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Analysis of Educational Philosophy on Research and Technology Development at *Pesantren*: George R. Knight's Perspective

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ABSTRACT

The development of research-based science and technology presents challenges for *pesantren* in integrating religious and scientific knowledge in a coherent manner. Such integration requires not only curricular adaptation but alse a clear educational philosophy as a foundation for guiding educational practice. This study aims to: (1) examine the construction of educational philosophy, including its metaphysical, epistemological, and axiological dimensions in the integrative development of science-technology research; and (2) analyze the educational goals and institutional governance that support this development at MBS Al-Amin Bojonegoro. This qualitative case study employed document analysis and semi-structured interviews with key institutional actors. Peer debriefing was conducted to strengthen the credibility and validity of the data. Data were analyzed through five stages: data collection, coding, categorization, interpretation, synthesis and reporting using George R. Knight framework as an analytical lens.. The findings show that the development of science and technology research is grounded in two main paradigms, namely *Nushusisasi* Sains (Scripturalization of Science) and Saintifikasi *Nushush* (Scientification of Scripture). These paradigms position knowledge as originating from Allah Swt. and emphasize its ethical orientation toward human well-being. The integration of religion and science-technology is further reflected in its institutional governance, including curriculum structure, teacher development, and research-based learning process. This study contributes by providing a structured philosophical analysis of science -religion integration using George R. Knight's framework and by showing how philosophical assumptions shape educational governance and research development in *pesantren*.

Keywords: Educational Philosophy; Science and Technology; *Pesantren*; George R. Knight

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1. INTRODUCTION

The Scientific Revolution, with science and technology as the key drivers of industry and economic progress, has shaped the modern world since the nineteenth century (Akdogan, 2008). As a result, funding for science and technology research has increased significantly (Huda et al., 2020), research collaboration has involved many institutions and stakeholders (Pegkas et al., 2019), patents and technology exports have become primary national priorities (Agezew, 2024). However, Islamic countries remain behind in the quality of education, research publications, patents, scientific documents, and research funding in science and technology (Azra, 2017; Haq &

Tanveer, 2020). In general, Islamic countries lag behind in science and technology education and in the publication of scientific research.

In majority-Muslim countries, based on data analysis from PISA (Programme for International Student Assessment), less than one percent of students demonstrate high literacy skills, and most students show low literacy levels (Yusuf, 2020). PISA results also indicate that Muslim-majority countries are grouped in Cluster 2, with scores below the international average (Pratama & Husnayaini, 2022). In the 2019 TIMSS (Trends in International Mathematics and Science Study) assessment for eighth-grade students, Muslim-majority countries obtained an average Mathematics score of 439 and a Science score of 449. These scores are significantly lower than those of Christian-majority countries, which reached an average of 495 out of 500 (Hornung et al., 2023). In addition, student performance in mathematics, science, and reading based on TIMSS and PISA data shows a declining trend in educational quality among OIC (Organisation of Islamic Cooperation) member countries (COMCEC Coordination Office, 2018).

The backwardness of Muslims in science and technology is deeply concerning because Islamic civilization once experienced a period of scientific achievement (Badrun et al., 2024). Moreover, some Muslims limit themselves to religious knowledge and affect negative attitudes toward science (Azra, 2017). This condition has created a phenomenon described as a "catching-up syndrome" in response to modern scientific and technological achievements (Iqbal, 2018). Education that integrates faith and science in a comprehensive manner is considered a strategic approach to overcoming this gap while reducing the negative effects of science and technology (Ningsih et al., 2022).

The realities of the modern world present challenges for Islamic education. Islamic institutions must adapt to and accept modern science and technology in an integrative and non-dichotomous manner. This approach aims to prepare students with holistic competencies that are relevant to contemporary needs (Adiyono et al., 2024). Efforts to incorporate contemporary knowledge, scientific research, and technology-based learning have been undertaken to advance Islamic education (Putri et al., 2025). One approach is the implementation of curricula that integrate religious education with science and technology in *pesantren*. This integration can enrich learning experiences and strengthen adaptability to the demands of modern education (Syaharuddin et al., 2024). It also affirms that the integration of religious education with science and technology can support scientific revitalization in the Muslim world in addressing the challenges of the twenty-first century (Aksan et al., 2023).

