers asked about the function of bones in the hands and feet"*. This activity enabled students to interact directly with scientific concepts while simultaneously encouraging reflection on the human body as part of God's creation. In this way, the pedagogical activity and its spiritual purpose complemented one another. This finding is consistent with the Islamic STEM integrative approach, which emphasizes hands-on learning to develop both scientific understanding and ethical awareness (Elbashir, Alkhair, & Thani, 2024).

The participants also emphasized the importance of pedagogical flexibility during classroom instruction. Rather than following lesson plans rigidly, they adapted their teaching methods according to students' responses and classroom conditions. As the principal explained, *"learning also depends on the child's situation and condition, we spontaneously change methods that are interesting for the child. So, a plan can also change after implementation"*. This flexibility indicates that effective science–Islam integration cannot always be predetermined but requires teachers to respond to learning situations as they develop. The use of digital technology further supported this adaptive approach by extending learning opportunities beyond the classroom and encouraging students to explore knowledge independently (Ayuba, Abdulkadir, & Mohammed, 2025).

Although the participants demonstrated a strong commitment to integrating science and Islam, they consistently encountered several interconnected challenges during its implementation. Rather than representing isolated issues, the participants' experiences suggest that conceptual fragmentation, students' difficulty in developing relational understanding, and institutional constraints formed a mutually reinforcing system. Understanding the relationships among these challenges provides a more comprehensive explanation of the difficulties teachers experience than considering each issue separately.

At the centre of these challenges was a structural mismatch between the teachers' epistemological understanding and the institutional context in which they worked. While the participants viewed knowledge as an integrated unity grounded in tawhid, the educational system continued to organize learning through separate subjects, schedules, and competency-based assessments. As a result, every effort to integrate science and

Islam required teachers to work within an institutional structure that was still largely based on disciplinary boundaries. This finding is consistent with previous studies that report that implementing curricula in Islamic educational institutions often creates tension between integrative pedagogical ideals and subject-based curriculum structures (Laila, Mufarokah, Anwar, & Mudhofar, 2025).

This institutional condition also influenced students' learning experiences. According to the participants, students entered the classroom with ways of thinking shaped by subject-separated learning. Consequently, helping students understand the relationship between scientific concepts and Islamic teachings involved more than introducing new knowledge; it required supporting them in recognizing connections that they had not previously experienced. As the principal expressed, *"How do I help children understand the connection between science and Islam?"* This challenge supports previous research showing that developing such understanding requires not only pedagogical competence but also sustained institutional support (Arif, Aziz, & Ma'arif, 2025). The participants' experiences further suggest that limited institutional support made this process more difficult because teachers were expected to promote an integrated understanding of knowledge within an educational structure that remained largely compartmentalized.

The implementation of the Merdeka Curriculum further intensified these challenges. As both participants explained, grade 6 had only begun implementing the curriculum this academic year, requiring teachers to adapt to new policy expectations while simultaneously strengthening science–Islam integration in classroom practice. Their experiences indicate that these challenges were not simply the result of individual teaching practices but were closely tied to broader institutional conditions that influence the implementation of integrative learning.

Despite the institutional and pedagogical challenges, both participants consistently observed meaningful changes in students' learning experiences. The most significant change was not simply an improvement in students' understanding of science or Islamic knowledge as separate subjects, but the emergence of what the participants described as a dual understanding in which students learned scientific concepts and Islamic values simultaneously without experiencing them as separate domains. Rather than perceiving themselves as learning two different subjects, students experienced a deeper understanding of a single concept presented through an integrated perspective. This finding suggests that science–Islam integration extends beyond combining subject matter and instead shapes how students construct meaning from their learning experiences.

This experience is reflected in the participants' descriptions of classroom practice. As the vice principal explained, *"indirectly, the children understand two subjects, not just one"*. Similarly, storytelling enabled scientific concepts and Islamic teachings to be presented within a single narrative rather than as two separate bodies of knowledge. These findings are consistent with Fogarty's concept of nested integration, in which different disciplines are integrated within a single learning experience rather than taught sequentially (Rashed & Tamuri, 2022). The present findings further illustrate how learners experience such integration as a unified process of understanding rather than as the combination of separate subjects.

