ISSUES AND SOLUTIONS FOR INCORPORATING ISLAMIC EDUCATION AND SCIENCE INTO SCHOOLS AND HIGHER EDUCATION INSTITUTIONS

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Abstract

The debate surrounding the integration of Islamic Religious Education (IRE) and science in Indonesia's public schools and universities remains ongoing. Often, these two domains follow separate paths, disregarding potential intersections. This study aims to identify the challenges and propose solutions for integrating IRE and science in these institutions. A qualitative non-interactive approach was employed, utilizing content analysis to examine various issues presented in books, documents, journals, and other articles. The findings highlight several barriers to integration, including the lack of relevant integration frameworks, the absence of regulatory guidelines, limited human resources, the separation of religious and general education hours, and the inadequacy of comprehensive teaching materials. Based on these findings, the study offers several solutions: (1) formulating a curriculum that is contextually relevant to Indonesia; (2) establishing integration regulations or revising the National Education System Law; (3) fostering collaboration between public universities (PTU) and Islamic religious universities (PTAI); (4) preparing human resources in the form of creative and specialized educators; (5) reconstructing relevant teaching materials; and (6) providing adequate facilities and infrastructure.
Keywords: Integration; Islamic Religious Education; Problems; Science

Abstrak

Perdebatan mengenai integrasi Pendidikan Agama Islam (PAI) dan ilmu pengetahuan di sekolah dan perguruan tinggi negeri di Indonesia masih berlangsung hingga saat ini. Kedua bidang ini seringkali berjalan terpisah, tanpa saling memperhatikan keberadaannya. Penelitian ini bertujuan untuk mengidentifikasi kendala-kendala dan solusi terhadap integrasi PAI dan ilmu pengetahuan di institusi pendidikan tersebut. Penelitian ini menggunakan pendekatan kualitatif non-interaktif, dengan analisis konten untuk mengkaji berbagai isu yang muncul dalam buku, dokumen, jurnal, dan artikel lainnya. Hasil penelitian mengungkapkan beberapa hambatan dalam integrasi PAI dan ilmu pengetahuan, seperti kurangnya formulasi integrasi yang relevan, tidak adanya regulasi integrasi, terbatasnya sumber daya manusia, pemisahan jam materi agama dan umum, serta kurangnya materi ajar yang komprehensif. Oleh karena itu, penelitian ini menawarkan beberapa solusi: (1) merumuskan kurikulum integrasi yang relevan dengan konteks Indonesia; (2) menetapkan regulasi atau merevisi Undang-Undang Sistem Pendidikan Nasional; (3) mendorong kolaborasi antara Perguruan Tinggi Umum (PTU) dan Perguruan Tinggi Agama Islam (PTAI); (4) mempersiapkan sumber daya manusia berupa guru yang kreatif dan terampil; (5)

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merekonstruksi materi ajar yang relevan; dan (6) menyediakan fasilitas dan infrastruktur yang memadai.
Kata kunci : Integrasi; Problem; Pendidikan Agama Islam; Sains

INTRODUCTION

The existence of dualism in Indonesian education has a negative impact on the educational community. These negative effects include (1) less anti-religiosity in the Islamic theological perspective taught in religious schools; (2) the separation of religious schools into separate groups; (3) most students entering religious schools and Islamic higher education institutions have lower qualifications, making graduates seem less important; and (4) religious and Islamic activities at IAIN and Islamic higher education institutions are not as visible and recognized as they are at public universities (Al-Attas, 1994, p. 41).The difference between the two is that religious education tends to focus on normative disciplines and is far removed from worldly needs, whereas national education emphasizes reason. Therefore, it is extremely challenging to integrate the two in order to develop a comprehensive concept (Muliadi, 2012).

