

Scientific Literacy in Islamic Schools: Harmonizing Religious Values and Scientific Knowledge

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Abstract: The integration of scientific literacy within Islamic schools presents unique challenges and opportunities as educators strive to balance religious values with modern scientific knowledge. This article explores how Islamic schools harmonize these two aspects to provide a holistic educational experience. Data from the study indicate that 75% of teachers incorporate scientific literacy into their curriculum, yet only 52% of students feel adequately instructed in science. Major challenges include reconciling scientific theories, such as evolution, with traditional Islamic teachings. To address these challenges, educators use strategies like contextual learning, where Qur'anic verses are linked with scientific principles, and inquiry-based learning, which encourages student exploration and critical thinking. Despite the benefits of these approaches, teachers face significant obstacles, including a lack of professional development and community resistance. 65% of educators report encountering opposition from parents when controversial scientific topics are taught. However, students express a desire for more hands-on experiments and real-world applications, with 68% believing that these methods would enhance their understanding of science in an Islamic context. This study highlights the need for comprehensive teacher training and greater community engagement to successfully integrate scientific literacy while maintaining Islamic values, ensuring that students are equipped for the complexities of modern scientific challenges without compromising their faith.

Keywords: Education, Scientific literacy, Islamic schools, religious values.

Introduction

In era where the demands of modern life require a robust understanding of scientific concepts, scientific literacy has become a crucial skill. It is essential not only for academic achievement but also for making informed decisions in personal, societal, and professional contexts. For Islamic schools, the challenge is even greater, as they must balance both religious values and scientific knowledge within their educational framework. This dual responsibility offers unique opportunities and challenges as educators strive to integrate Islamic teachings with contemporary scientific understanding.

Scientific literacy refers to the ability to engage with scientific concepts and processes, enabling individuals to make informed decisions, participate in civic matters, and contribute to

economic productivity. In the context of Islamic education, fostering scientific literacy involves harmonizing scientific learning with Islamic principles derived from the Qur'an and Hadith. This endeavor is not merely a modern educational issue but is deeply rooted in the Islamic tradition, which emphasizes the pursuit of knowledge and intellectual growth.

The Qur'an frequently encourages the pursuit of knowledge, both religious and scientific. One of the most profound examples of this is found in Surat Al-Alaq (96:1), which begins with the divine command, "Read in the name of your Lord who created." This command emphasizes the centrality of reading and learning in Islam, framing the act of seeking knowledge as an act of worship when done in the name of Allah. Importantly, the 3 verse does not confine this knowledge to religious

matters; rather, it invites believers to explore the entire creation, which includes the natural world – an arena that science seeks to understand.

Moreover, the Prophet Muhammad (peace be upon him) emphasized the importance of seeking knowledge. A well-known hadith states, "Seeking knowledge is an obligation upon every Muslim." This hadith underscores that the pursuit of knowledge is not optional; it is a duty. The scope of this knowledge includes both 'ilm al-din (religious knowledge) and 'ilm al-dunya (worldly knowledge), encompassing fields such as science, medicine, and mathematics. Islamic education, therefore, traditionally advocates a comprehensive view of learning, where spiritual and scientific pursuits are viewed as complementary rather than oppositional. In today's globalized world, where the intersection of religion and science is often debated, Islamic scholars argue that there is no intrinsic conflict between Islam and science. Instead, they suggest that scientific exploration is a way of appreciating Allah's creation. The study of the natural world is seen as a means of better understanding the divine wisdom embedded in creation. Thus, for many Muslim educators, science is not a threat to religious faith but rather a tool to deepen it (Iqbal et al., 2021).

However, integrating scientific literacy in Islamic education comes with challenges. Among the key difficulties are reconciling certain scientific theories with traditional religious interpretations, overcoming societal attitudes that may resist scientific inquiry, and addressing the lack of resources or qualified educators capable of teaching both science and Islamic studies. Despite these hurdles, the potential benefits of fostering scientific literacy in Islamic schools are profound. By equipping students with both religious and scientific knowledge, Islamic schools can produce individuals who are not only devout in their faith but also capable of contributing to the scientific and intellectual advancements of their societies. One powerful example of how Islamic education can promote scientific literacy is by highlighting the achievements of the Islamic Golden Age, during which Muslim scholars made significant contributions to fields such as mathematics, astronomy, medicine, and chemistry. Scholars like

Al-Khwarizmi, Ibn Sina (Avicenna), and Al-Haytham (Alhazen) laid the foundations for modern scientific disciplines, demonstrating that the pursuit of scientific knowledge is deeply embedded in the Islamic intellectual tradition. These scholars viewed scientific inquiry as a religious act, an exploration of Allah's creation through the lens of reason and observation (Nasr, 2007)

Additionally, Surat Al-Mulk (67:3-4) invites believers to reflect upon the heavens and the intricacies of creation: "[He] who created seven heavens in layers. You do not see in the creation of the Most Merciful any inconsistency. So return your vision to the sky, do you see any breaks? Then return your vision twice again. Your vision will return to you humbled while it is fatigued." This verse emphasizes the importance of observation and critical thinking, both of which are foundational to the scientific method.

The Hadith further reinforces the value of intellectual pursuits. One narration states, "The superiority of a learned man over a worshipper is like that of the full moon over the rest of the stars." This analogy underscores the significance of knowledge and intellect, suggesting that scholarly endeavors, including the study of science, are highly valued in Islam. According to Hashim (2018), the pursuit of knowledge whether spiritual or scientific is a key element of the Islamic way of life, and mastering scientific literacy is an extension of this intellectual tradition (Hashim, R, 2018).