Pesantren, which traditionally focused on religious education, have modernized their educational systems in response to contemporary developments (Fauzi, 2012). This modernization includes the establishment of formal schools and the inclusion of non-religious subjects within *pesantren* institutions (Azra et al., 2007; Isbah, 2020). The adoption of modern systems and curricula has positioned *pesantren* as potential models for integrating religious knowledge with science (Kurniawan, 2018). However, this process is not without difficulty. *Pesantren* are often considered unable to produce graduates with strong scientific competence (Fitriyah et al., 2020). The integration of science and technology also requires strategic management adjustments. These adjustments include integrative curriculum development, institutional governance, human resource management, infrastructure, financial management, and graduate outcomes (Zainal et al., 2022).

The acceptance and development of science and technology in *pesantren* arise from the view that science enhances understanding of the universe as God's creation from a religious perspective (Khoirudin et al., 2022). This shows that educational theory and practices are closely related to

the paradigm or philosophical perspectives that are believed in. According to George R. Knight, educational philosophy applies philosophical reflection on the nature of reality (metaphysics), the nature of knowledge (epistemology), and the nature of values (axiology) as the foundation of educational practice. Differences in educational philosophy lead to differences in educational practice among institutions (Knight, 2007). Based on George R. Knight, clarity on educational philosophy is the basis for educational theory and practice (Khoirudin & Aulassyahied, 2023). Philosophical differences within educational institution influence educational goals, thus impacting educational practices including social function, views on students, views on teachers, curriculum, dan learning process (Knight, 2010). The difference in educational paradigm, related to George R. Knight framework, for example religious-based education and secular-based education differ in carrying out educational goals (Chirwa & Mukuka, 2025).

The integrative education in *pesantren* often remains at the practical and curricular levels, but limited attention to its underlying philosophical foundation. In many cases, the integration process is not fully supported by a coherent framework that systematically related to metaphysical beliefs, epistemological assumption, and axiological values. As a result, the integrative education process risks becoming fragmented, potentially leading to inconsistencies between educational goals. Furthermore, existing studies on the integration of religion and science in *pesantren* to emphasize curriculum models and pedagogical strategies, while relatively few examine how educational philosophy shapes and direct educational process within institution. This gap indicates the need for a more in-depth philosophical analysis to understand how foundational beliefs influence the direction integrative education in *pesantren*. In response to this gap, this study aims to analyze educational philosophy as the foundation for the development of science and technology research in *pesantren* using George R. Knight's theory of educational philosophy as an analytical lens. Specifically, this study seeks to understand: (1) educational philosophy in terms of metaphysical, epistemological, and axiological perspectives in the development of science and technology research in *pesantren*; and (2) the educational goals and governance of *pesantren* in developing science and technology research based on the guiding educational philosophy. The findings are expected to provide insight into a model of educational philosophy as the foundation of Islamic educational practice in *pesantren* in responding to contemporary needs.

2. METHODS

A qualitative approach was selected to understand the phenomenon of educational philosophy in the development of science and technology research at Muhammadiyah Boarding School (MBS) Al-Amin Bojonegoro (Creswell, 2013; Miles et al., 2014). MBS Al-Amin Bojonegoro was selected as a strategic case study due to its institutional position was designated by the Central Executive Board of Muhammadiyah as a pilot project of the Systemic Muhammadiyah *Pesantren* (PMS), which explicitly promotes integration of Islamic values, scientific knowledge, and technological development. MBS Al-Amin recognized as a modern *pesantren* with strong institutional management in integrating religious knowledge with research, science, and technology (Muhammadiyah, 2025). MBS Al-Amin has formally articulated its educational process based on educational paradigm in its institutional development plan.

In the *Pesantren* Master Development Plan document (*Rencana Induk Pengembangan Pesantren*), it is stated that a research and technology-based educational paradigm was adopted as a strategic direction for institutional development. This paradigm integrates Islamic values, scientific knowledge, and technological innovation in response to contemporary developments.