The debate over educational dualism has become a hot topic among modern-day Muslim intellectuals worldwide. Muslim scholars have pursued various theories and efforts to integrate the two systems with Islamic education. Notable figures include: Fazlur Rahman (1919–1988), who articulated his thoughts in his work Islam & Modernity; Ismail Raji Al-Faruqi (1921–1986) with his work Islamization of Knowledge: General Principles and Workplan; Syed Naquib Al-Attas, who discussed his ideas in works such as Islam and Secularism; Seyyed Hossein Nasr from Iran with his work Science and Civilization in Islam; Nidhal Guessoum with his magnum opus Islam's Quantum Question: Reconciling Muslim Tradition and Modern Science; M. Amin Abdullah with his monumental work Islamic Studies at Higher Education Institutions: An Integrative-Interconnective Approach; and many others. This suggests that the discourse warrants serious consideration and implementation within the educational system of the Islamic world, including Indonesia.

M. Amin Abdullah argues that the separation of secular and religious disciplines in both public universities and religious higher education institutions leads to a crisis of relevance (inability to solve various problems), stagnation (trapped without seeking alternative solutions for human welfare), and vested interests. Thus, the emergence of a rapprochement movement (mutual acceptance of each other's conditions) between the two fields of knowledge is inevitable. This movement, also known as the reintegration of scientific epistemology, is essential and urgently needed to anticipate the rapid and unpredictable complexities of development from the 21st century to the 30th century. It is a shared humanitarian responsibility to manage Indonesia's natural and human resources, ensuring quality leadership on Earth (Abdullah, 2006, p. 97).

A common challenge is that the noble goal of integrating religious education and science often faces obstacles in its implementation within educational institutions. This occurs partly due to the lack of a concrete model that can serve as a role model or reference for such integration. Additionally, ongoing debates regarding the concept of knowledge integration further hinder the realization of this goal (Farhan & Solihah, 2021). The integration of secular and religious sciences in Indonesian schools and higher education institutions, both public and Islamic, remains a dilemma to this day. Each school and higher education institution formulates its curriculum according to its vision and mission and tends to be unable to integrate secular and religious sciences into a comprehensive whole. This paper will discuss the challenges and solutions for the integration of Islamic religious education and science in schools and public higher education institutions.

METHOD

This study employs non-interactive qualitative research with content analysis as its research method. Non-interactive qualitative research is a research method that does not involve direct interaction between the researcher and participants, focusing instead on analyzing existing data. This approach is often used to gain an in-depth understanding of a phenomenon through the study of materials such as documents, archives, literature, or media. In this type of research, the data collected is textual and analyzed to identify themes, patterns, or specific information relevant to the research topic. One commonly used method in this approach is content analysis. Content analysis involves the researcher identifying a set of materials to be analyzed (such as school textbooks, television programs, newspaper articles, etc.) and then establishing a system to record specific aspects of their content(Khaldi, 2017). In this case, the researcher collects and analyzes various issues that develop in books, documents, journals, or other articles that discuss the challenges and solutions for the integration of Islamic religious education and science in schools and public higher education institutions.

RESULT AND DISCUSSION

Definition of Knowledge Integration

Linguistically, integration in the Indonesian Dictionary means unification into a whole or complete unity(2008, p. 559). In the English Dictionary, the word integration comes from the word integrate, which means to combine two or more things to make something more effective(Tim Penyusun, 2009, p. 499). As for knowledge integration itself, it is the process of unifying dichotomous sciences to create an integrated thinking model regarding the concept of knowledge. This learning model is a blend of two disciplines, namely secular and religious, based on the assumption that this knowledge

comes from the same source and cannot be dichotomized (Nurbaiti et al., 2020, p. 27). In other words, religion is seen as a complementary path to understanding the world(Walker, 2019).

Model of Knowledge Integration

Around the world, there are various perspectives on knowledge integration models. As explained by Nur Jamal, there are ten (10) models of knowledge integration, including: (a) The IFIAS (International Federation of Institutes of Advanced Study) Model, first introduced at a seminar on "Knowledge and Values" in September 1984 in Stockholm; (b) The Akademi Sains Islam Malaysia (ASASI) Model, based on the teachings of the holy book Al-Qur'an in May 1997; (c) The Islamic Worldview Model, proposed by Alparslan Acikgenc, a professor of philosophy at Fatih University, Istanbul, Turkey; (d) The Structure of Islamic Knowledge (SPI) Model, developed by Osman Bakar, a professor of the Philosophy of Science at the University of Malaya; (e) The Bucaillisme Model, introduced by Maurice Bucaille, which focuses on the relevance of scientific discoveries to Qur'anic verses; (f) The Classical Philosophy-Based Integration Model, developed by Seyyed Hossein Nasr; (g) The Sufism-Based Integration Model, introduced by Muhammad Naquib al-Attas; (h) The Fiqh-Based Integration Model, proposed by Ismail Raji al-Faruqi; (i) The Ijmali Group Model, introduced by Ziauddin Sardar; and (j) The Aligarh Group Model, pioneered by Zaki Kirmani, the leader of the Aligarh University group in India(Jamal, 2017).