The participants also highlighted the importance of students' emotional engagement during learning. The principal noted that *"the most interesting thing for children is assignments via cellphone (homework),"* while the vice principal observed

that students were *"happy during the learning process"*. These experiences indicate that students' positive emotional responses accompanied the integration of scientific and Islamic knowledge. In line with Islamic educational philosophy, meaningful learning involves not only intellectual development but also the formation of spiritual and moral awareness (Khan & Ahmed, 2025). The participants' experiences, therefore, suggest that science–Islam integration created learning experiences that were both cognitively meaningful and personally engaging for students.

Taken together, these findings reveal a consistent pattern in the participants' experiences. Both teachers understood science–Islam integration not as a teaching technique but as an epistemological orientation grounded in the unity of knowledge. This orientation shaped the pedagogical strategies they selected, influenced how they interpreted the challenges they encountered, and informed the meaningful learning experiences they sought to create for their students. Across these interconnected experiences, teaching was understood as the process of making the unity of knowledge accessible to learners rather than connecting two previously separate domains.

This perspective also highlights an important implication for science–Islam integration in Islamic elementary education. Existing studies have primarily focused on instructional strategies, curriculum models, or teacher competencies. The present findings suggest that these aspects are closely related to teachers' own epistemological understanding of knowledge. The phenomenological approach adopted in this study, therefore, provides insight into the lived experiences underlying teachers' pedagogical decisions, revealing that meaningful integration begins with how teachers themselves understand the relationship between science and Islam. Consistent with Hasan (2023), the findings further indicate that addressing the dichotomy of knowledge requires not only curriculum development or policy reform but also strengthening teachers' epistemological orientation as the foundation for implementing meaningful science–Islam integration in classroom practice.

4. Conclusion

This phenomenological study illuminates how two MI teachers at NU Mafatihul Ulum experienced science-Islam integration as an epistemological unity grounded in tawhid, not as separate fields requiring technical bridging. Within this specific institutional context, both participants did not experience science and Islam as two domains being brought together, but as a unity already inhabited, one that teaching seeks to make visible to students. Teachers employ diverse pedagogical strategies (storytelling, group discussions, hands-on activities, and digital technology) to facilitate holistic learning. Despite facing conceptual, pedagogical, and institutional challenges, particularly related to curriculum fragmentation and Merdeka Curriculum adaptation, teachers perceived that integration facilitated students' simultaneous engagement with scientific concepts and religious values, a phenomenon both participants described as "dual understanding". However, as this study relies exclusively on teachers' self-reported experiences, these outcomes reflect teachers' perceptions rather than independently verified student learning gains.

The study contributes theoretically by enriching the integration literature through a phenomenological perspective rarely used in madrasah contexts, and practically by providing foundations for developing contextual teacher-training programs and integrative learning modules. Limitations include the small sample (two informants, one

institution) and reliance on self-reported experiences without systematic classroom observation. Future research should involve larger, more diverse samples across multiple madrasahs, employ longitudinal designs to track teachers' development over time, combine phenomenology with classroom observations and student assessments, and explore specific areas such as school leadership roles, assessment tool development, and long-term impacts on students' scientific literacy and religious character. This study affirms that overcoming knowledge dichotomy requires not only curriculum reform but also profound transformation in how teachers understand and embody knowledge unity in daily practice.

References

Adiyono, A., Fitri, A. Z., & Matari, A. S. A. (2024). Uniting Science and Faith: A Re-STEAM Interdisciplinary Approach in Islamic Education Learning. *International Journal of Social Learning (IJSL)*, *4*(3), 332–355. https://doi.org/10.47134/ijsl.v4i3.281

Aji, W., Ziyah, & Mahwiyah. (2023). The Influence of Science Dichotomy on Islamic Religious Education Curriculum. *Amandemen: Journal of Learning, Teaching and Educational Studies*, *1*(1), 7–14. https://doi.org/10.61166/amd.v1i1.2

Aksan, S. M., Zein, M., & Saumur, A. S. (2023). Islamic Educational Thought on STEM (Science, Technology, Engineering, Mathematics): Perspectives and Implementation. *International Journal of Trends in Mathematics Education Research*, *6*(4), 378–386. https://ijtmer.saintispub.com/ijtmer/article/view/325/0