Therefore, a case study design was chosen to obtain an in-depth understanding of the research-based science and technology educational philosophy at MBS Al-Amin Bojonegoro (Yin, 2016). This makes MBS Al-Amin a critical case for examining how educational philosophy or paradigm is translated into practice and development, particularly in the context of science and technology. Studying MBS Al-Amin not only of its conceptual strengths but also the potential tensions and limitations in implementing research-based science and technology paradigm in *pesantren*.

Research informants were selected using purposive sampling. This technique involves selecting individuals based on specific criteria, competence, and knowledge relevant to the research topic (Oranga & Matere, 2023). Two informants participated in this study: (1) a member of the *Pesantren* Supervisory Board (BPP), specifically in the Education Division; and (2) the *Mudir* (Director) of MBS Al-Amin Bojonegoro. These informants were considered capable of providing relevant information based on their structural and functional responsibilities within the institution. Although the number of informants is limited, they were selected due to their strategic roles and positions in institutional decision-making and development plan. Their roles and positional authority could present depth of insight. This study employs George R. Knight's theory of educational philosophy as its conceptual framework and analytical lens. According to Knight, educational practice within an institution is grounded in fundamental philosophical beliefs related to metaphysics, epistemology, and axiology, as shown in Figure 1.

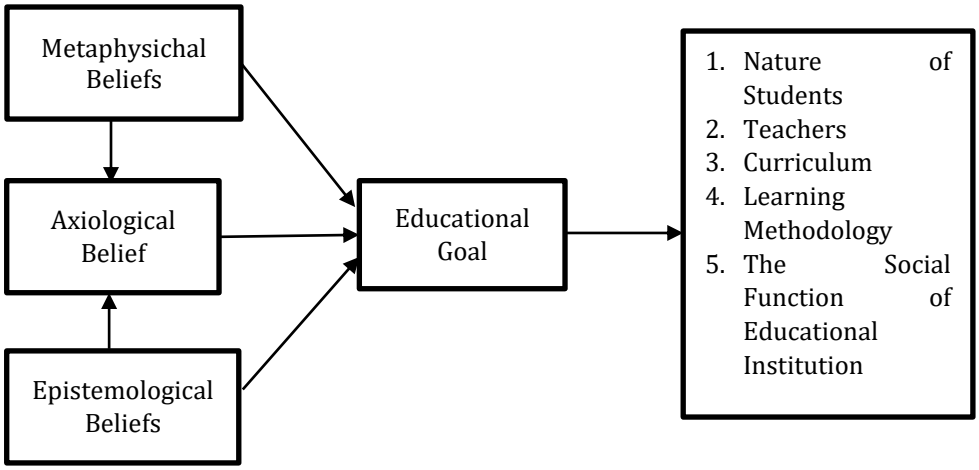


Figure 1. George R. Knight's Concept of Educational Philosophy (Knight, 2007)

Documentation and interviews were used as data collection techniques. Documentary data were obtained from two main documents: (1) the *Pesantren* Master Development Plan or *Rencana Induk Pengembangan Pesantren* (RIPP) 2025–2050; and (2) the Grand Paradigm of Muhammadiyah Pesantren: A Projection for the Rebirth of Progressive Islamic Civilization or *Grand Paradigma: Proyeksi Kebangkitan Peradaban Islam Berkemajuan*. The interview method involved in-depth interviews using semi-structured and open-ended questions. This approach was chosen to obtain detailed responses and to allow further elaboration from the informants. Peers debriefing applied to strengthen research credibility. Peers engaged in discussions about the research process and findings to provide an external perspective to challenge researchers' interpretations and conclusions. Documentation and interviews were conducted based on research indicators derived from George R. Knight's theory of educational philosophy, as presented in Table 1.