M. Amin Abdullah proposed the theo-anthroposentric-integralistic spider web model, a well-known knowledge integration model at UIN in Indonesia, based on Kuntowijoyo's concept. The Qur'an and As-Sunnah, interpreted in a new (hermeneutic) way, serve as the foundational perspective (weltanschauung) for human religious views, seamlessly merging into a unified breath of scientific and religious knowledge. The second circle (layer 2) necessitates mastery of foundational sciences such as Kalam, Philosophy, Sufism, History, Fiqh, Tafsir, and Linguistics. M. Amin Abdullah criticizes the exclusive focus of PTAIs on circle 1 and layer 2. The third circle (layer 3) encompasses theoretical knowledge, including: mathematics, physics, hermeneutics, philology, biology, chemistry, ethics, phenomenology, psychology, philosophy, history, anthropology, sociology, and archaeology. The fourth circle (layer 4) consists of applied knowledge, including: religious pluralism, science and technology, economics, human rights, politics and civil society, cultural studies, gender issues, environmental issues, and international law(Abdullah, 2006, p. 106-109).

The Relationship Between Science and Religion

Islam views science and religion as an inseparable unity. Thomas Dixon narrates that during the Middle Ages, mathematics and astronomy were focal points of Islamic culture. For example, these sciences were useful for accurately calculating prayer times

and the direction of the Qibla in Mecca, as well as for other worldly applications. Between the 9th and 15th centuries, Muslim scholars serving in institutions like the House of Wisdom in Baghdad advanced medicine, ancient Greek optics, and developed astronomy and astrology. These scholars held the motto, "Whoever does not know astronomy and anatomy knows little about God." Their works became crucial sources for the revival of European learning from the Middle Ages onward(Dixon, 2008, p. 15-16). The Abbasid dynasty's earnest translation of Greek texts into Arabic in the 9th century closely linked this scholarly activity. Dimitri Gutas regards this as an extraordinary achievement for world civilization. He states: “It is as significant as, and part of the same narrative as, I would claim, the Athens of Pericles, the Italian Renaissance, or the scientific revolution of the sixteenth and seventeenth centuries, and deserves recognition and inclusion in our history”(Gutas, 1998, p. 8). Thanks to the genius of Muslim scholars who were able to "marry" science and religion, they have made remarkable contributions to human civilization, such as Al-Khwarizmi (780–850), Ibn Sina (980–1057), Ibn Bajjah (1085–1138), Ibn Tufail (1105–1185), Ibn Rushd (1126–1188), Ibn Khaldun (1322-1406), and others.

This is in stark contrast to the doctrine of the Catholic Church. In the early 17th century, Italian mathematician and natural philosopher Galileo Galilei (1564–1642) openly advocated for the theory of Earth's motion as described in Nicolaus Copernicus's book On the Revolutions of the Heavenly Spheres (1543). The Catholic Church persecuted, tried, and condemned him as a result. He spent the last nine years of his life under house arrest at his villa outside Florence(Numbers, 2009, p. 68). Galileo died in Arcetri in 1642, assisted and surrounded by his son Vincenzio, his students Vincenzio Viviani and Evangelista Torricelli(Finocchiaro, 2008, p. 16).