Arif, M., Aziz, M. K. N. A., & Ma'arif, M. A. (2025). A Recent Study on Islamic Religious Education Teachers' Competencies in the Digital Age: A Systematic Literature Review. *Journal of Education and Learning*, *19*(2), 587–596. https://doi.org/10.11591/edulearn.v19i2.21311

Ayuba, J. O., Abdulkadir, S., & Mohammed, A. A. (2025). Integration of Digital Tools for Teaching and Learning of Islamic Studies among Senior Secondary Schools in Ilorin Metropolis, Nigeria. *INJIES: Journal of Islamic Education Studies*, *2*(1), 1–9. https://doi.org/10.34125/injies.v2i1.16

Desfita, V., Salminawati, S., & Usiono, U. (2024). Integration of Science in the Perspective of Islamic Educational Philosophy and its Implications in Realizing Holistic Education. *Jurnal As-Salam*, *8*(2), 114–134. https://doi.org/10.37249/assalam.v8i2.714

Elbashir, A. M., Alkhair, S., & Thani, N. J. A. (2024). Fostering STEM Learning: Exploring the Integration of Design Thinking in Islamic STEM Education. *QiST: Journal of Quran and Tafseer Studies*, *3*(3), 411–432. https://doi.org/10.23917/qist.v3i3.6138

Fitri, A., Fitriani, D., & Putri, G. S. (2024). Integrasi Ilmu Pengetahuan dan Agama sebagai Islamisasi Ilmu Pengetahuan dalam Sistem Pendidikan di Sekolah. *Jurnal Basicedu*, *8*(2), 1224–1234. https://doi.org/10.31004/basicedu.v8i2.7311

Gürsoy, G. (2021). Digital Storytelling: Developing 21st Century Skills in Science Education. *European Journal of Educational Research, 10*(1), 97–113. https://doi.org/10.12973/EU-JER.10.1.97

Hamdani, S. (2024). Implementasi Metode Fenomenologi dalam Penelitian Pendidikan Islam. *Ta'dib: Jurnal Pendidikan Islam dan Isu-Isu Sosial*, *22*(1), 35–53. https://jurnal.iaihpancor.ac.id/index.php/tadib/article/view/1560

Harahap, F. D. S., Arbi, A., & Yusrianto, E. (2025). Integrasi Sains dan Islam dalam Pendidikan Islam: Model, Tantangan, dan Implementasi di Madrasah dan Pesantren. *Kutubkhanah*, *25*(1), 1–12. https://doi.org/10.24014/kutubkhanah.v25i1.36861

Hasan, H. (2023). Integration of Islamic Science in the Development of Al-Qur'an Studies in Student Final Projects in Indonesia. *Hayula: Indonesian Journal of Multidisciplinary Islamic Studies*, *7*(1), 1–16. https://doi.org/10.21009/hayula.007.01.01

Imamah, Y. H. (2025). Integration of Science and Religious Values in Learning Islamic Religious Education. *Journal Corner of Education, Linguistics, and Literature*, *5*(1), 25–35. https://doi.org/10.54012/jcell.v5i1.510

Imran, M., Anjum, G. M., Iqbal, J., & Ali, Z. (2024). Islamic Approach to Education Balancing Religious and Secular Knowledge in Pakistani Schools. *Al Khadim Research Journal of Islamic Culture and Civilization*, *5*(1), 68–71. https://arjicc.com/index.php/arjicc/article/view/302

Junaedi, M., & Wijaya, M. M. (2021). Islamic Education Development Based on Unity of Sciences Paradigm. *Ulul Albab: Jurnal Studi Islam*, *22*(2), 292–312. https://doi.org/10.18860/ua.v22i2.13362

Karim, M. N., Bakar, A., & Miswanto. (2023). Konsep Implementasi Integrasi Sains dengan Agama (Islam) dalam Kurikulum Pendidikan Islam di Madrasah dan Pendidikan Tinggi Keagamaan Islam (PTKI). *Jurnal Adzkiya*, *7*(1), 25–32. https://www.jurnalstaiibnusina.ac.id/index.php/adz/article/view/165