Tabel 1. Research Indicator

No.	Topic	Indicator
1.	Educational Goals and Governance	Students, Teachers, Curriculum, Learning Methodology, Social Function of Educational Institutions
2.	Metaphysics	The Nature of God, the Universe, Humans, and Reality
3.	Epistemology	The Nature of Knowledge and Sources of Knowledge
4.	Axiology	Ethics of Good or Bad, and Aesthetics

Data obtained from documents and interviews were transcribed before analysis. Transcription was necessary to organize and select data relevant to the research topic and objectives so that it could be presented, discussed, and analyzed systematically (Busetto et al., 2020). Data analysis in qualitative research proceeds in a linear and iterative manner from planning to reporting (Moser & Korstjens, 2018). The analysis followed five stages: data collection, coding, data organization, interpretation of meaning, and reporting of findings (Yin, 2016).

The first stage of data analysis i.e. data collection through interviews and document studies. The second stage involves coding the data obtained from interviews and documents according to several research indicators, i.e. metaphysics, epistemology, axiology, objectives, and institutional governance. This stage is crucial for selecting data relevant to the research topic. The third stage involves organizing the data into research indicators and then grouping them into sub-themes to facilitate understanding of the research findings. The fourth stage involves interpreting the data. The data interpretation conduct based on George R. Knight's framework. The results or findings of the data obtained are interpreted to explain key themes in the philosophy of education as the basis for implementing the practice of integrating religion with science and technology research in *pesantren*. The final stage involves reporting the results and presenting the study conclusions as reference for further research.

3. RESULT AND DISCUSSION

Educational philosophy in the Islamic perspective is essential because it clarifies the core of educational theory and practice. It serves as a reference for holistic learning that responds to social realities (Hassan et al., 2010). Educational philosophy also provides the foundation for developing knowledge within an Islamic paradigm to address contemporary challenges (Zaelani, 2015). Philosophical understanding on epistemology, especially in relation to educational processes, is crucial in the context of rapid digital technological development (Salimova et al., 2025). At the same time, advances in science, engineering, and technology require stronger guidance in norms and ethics at the axiological level. Ethical standards are necessary to balance the speed of scientific progress and research activity (Zhou et al., 2025).

Muhammadiyah Boarding School (MBS) Al-Amin is a pioneer of the *Pesantren Muhammadiyah Sistemik* (PMS) model. PMS is a Muhammadiyah *pesantren* model designed to produce graduates who understand Islamic textual sources (*nash*) and mastery in science and technology (Ibrahim, 2023). This goal aligns with Muhammadiyah's educational vision, which seeks to produce graduates who believe in Allah SWT. and are competent in science and technology. So, they are expected to possess faith, spiritual awareness, and scientific expertise as foundations for well-being, prosperity, and obedience to Allah SWT (PP Muhammadiyah, 2010). Muhammadiyah views science and technology as key drivers of civilizational progress and human development. Therefore, integrating science and technology with Islam forms a strong and comprehensive foundation of Muhammadiyah's educational philosophy (Fuady, 2025). The integration of science

and religion in schools is also considered important for shaping morally upright students who are able to think critically about both scientific and religious claims (Riwanda et al., 2025).

3.1 The Philosophy of Science and Technology Research Development at MBS Al-Amin Bojonegoro

The development of science and technology research at MBS Al-Amin Bojonegoro is grounded in two main paradigms: *Nushusisasi Sains* (Scripturalization of Science) and *Saintifikasi Nushush* (Scientification of Scripture) (Ibrahim, 2023). The paradigm of *Nushusisasi Sains* begins from the view that Qur'anic texts (*nash*) provide the theological and teleological foundations of science. The theological basis affirms that science related to the signs of the greatness of Allah SWT (Ibrahim, 2023). Table 2 explains the basic values of the theological basis of *Nushusisasi Sains* at (Scripturalization of Science) MBS Al-Amin.