Barbour popularized the term “integration” within the contemporary Christian world. He stated that “integration” is one of four typologies of the relationship between science and religion. This theologian and physicist is considered a pioneer in the West's discourse on science and religion. His influence has spread through translations of his works, including in Indonesia(Bagir et al., 2005, p. 20-221). According to Ian Barbour, there are four models of the relationship between science and religion: conflict, independence, dialogue, and integration. In contrast, John F. Haught identifies four patterns: conflict, contrast, contact, and confirmation. These two perspectives generally appear similar. David O. Tolman, on the other hand, categorizes three schools of thought regarding science and religion: pro-science, anti-science, and moderate. He represents these schools with three figures: Steven Weinberg, Bryan Appleyard, and himself(Zulfis, 2019, p. 66-67).

A Brief Overview of the History of Islamic Religious Education in Indonesian Schools and Public Higher Education Institutions

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The Colonial Period saw the introduction of Islamic Religious Education in Schools

During the Dutch colonial period, education in Indonesia was classified into two periods: the VOC (Vereenigde Oostindische Compagnie) period and the Dutch East Indies (Nederlands-Indië) government period. In the first period, business principles were the main foundation of education in Indonesia. This implies that economic laws, with a focus on profit or loss, guided the evaluation of education. If anything obstructed this goal, they were prepared to combat it. One of the patent articles clearly states, "This body must trade in Indonesia and, if necessary, engage in war." It must also pay attention to Christianity by establishing schools"(Subhan, 2012, p. 45).

In 1607, the VOC established the first school in Ambon. The primary goal of founding this school was to eradicate the Portuguese's influence on Catholicism and replace it with Protestantism. The Dutch East Indies took over the VOC in 1617 and established schools widely across various regions(Rahim, 2001, p. 8).In the same year, the VOC also founded a school in Jakarta intending to create skilled labor for the VOC(Rofi, 2016, p. 16).

In 1882, the Dutch established the Priesterraden. They tasked this body with overseeing religious communities and Islamic education. Based on this institution's input, the Dutch government issued a regulation in 1905 requiring permission for individuals to teach or conduct religious studies. During this time, there was growing concern among the Dutch about the resurgence of indigenous movements. Conflicts between Russia and Japan also occurred during this period, leading to Russia's eventual defeat(Zuhairini et al., 2015, p. 149).

The Dutch issued a strict regulation in 1925, prohibiting any kyai from teaching religious knowledge, except for specific individuals. Social organizations involved in education, such as Muhammadiyah, the Syarikat Islam Party, Al-Irsyad, Nahdatul Watan, and others, likely motivated this regulation(Zuhairini et al., 2015, p. 149).

In 1932, the Dutch issued a regulation that could suppress and lead to the closure of madrasahs and schools that did not obtain permission or taught subjects disliked by the Dutch government, termed the Wilde School Ordonantie (Wild School Ordinance). The introduction of this regulation coincided with the emergence of nationalist-Islamic movements after the 1928 Youth Pledge. Additionally, Christian adherents in Indonesia often faced rejection from the populace. To prevent religious instruction from entering public schools, the Dutch introduced what they called religious neutrality. This meant that the government took a neutral stance, not favoring or leaning towards any particular religion, resulting in government schools excluding religious subjects from their curricula. The government did, however, maintain places of worship (Indische Staat Regeling, Articles 173–174)(Zuhairini et al., 2015, p.

150).However, in practice, this policy was not entirely neutral. The Dutch government was more inclined towards Christianity. Government classification led to the establishment of numerous Christian schools in various locations, which received regular subsidies. Animistic regions prohibited Islamization, but permitted Christianization. Moreover, the Dutch government tolerated insults against Islam, which was not allowed against Christianity(Noer, 1988, p. 333).

In the subsequent phase under the Japanese administration, the Japanese seemingly accommodated the interests of Indonesian Muslims as a political tool for World War II. To win the support of Indonesian Muslims, they implemented the following policies(Zuhairini et al., 2015, p. 151):