Khan, S. A., & Ahmed, S. Z. (2025). Cultivating Minds, Inspiring Change: Transformative Paradigms in Islamic Education. *The Critical Review of Social Sciences Studies*, *3*(1), 3204–3214. https://doi.org/10.59075/gqgnj655

Laila, S. N. F., Mufarokah, A., Anwar, H. S., & Mudhofar, A. (2025). Curriculum Changes in Indonesia: Implementation and its Challenges in Religious Institutions. *Journal of Educational Research and Practice*, *3*(1), 2–16. https://doi.org/10.70376/jerp.v3i1.266

Lubis, M., Purnomo, B., & Syahrifin, M. (2025). Model Pembelajaran Berbasis Integrasi Ilmu Keislaman dan Sains di Madrasah Ibtidaiyah. *Bunayya: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, *5*(1), 44–47. https://doi.org/10.61082/bunayya.v5i1.515

Lundeto, A. (2023). Empowering Islamic Religious Teachers: Professional Development and Challenges. *International Journal of Science and Society*, *5*(3), 430–450. https://doi.org/10.54783/ijsoc.v5i3.840

Moslimany, R., Otaibi, A., & Shaikh, F. (2024). Designing a Holistic Curriculum: Challenges and Opportunities in Islamic Education. *Journal on Islamic Studies*, *1*(1), 52–73. https://centerpub.ristek.or.id/index.php/jois/article/view/19

Mulyani, E. K. S., & Nugraha, M. S. (2025). Pemahaman Epistemologi Guru terhadap Integrasi Sains dan Agama di MTs 1 Serang. *Tadbir: Jurnal Manajemen Pendidikan Islam*, *13*(1), 115–132. https://doi.org/10.30603/tjmpi.v13i1.5847

Primawan, D. P., & Roqib, M. (2024). Tantangan Akademik dan Teologis Integrasi Islam, Sains dan Budaya Nusantara. *Journal on Education*, *6*(2), 12838–12846. https://jonedu.org/index.php/joe/article/view/5136

Rashed, Z. N., & Tamuri, A. H. (2022). Integrated Curriculum Model in Islamic Education Curriculum. *International Journal of Academic Research in Business and Social Sciences*, *12*(7), 205–213. https://doi.org/10.6007/ijarbss/v12-i7/14249

Rizki, B. (2022). Konsep Integrasi Sains (Ilmu Pengetahuan Umum) dan Ilmu Agama. *Journey-Liaison Academia and Society*, *1*(1), 101–108. https://j-las.lemkomindo.org/index.php/BCoPJ-LAS/article/view/99

Rohman, A., Muhtamiroh, S., Imron, A., & Miyono, N. (2023). Integrating Traditional-Modern Education in Madrasa to Promote Competitive Graduates in the Globalization Era. *Cogent Education*, *10*(2), 1–17. https://doi.org/10.1080/2331186X.2023.2268456

Schreiber, A., Wagner, Y., & Becker, L. (2024). Integrating Islamic Values in Science Education: A Case Study in Indonesian Islamic Schools. *World Journal of Islamic Learning and Teaching*, *1*(1), 18–22. https://doi.org/10.61132/wjilt.v1i1.99

Stolz, S. A. (2023). The Practice of Phenomenology in Educational Research. *Educational Philosophy and Theory*, *55*(7), 822–834. https://doi.org/10.1080/00131857.2022.2138745

Sutiana, D., & Nugraha, M. S. (2025). Integration of Islamic Values and Science in Islamic Primary Schools: A Philosophy of Science Approach. *Journal of Elementary Education Research and Practice*, *1*(1), 21–34. https://doi.org/10.70376/bv7bqx53

Tambak, S., Ahmad, M. Y., Sukenti, D., & Siregar, E. (2022). Faith, Identity Processes and Science-Based Project Learning Methods for Madrasah Teachers. *Al-Ishlah: Jurnal Pendidikan*, *14*(1), 203–216. https://doi.org/10.35445/alishlah.v14i1.1184

Tolman, E. R., Ferguson, D. G., Hubble, G., Kaloi, M., Niu, M., & Jensen, J. L. (2021). Barriers to Teaching Evolution in Higher Education. *Evolution: Education and Outreach*, *14*(12), 1–16. https://doi.org/10.1186/s12052-021-00151-1