Table 2. Theological Basis of the Scripturalization of Science (*Nushusisasi* Sains)

No.	Core Values	Aspect
1.	The object of science is the phenomena of the universe, which are part of the signs (*ayat*) of Allah Swt.;	Metaphysics
	Science demonstrates the power and oneness (tawhid) of Allah Swt.;	
	The ultimate source of science is Allah Swt.;	Epistemology
	Science is acquired in accordance with divine provisions through revelation (*nash*), reason, empirical evidence, and intuition (*dlamir*);	
	Science is obtained through serious human effort;	
	Science is not value-neutral; its use must follow divine guidance from Allah Swt.;	Axiology
	Science must not lead humans to arrogance;	
	Science is a means for believers to attain honor	

Sumber: Processed by the researcher from the Grand Paradigm of Muhammadiyah *Pesantren* (Ibrahim, 2023)

The teleological basis within this paradigm emphasizes that science must bring benefit (*maslahah*) to human life in this world and the hereafter (Ibrahim, 2023). Science is a human effort to understand the universe in order to achieve progress, happiness, and prosperity. Table 3 below shows the main values of the teleological basis in the development of science and technology at MBS Al-Amin Bojonegoro.

Table 3. Teleological Basis of the Scripturalization of Science (*Nushusisasi* Sains)

No	Core Values
1	Science must not be used to damage the environment or harm humanity
2	Science must not be used for injustice against oneself or others
3	Science must be taught and shared
4	Science functions to facilitate human life
5	Science explains probability rather than absolute causality
6	Science provides explanation, control, and prediction of phenomena
7	Science is cumulative, interconnected, self-corrective, and not final

Sumber: Processed by the researcher from the Grand Paradigm of Muhammadiyah *Pesantren* (Ibrahim, 2023)

These theological and teleological foundations show three key points. First, at the metaphysical level, the object of science is understood as a unified reality. The Qur'anic text and

empirical reality do not contradict each other because both originate from the same source and point-out to the existence and power of Allah SWT (Badrun et al., 2023). Thus, the development of science and technology does not exclude metaphysics, as often found in modern scientific thought. God remains acknowledged as the Creator of the universe.

Second, at the epistemological level, revelation and empirical reality stand together as sources of knowledge. Both are needed to achieve truth and comprehensive understanding (Lubis et al., 2024). Third, at the axiological level, the purpose of knowledge is to bring human happiness in this world and the hereafter (Zamroni & Fajri, 2024). This happiness includes non-physical and physical dimensions without neglecting spirituality and religiosity (Rahman, 2024). Knowledge must be used for good purposes, because humans are accountable for how they use it in the hereafter (Anwar, 2021).

The second paradigm is *Saintifikasi Nushush*. This concept means that science functions as a tool to explain, elaborate, correct, and compare scientific indications found in the Qur'an and Hadith (Ibrahim, 2023). The Qur'an, as a scriptural source (*nash*), does not only guide Islamic sciences. It also contains many references to natural and human phenomena. It is reported that around 750 verses relate to scientific indications, 43 verses explicitly encourage reflection, and approximately 11,000 verses—around 20 percent—refer to natural phenomena and the pursuit of knowledge (Purwanto, 2008; Yussof & Danehsgar, 2011). These references show that Islam encourages scientific inquiry to gain accurate and comprehensive knowledge of the universe (Hasibuan et al., 2024). Scientific indications in the scriptural texts (*nushush*) should therefore inspire the search for knowledge.

A key concept in both paradigms is that scriptural texts (*nushush*) contain theological messages related to knowledge. Knowledge is closely connected to awareness of the presence of Allah SWT (Ibrahim, 2023). In this view, the Qur'an serves as a theological foundation and grand theory of knowledge. Knowledge, in this paradigm, originates from God and is also developed through human reasoning (Abdullah, 2012). So, this paradigm affirms that knowledge is *tauhidic*, i.e. Allah SWT is the ultimate source of true knowledge, including scientific reality (Kartanegara, 2005; Othman, 2014). The Qur'an calls for the integration of religious sciences and natural sciences, since it contains references to religious knowledge, natural sciences, humanities, history, and moral philosophy (Abdullah, 2012).

Historically, scriptural texts (*nash*) inspire to Islamic sciences centered on the Qur'an and Hadith. These sources became the foundation for systematic methodologies within various religious disciplines (*ulum al-din*) (Abdullah, 2012; Ibrahim, 2023). These disciplines (*ulum al-din*) later supported the growth of knowledge in the Islamic world, especially during periods of scientific advancement that relied on reason and logic as instruments of inquiry (Abdullah, 2017). This history shows that Islamic sciences (*ulum al-din*) provided a strong foundation for responding to scientific development. Islam does not separate religious sciences from natural sciences, both are integrated within a theo-anthropocentric framework (Abdullah, 2012; Ibrahim, 2023).