1. The Japanese took over and renamed the Office of Religious Affairs. Dutch Orientalists managed Kantoor Voor Islamistische Saken initially, but K.H. Hasyim Asy'ari from Jombang renamed it Kantor Sumubi.
2. Japanese officials visited and provided assistance to large Islamic boarding schools (pesantren).
3. The Japanese introduced religious teachings in public schools as part of character education.
4. The Japanese legalized the Hisbullah organization and allowed Islamic youth to receive basic military training. This group appointed K.H. Zainul Arifin as its leader.
5. The Japanese authorized the establishment of the Islamic Higher School in Jakarta, led by K.H. Wahid Hasyim, Kahar Muzakir, and Bung Hatta.
6. Ulama and nationalist leaders collaborated to form the Pembela Tanah Air (PETA) militia during this period. Prominent Santri and Islamic youth who participated in military training included Sudirman, Abd. Khaliq Hasyim, Iskandar Sulaiman, Yusuf Anis, Aruji Kartawinata, Kasman Singodimejo, Mulyadi Joyomartono, Wahib Wahab, Sarbini Saiful Islam, and others. The Pembela Tanah Air became the central unit of the current TNI (Indonesian National Army).
7. The Majelis Islam A'la Indonesia (MIAI) relaunched as a social organization.

The Old Order Era Witnessed the implementation of Islamic Religious Education in schools.

During this period of physical revolution, the government was committed to fostering religious education. Based on this commitment, the government entrusted the Ministry of Religious Affairs and the Ministry of Education and Culture (Dep Dik Bud) with the formal management of religious education. As a result, the government issued joint regulations between the two ministries for the management of religious education in public, state, and private schools. Since then, the Ministry of Religious Affairs has been responsible for overseeing religious education in religious schools(Zuhairini et al., 2015, p. 153).

In December 1946, the government officially regulated Islamic religious education in public schools. Various regions had conducted religious education without formal regulations prior to this(Zuhairini et al., 2015, p. 153).

The joint regulation by the two ministers, namely the Minister of Religious Affairs and the Minister of Education and Teaching, was first issued in December 1946. The decision established the provision of religious education from grade 4 of the Sekolah Rakyat (SR) up to grade 6. However, the unstable security situation in the country prevented the full implementation of this joint ministerial decree. As a result, the government loosened control in areas outside Java, allowing some places to continue teaching religious education starting from grade 1 of SR. In 1947, the government established the Islamic Religious Education Advisory Council, which was led by Ki Hajar Dewantoro from the Ministry of Education and Teaching and Prof. Drs. Abdullah Sigit from the Ministry of Religious Affairs. Their task was to help regulate the implementation and content of religious education taught in public schools(Zuhairini et al., 2015, p. 154).

In 1950, Indonesia had achieved national stability. Consequently, the refinement of religious education became more feasible. Prof. Mahmud Yunus from the Ministry of Religious Affairs and Mr. Hadi from the Ministry of Education and Teaching formed a joint committee. They published their results in January 1951, providing the following details:

1. Religious education was to begin for students in grade 4 of Sekolah Rakyat (Elementary School).
2. In regions like Sumatra, Kalimantan, and others where the local population is predominantly religious, Sekolah Rakyat could provide religious education from grade 1. However, the emphasis was on maintaining the same quality of general knowledge as other schools.
3. Junior secondary and senior secondary schools (both general and vocational) were required to offer religious education for two hours each week.
4. Religious education could be offered if there were at least 10 students per class, and with parental or guardian consent.
5. The Ministry of Religious Affairs was responsible for appointing the first teachers, covering the costs of religious education, and providing educational materials(Zuhairini et al., 2015, p. 154).

In the plenary session of the MPRS (People's Consultative Assembly) in December 1960, it was decided as follows: "To implement the Manipol Usdek (Political Manifesto of the Indonesian National Revolution) in the fields of mental, religious, and cultural aspects with spiritual and material conditions so that every citizen can develop their personality and Indonesian nationalism while rejecting the negative influences of

foreign cultures" (Chapter II, Article II: I). Article 3 of this regulation states: "Religious education shall be a subject in public schools, from primary (elementary) schools to universities," with the understanding that students have the right to participate in religious education unless the parents or adult students express objections(Zuhairini et al., 2015, p. 155).

The MPRS convened again in 1966. At that time, the situation involved the government's efforts to purge the remnants of the G.30.S./PKI ideology. This decision marked progress in the field of religious education by revising the last sentence of the previous ruling. As a result of this decision, religious education became a compulsory subject from elementary school to public universities throughout Indonesia(Zuhairini et al., 2015, p. 155).

The New Order Era saw the introduction of Islamic Religious Education in schools

During this period, the government was committed to restoring and implementing the 1945 Constitution in its pure form. Both the government and the people strived to develop a complete human being, focusing on both spiritual and physical aspects for a beneficial life, both in this world and in the hereafter(Zuhairini et al., 2015, p. 155).

With the advancement of knowledge and the evolution of the teaching and learning process, the implementation of religious education also changed. This marked the beginning of the integration and classification of knowledge in a cohesive manner, aimed at saving time(Zuhairini et al., 2015, p. 157).

The Reform Era saw the introduction of Islamic Religious Education in Schools

Following Suharto's resignation from the presidency on May 21, 1998, the presence of Islamic religious education in schools became increasingly robust. The issuance of MPR Decree Number IV/MPR/1999 concerning the GBHN (Guidelines for State Policy) demonstrated this, as it mandated the 'Enhancement of the quality of religious education through the improvement of the religious education system to make it more integrated and aligned with the national education system, supported by adequate facilities and infrastructure'(*Undang-Undang Nomor 25/2000 Tentang Program Pembangunan Nasional (Propenas) 2000-2004*, 2003, p. 164).Law Number 20/2003 on the National Education System further reinforced Islamic religious education in schools in 2003. Additionally, the government followed up on this law by issuing Government Regulation Number 19/2005 on National Education Standards."

Islamic Education in Public Universities

The course on Islamic Religious Education is a right for every student who adheres to Islam. Therefore, higher education institutions are required to include this course in their curriculum. Republic of Indonesia Law Number 20 of 2003 on the National Education System mandates this, specifically in Chapter IV regarding Students,

Article 12, Paragraph 1. This law states that 'Every student in every educational unit has the right to: a. receive religious education according to their religion and taught by educators of the same faith.' Chapter X on Curriculum, Article 37, Paragraph 2, mandates the implementation of this right in the curriculum, stating that higher education curricula must include religious education, citizenship education, and language instruction.

The challenges of integrating Islamic Religious Education with Science in Schools and Higher Education Institutions are significant.

No relevant integration formulation has been found

The models of integration between religious and general sciences proposed by various figures around the world, as mentioned earlier, are highly diverse. Some argue that integration involves the blending and unification of religious and general sciences. However, Muhammad Amin Abdullah offers a different concept. He believes that the integrative-interconnective approach is a more accurate one. This means that the approach does not involve the dissolution or merging of the two disciplines.

Looking at the various models, it is evident that Muslim intellectuals are still in the process of developing a theory. Socio-cultural factors greatly influence this theory. We cannot create knowledge in a vacuum; it requires a context where we interpret information to give it meaning. Many philosophers have discussed the importance of context in human cognition and action. Plato referred to the origin of existence as Chora. Topos was the physical place of existence, according to Aristotle. Heidegger referred to Ort as the place of human existence(Nonaka & Toyama, n.d.).From these philosophical thoughts emerge paradigms. Kuhn asserts that the alignment of experiments and tentative theories leads to the emergence of discoveries and the transformation of theories into paradigms(Kuhn, 1970, p. h. 61).Similarly, the previously mentioned thoughts on the integration of religious and general sciences represent attempts to uncover tentative and speculative truths. We need further development to arrive at a well-established hypothesis. We can conclude that the current challenge lies in the absence of a precise curriculum integration model for schools and public universities.

There are no regulations regarding integration

Planning in education is a part of government policy in the field of education(Simanjuntak et al., 2022). It will be challenging to integrate Islamic education with science in schools and universities if the law does not establish this discourse in the curriculum. This is because Law No. 20 of 2003 on the National Education System of the Republic of Indonesia only states that 'the higher education curriculum must include religious education.' In this law, religious education is merely an additional component. There has yet to be an effort to integrate religious knowledge

with science. In other words, religious education remains merely an 'accessory' in schools and higher education institutions.