Education is a conscious human effort to achieve educational goals based on specific philosophical beliefs and worldviews. For this reason, educational philosophy is closely connected to educational practice (Knight, 2007). In essence, educational philosophy applies the main content of philosophy—metaphysics (the nature of reality), epistemology (the nature of truth), and axiology (the formation of values)—to the field of education (Knight, 2007). The main elements of educational philosophy—metaphysics, epistemology, and axiology—serve as the basis for shaping educational processes and institutional orientation.

From George R. Knight's perspective, such a framework reflects an attempt to align metaphysical beliefs, epistemological assumptions, and axiological values within an educational system. The belief that knowledge ultimately originates from Allah SWT (metaphysics) is connected with the recognition of multiple sources of knowledge, including revelation, reason, and empirical observation (epistemology), and is directed toward ethical purposes and human well-being (axiology). This alignment suggests a relatively coherent philosophical foundation for the development of science and technology research at MBS Al-Amin. However, the integration of these dimensions is not without challenges. The positioning of revelation and empirical inquiry as interconnected sources of knowledge requires careful interpretation, particularly in situations where scientific explanations may differ from literal understandings of scriptural texts (Alexander et al., 2025; Riwanda et al., 2025; Stahi-Hitin & Yarden, 2022). This indicates that the integration of science and religion is not a fixed condition, but an ongoing process that involves interpretation, dialogue, and adjustment in educational practice. Nevertheless, the findings of this study support the view that the educational philosophy of integration of religion and science in Islamic education is important for developing holistic understanding (Hassan et al., 2010).

3.2 Educational Goals and Governance of Science and Technology Research Development at MBS Al-Amin Bojonegoro

The world is changing rapidly, and this transformation presents new challenges for Islamic education. Advances in transportation and communication create global interaction and multicultural societies. Professional research in science and technology also requires openness and interdisciplinary collaboration. MBS Al-Amin Bojonegoro recognizes these realities as challenges in developing an excellent *pesantren* model based on the integration of Islamic values, scientific knowledge, and technological innovation (MBS Al-Amin, 2025).

The integrative *pesantren* model aims to produce students who are strong in religious understanding and responsive to scientific and technological progress (Zulfikar et al., 2023). The *pesantren* is expected to function as a center of Islamic learning and a center of innovation. It seeks to produce students who uphold religious values, mastery in science and technology, think critically, act creatively, and contribute to Islamic civilization and global development (MBS Al-Amin, 2025; Wasehudin et al., 2023). This model demonstrates that religious and scientific education can develop together within a *pesantren* environment.

The integrative and holistic paradigm at MBS Al-Amin expands the traditional function of *pesantren* as institutions for religious learning and preparation of future scholars (*tafaqquh fiddin*). The integration of knowledge aims to produce scholars, intellectuals, and leaders who are competent in religious sciences and scientific research. They are expected to be progressive, collaborative, morally upright, knowledgeable in religion, memorizers of the Qur'an, and proficient in Arabic and English (MBS Al-Amin, 2025). Despite its orientation toward scientific research, MBS Al-Amin maintains its identity as an Islamic educational institution committed to preparing religious scholars (*tafaqquh fiddiin*) (Fuady, 2020; Wati & Suriani, 2019).

This integrative model responds to societal demand to the ideal educational institution for their children. Many parents choose *pesantren* education so their children gain strong religious understanding while also developing academic expertise (intellectual or scientist) (MBS Al-Amin, 2025). Historically, *pesantren* institutions have adapted to social change (Kurniawati & Anshory, 2024). Society places trust in *pesantren*—as Islamic education institution—to meet educational needs aligned with socio-economic and technological developments (Alid et al., 2022; Wati & Suriani, 2019).