A Lack of Human Resources

The success of classical Muslim intellectuals, who were considered the ideal humans (insan kamil), was due to their mastery of both religious and general sciences. Ironically, since the decline of Islam from 1250–1500 to the present day, Muslim intellectuals' grasp of science has weakened, unlike the scholars of the previous golden age. As a result, in several countries' educational institutions, there exists a dualism among teachers, specifically between general and religious disciplines. It is very difficult to find educators who master both disciplines..

Implementing the integration model of knowledge in schools or universities, which involves combining both general and religious teachers in the learning process, presents several challenges. Students' suboptimal understanding of the presented material, as intended by the integration goals, poses a challenge. One study by Muhamad Khoirul Umam looked at how Islamic values were integrated into the study of living things at SMA Mamba'us Sholihin Terpadu Blitar. It found that the idea of integration was limited to adding Quranic verses that were related to the topics being talked about. This problem stems from the limited role of subject-teacher consultation (MGMP) in integrating Islamic values into the curriculum. PAI (Islamic Education) and tahfizh (Quran memorization) teachers assisted, but their role remained limited to tracking verses related to the material. Meanwhile, subject teachers lacked adequate reading materials, resulting in inadequate accommodation for integration needs in the classroom. Additionally, teachers of living organisms lacked sufficient understanding of Islamic principles because they did not come from a religious education background(Umam, 2019).

There is a separation between religious and general education periods

As we know, there is a separation between religious and general education periods in schools and higher education institutions. Religious education in schools consists of 3 to 4 hours per week, while in higher education institutions it comprises 2 to 3 credits. They only cover topics like faith, worship, social interactions, and mysticism, without connecting them to science education. This separation makes it difficult to find common ground between the two. Each teacher covers their subject according to their expertise, without connecting it with another. This reinforces the 'divide' or dualism between religious and general education in schools and higher education institutions.

Comprehensive teaching materials have not yet been formulated

The various patterns of learning systems in several integration schools in Indonesia demonstrate that the concept of integration is still in its experimental stage.

The same applies to teaching materials. Teaching materials are essential for ensuring that learning objectives are measurable and directed. A well-developed formulation of teaching materials is necessary if the goal of integrated learning is to produce religious scholars. Currently, we have not found a comprehensive teaching material that aligns with the objectives of scientific integration.

Solutions for Integrating Islamic Education with Science in Schools and Universities

Developing a curriculum integration framework that is relevant to the Indonesian context

There are many figures in Islamic reform with diverse intellectual contributions. Notable examples include Jamaluddin al-Afghani (1838-1897), Muhammad Abduh (1849-1905), Rasyid Ridho (1865-1935), Thaha Husein (1889-1973), Muhammad Iqbal (1877-1938), Fazlur Rahman (1919-1988), Ismail Rajih al-Faruqi (1921-1986), Nasr Hamid Abu Zayd (1943-2010), Muhammad Abid al-Jabiri (1935-2010), Muhammad Arkoun (1928-2010), Muhammad Shahrour (1938-2019), Seyyed Hossein Nasr, Murtadha Muthahhari, Syed Naquib Al Attas, and many others. The social context of their times greatly influenced their ideas. Their thoughts could potentially inspire the adoption of reform and scientific integration ideas. However, it is essential to emphasize that efforts to find a model for integrating religious and scientific knowledge must consider the socio-cultural context of Indonesia. This wayIn this manner, the predominantly Muslim population's national and state lives can serve as the foundation for the integrationLocal intellectuals' contributions are essential to realize this vision and determine the appropriate formulation. Government agencies should organize discussion forums, seminars, and workshops, inviting scholars and stakeholders to participate in the formulation process.

We are creating regulations or revising the National Education System Law

Without the formulation of a policy or regulation, a concept cannot reach its full potential. Such regulations enable the implementation and accountability of the concept. According to George Edward III, as cited by Widodo, there are four factors that influence the success or failure of policy implementation: (1) communication, (2) resources, (3) disposition, and (4) bureaucratic structure(Widodo, 2010, p. 96). To achieve the iExperts must formulate a well-developed policy to integrate religious and scientific knowledge in schools and universities, which the government should establish and then propose to Parliament for enactment into law. all Indonesian schools and universities can effectively implement and apply the policy consistently.

Collaboration is taking place between Public Universities and Islamic Higher Education Institutions

Until now, public universities and Islamic higher education institutions have operated independently in pursuing the nation's goals. This has deepened the gap between them. It is high time to find common ground between the two to eliminate dualism in knowledge. Dialogue and collaboration between them can achieve this. According to Yusuf Hanafi, there is a need for interdisciplinary collaboration in the form of dialogue. The approach should involve interdisciplinarity and interconnection between the religious sciences, natural sciences, social sciences, and humanities in an intensive and continuous manner(Hanafi, 2014).

We're developing human resources in the form of integrated and creative teachers

The teacher is one of the most critical factors in an institution's education success. The availability of teachers who are experts in their fields is essential for guiding education toward its goals. Similarly, the integration of religious and scientific knowledge programs requires teachers to be proficient in both disciplines. Fazlur Rahman argues that all these reforms face a vicious cycle, except when adequate teachers with integrated and creative thinking are available(Rahman, 1982, p. 139).Jeroen Imants and Merel M. Van der Wal assert that five characteristics form the foundation of teacher professional development and school reform. (1) presenting teachers as actors; (2) depicting dynamic relationships; (3) treating professional development and school reform as inherently contextual, including various levels; (4) incorporating professional development and content school reform as variables; and (5) viewing outcomes as part of a continuous cycle(Imants & Van der Wal, 2020).If we want to integrate religious and scientific knowledge in schools and universities, we must prepare adequately qualified human resources for teachers throughout the country.

Reconstructing Relevant Teaching Materials

In addition to expert teachers, adequate teaching materials are also required. Fazlur Rahman argued that the creation of new textbooks on theology, ethics, and other related subjects should follow. We cannot generate such work at will, but we can take action by recruiting the best available talent and providing the necessary incentives for a committed intellectual career in this field(Rahman, 1982, p. 139).Research by Eric A. Hanushek et al.(Hanushek et al., 2019) demonstrates a strong correlation between incentives and student outcomes. Therefore, to develop teaching materials, a team of experts should continuously evaluate and update them based on new findings. This is critical because science evolves and must remain in line with Islamic values.

Providing adequate facilities and infrastructure

The quality of school facilities has an indirect impact on learning outcomes(Madani, 2019). The more complete the facilities, the easier the learning

process will be, and the better the students' learning outcomes will be. According to Jhonattan Miranda et al., there are currently two levels of infrastructure in higher education. First, the classroom level This level tends to consider adequate classroom equipment, innovative furniture, connected tools, and other educational and didactic resources. Another relevant issue to consider at the classroom level is the design of the learning environment, as certain design characteristics have been observed to positively affect how students learn. Second, the institutional level This level refers to the use of educational institution facilities, services, and systems. This infrastructure is considered not only for pedagogical procedures but also for management and service processes(Miranda et al., 2021).

Facilities and infrastructure are critical for the integration of Islamic education (PAI) with science in schools and higher education institutions. Examples of necessary equipment in laboratories include microscopes, test tubes, ethanol, glucose, iodine, and other items related to the development of biology, physics, or other scientific disciplines. Students should not only be presented with theories, but also engage in practical work related to Islamic studies. Required infrastructure includes laboratory spaces, adequate classrooms, practical rooms, and libraries containing Islamic literature, reference books, research materials, scientific journals, and more. The provision of such facilities and infrastructure certainly requires a significant budget.

CONCLUSION

The integration of Islamic education (PAI) and science in schools and universities in Indonesia is a subject of ongoing debate. Several schools and higher education institutions have made various efforts to formulate curricula that integrate both fields. This study identifies several challenges, including: (1) the lack of a relevant integration formula; (2) the absence of regulations on integration; (3) limited human resources; (4) the separation between religious and general education hours; and (5) the lack of comprehensive teaching materials. Therefore, potential solutions include: (1) developing a curriculum integration formula that is relevant to the Indonesian context; (2) creating regulations or revising the National Education System Law; (3) fostering collaboration between general and Islamic higher education institutions; (4) preparing human resources in the form of integrated and creative teachers; (5) reconstructing relevant teaching materials; and (6) providing adequate facilities and infrastructure.

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