MBS Al-Amin applies an open admission policy. Students with low, moderate, or high academic ability are all accepted. The institution emphasizes quality learning processes and good management as key conditions for developing students' potential and achieving high graduate standards (Malisi et al., 2024; Mikail, 2022). Institutional management includes academic staff, curriculum, facilities, administration, and learning processes as a key parts to achieve the goal in educational process for creating an excellent outcome (Zainal et al., 2022). MBS Al-Amin sees an effective management enables the *pesantren* to use its resources efficiently to reach its educational goals (MBS Al-Amin, 2025).

The integration of the Qur'an and science curricula serves as the foundation of research-and technology-based learning at MBS Al-Amin. This integration curricula appears in intellectual traditions, scientific culture, and academic attitudes. The curriculum promotes contextual, dialogical, and democratic learning to stimulate students engage with physical and social environments, construct knowledge and develop confidence. The learning experiences in MBS Al-Amin promote student to gain experience interacting with diverse communities, which fosters tolerance and pluralistic attitudes (MBS Al-Amin, 2025).

The curriculum structure combines the national curriculum, the LP2M curriculum (*Lembaga Pengembangan Pesantren Muhammadiyah*), the boarding curriculum, and a special curriculum known as the RELIGI Project, which integrates religion, science, and foreign languages (MBS Al-Amin, 2025). The national, LP2M, and boarding curricula are part of the formal daily schedule. The RELIGI Project is implemented weekly as a co-curricular program. The RELIGI Project is managed by a Special Team. Subject teachers whose disciplines are related to research themes must participate. The project operates across six levels with different targets each semester for junior and senior high school students. At the junior level, the focus is on introducing research and building interest. At the senior level, students are expected to produce research outputs suitable for publication. Projects are conducted in groups under teacher supervision. Each group completes two research projects over a three-month period. Integrative curriculum models such as this require structured stages and practical application (Muttaqin, 2018). Table 4 explains the curriculum structure at MBS Al-Amin.

Table 4. The Curriculum Structure at MBS Al-Amin.

No.	Level	National Curriculum	LP2M Curriculum	*Pesantren* Curriculum	Special Curriculum
1.	SMP	Islamic Religious Education (PAI); Indonesian; Pancasila Education; Mathematics; Natural Sciences (IPA); Social Sciences (IPS); English; Physical Education (PJOK); Informatics; Crafts; Local Content in Javanese; ISMUBA; Quranic Recitation.	The Qur'an; Hadith; Fiqh; Morals; Creed; Arabic; Prophetic Sirah.	*Imla'; Nahwu; Shorof; Insya'.*	Integration of Religion and Science (Quran Memorization, Quran Recitation, Advanced Quran Memorization, Quran Interpretation, Quran Study and Analysis, Quran Memorization and Understanding); Arabic and English; *Muhadharah*.
2.	SMA	Religious Education and Character Education; Pancasila and Civic Education; Indonesian, Mathematics, Indonesian History, English; Arts and	The Qur'an; Hadith; Fiqh; Morals; Creed; Arabic; Prophetic Sirah.	*Imla'; Nahwu; Shorof; Insya'.*	Integration of Religion and Science (Quran and Science Fundamentals, Deep Understanding of the Qur'an, Integration of Religion and Science,

No.	Level	National Curriculum	LP2M Curriculum	*Pesantren* Curriculum	Special Curriculum
		Culture, Physical Education, Crafts and Entrepreneurship; Specializations (Physics, Chemistry, Biology, Geography, Economics, Sociology); ISMUBA.			Quran and Science, Hadith Study and Analysis, Hadith Memorization and Understanding); Arabic and English; *Muhadharah*.

Source: Research Results from RIPP MBS Al-Amin (MBS Al-Amin, 2025)

Teaching at MBS Al-Amin uses contextual, dialogical, and democratic approaches based on research and technology. Students are positioned as active learners. They are trained to think critically, creatively, and innovatively. Learning activities involve practical engagement, cooperation, and problem solving (MBS Al-Amin, 2025). Research-based learning is the responsibility of all teachers. At the beginning of each academic year, teachers must prepare modules that integrate science and religion. Each module must connect subject content with relevant Qur'anic verses or Hadith. This approach ensures that scientific themes are linked with Islamic teachings (Irham, 2025). The modules are reviewed by the MBS Al-Amin Expert Council at the start of the academic year. Teachers receive support from the Special Team responsible for the RELIGI Project. Modules are evaluated every three months.Given the central role of teachers, MBS Al-Amin applies careful recruitment standards. Teachers must demonstrate academic, pedagogical, professional, and social competence in line with the four curriculum categories. MBS Al-Amin conducts training to improve the quality of teachers in the preparation and implementation of learning based on the integration of science and technology research every year. The regular training programs to strengthen teachers' capacity in implementing integrative learning need to do regularly to strengthen teachers' qualities (Ma'arif et al., 2023). Moreover, clear guidelines are necessary, especially when scientific topics may appear to differ from religious interpretations (Riwanda et al., 2025), such as discussions on evolution (Alexander et al., 2025; Stahi-Hitin & Yarden, 2022). Teachers are encouraged to shift from teacher-centered methods to argumentation-based learning that fosters critical engagement (Alanazi, 2026).

From George R. Knight's perspective, these governance elements—curriculum, teachers, learning processes, and institutional function—represent the practical expression of underlying philosophical beliefs. Educational goals are not independent from metaphysical, epistemological, and axiological assumptions, but are shaped by them. In the case of MBS Al-Amin, the emphasis on integrating religion and science reflects a consistent effort to align philosophical foundations with institutional practices. However, the findings also suggest that implementing such an integrative model is a complex process. The need to balance religious and scientific competencies, manage diverse student abilities, and ensure teacher readiness presents ongoing challenges. This indicates that philosophical coherence at the conceptual level does not automatically lead to uniform implementation in practice. Instead, it requires continuous adjustment, evaluation, and institutional capacity building.

In relation to broader discussions, this finding supports the argument that the integration of religion and science in Islamic education involves not only curriculum design, but also governance and management aspects (Zainal et al., 2022). Despite its integrative vision, the implementation of research-based learning in pesantren faces structural challenges. These include variability in teacher capacity, potential overload in curriculum integration, and the difficulty of maintaining balance between religious and scientific competencies. Such challenges indicate that philosophical

integration does not automatically guarantee pedagogical effectiveness. Interview data indicate that institutional actors emphasize alignment between Qur'anic values and scientific inquiry; however, they also acknowledge the need for continuous teacher training to effectively implement this integration (Mansour, 2008).

4. CONCLUSION

This study presents two main findings. *First*, the development of science and technology research at MBS Al-Amin Bojonegoro is grounded in two main paradigms namely *Nushusisasi Sains* (Scripturalization of Science) and *Saintifikasi Nushush* (Scientification of Scripture). These paradigms provide theological and teleological foundations that shape how knowledge is understood dan applied. At the metaphysical level, reality is viewed as unified manifestation of the signs (*ayat*) af Allah SWT. At the epistemological level, knowledge is derived from both revelation and human effort through reason and empirical inquiry. At the axiological level, science is not value-neutral but must be directed toward human well-being in this world and hereafter.. *Second*, at the institutional level, this philosophical foundation is translated into educational goals and governance of *pesantren*, including student input, teacher development, curriculum structure, and learning process oriented toward integration of science and technology research. This indicates that philosophical beliefs are not only abstract principles but also shape concrete educational practices. At the same time, the finding suggests that aligning philosophical ideals with institutional practices requires continuous effort, particularly in maintaining coherence between religious values and scientific approaches. . This study contributes by showing how an educational philosophy framework, particularly from George R. Knight's perspective, can be used to understand the integration of religion and science in more structured way. It also highlights that the integration of science and technology in *pesantren* is not merely a curricular issue, but fundamentally a philosophical one that influences the direction of knowledge development and educational practice. Based on these findings, future studies examines: (1) the development of curriculum models for integrating religion and science-technology research in *pesantren*; (2) the implementation of integrative learning at the classroom; and (3) teachers' perspective of integrative learning that combines religion and science-technology research. These aspects are important to better understand how this integrative model operates in practice.

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