To achieve this, Islamic schools must foster an environment where inquiry is encouraged, and scientific exploration is viewed as a means of deepening religious understanding, rather than a threat to faith. As the Qur'an says in Surat Yunus (10:101), "Say, 'Observe what is in the heavens and the earth.'" This verse can be interpreted as an invitation to study the universe, to explore its mysteries, and to recognize the signs of Allah's creation. In doing so, students learn to see science as an act of worship, a way of drawing closer to Allah through the study of His creation.

In conclusion, scientific literacy is not only compatible with Islamic values but is deeply rooted in the Islamic tradition of seeking knowledge. By promoting an educational

framework that integrates religious teachings with scientific inquiry, Islamic schools can cultivate individuals who are both devout in their faith and proficient in scientific disciplines. Such individuals will be well-equipped to contribute meaningfully to both the Muslim community and the broader world, demonstrating that Islam and science can indeed be harmonized in the pursuit of knowledge and truth.

Scientific literacy, broadly defined, refers to the knowledge and understanding of scientific concepts and processes necessary for personal decision-making, participation in civic and cultural affairs, and economic productivity. In Islamic schools, this concept must be integrated with religious teachings. The definition of scientific literacy varies depending on the educational context and the goals of the institutions in question. Islamic education systems face unique challenges in balancing Qur'anic teachings with the demands of modern science, a subject increasingly emphasized in global educational standards. Studies show that scientific literacy in Islamic education requires an approach that incorporates both religious principles and critical scientific inquiry to foster holistic growth among students (Iqbal. M, 2021).

Materials and Methods

This study employed mixed-method research, collecting data through teacher surveys 34 Person, student focus groups, and interviews with education stakeholders. Data analysis used thematic coding to explore recurring themes such as teaching strategies, perceptions of science and religion, and integration challenges in Yogyakarta.

Procedures

The research procedures were conducted in three main phases. In the preliminary phase, research instruments were developed, including survey questionnaires, focus group discussion (FGD) guidelines, and interview protocols. The data

collection phase included teacher surveys distributed to 100 educators across 10 Islamic schools to assess the incorporation of scientific literacy in curricula. FGDs with students in groups of 5-8 participants provided insights into their perceptions of scientific literacy. Semi-structured interviews with educational stakeholders, such as school principals and curriculum developers, identified challenges and strategies for integrating science and religion. Finally, triangulation techniques were applied during data validation to cross-reference and confirm findings from multiple sources, ensuring reliability and validity.

Data analysis

Data analysis employed thematic coding to uncover recurring patterns and themes. Initially, researchers familiarized themselves with the data through detailed reading. Codes were generated to encapsulate key ideas, such as "curriculum constraints," "community resistance," and "contextual learning." These codes were then grouped into overarching themes, including effective teaching strategies, challenges faced, and support systems. Synthesizing these themes allowed researchers to derive meaningful conclusions, emphasizing the interplay between scientific literacy and religious values.

Results and Discussion

Result

The results section presents the findings from the study on integrating scientific literacy in Islamic schools while harmonizing religious values. The data collected from surveys, interviews, and focus group discussions reveal significant insights into the perceptions and practices of educators and students. The analysis is organized around key themes that emerged from the data, including the current state of scientific literacy, the challenges faced, the strategies employed, and the implications for future educational practices.

Table 1. Current State, Challenges, Effective Practice scientific literacy.

| Aspect | Key Findings | Explanation |
|-------------------------------------|---|---|
| Science Literacy Instruction | 75% of teachers reported incorporating science literacy into the curriculum, but only 52% of students felt adequately instructed. | Teachers recognize the importance of science literacy, but students feel there is a lack of sufficient science instruction. |
| Main Challenges | Conflict between scientific theories (e.g., evolution) and traditional Islamic teachings. | Teachers feel pressured to teach scientific theories that may contradict the religious beliefs of students and parents. |
| Contextual Learning | Qur'anic verses are used to connect scientific concepts with religious teachings in instruction. | Science is taught by contextualizing scientific concepts within religious values through Qur'anic verses, helping students understand science in a religious context. |
| Inquiry- Based Learning | Applied by many teachers to encourage exploration, questioning, and scientific experimentation. | This method helps students link scientific understanding with religious beliefs, fostering a culture of inquiry consistent with both Islamic tradition and science. |
| Hands-On Experiments | 68% of students want more hands-on experiments and real- life applications in science lessons. | Students feel that direct experimentation would help them relate scientific concepts to their religious beliefs, enhancing their understanding. |
| Teacher Training Needs | Many teachers feel they need more training to effectively integrate science and religion. | Teachers require professional development programs to improve their ability to teach science literacy without neglecting religious values. |
| Community Engagement | 65% of teachers face resistance from parents and community regarding controversial scientific topics. | Parental and community engagement in discussions about the importance of science literacy is needed to reduce resistance and increase support for science education. |

1. Current State of Scientific Literacy in Islamic Schools

The survey data indicated that a significant majority of teachers (75%) reported including scientific literacy as a component of their curriculum. However, only 52% of students felt that they received adequate instruction on scientific topics. When asked about their confidence in teaching scientific concepts alongside religious teachings, 60% of teachers expressed moderate to high confidence, while 40% felt uncertain about effectively integrating these two areas. This disparity suggests that while educators recognize the importance of scientific literacy, they may lack the tools or support to teach these subjects cohesively. Moreover, students indicated a desire for more interactive learning experiences in science classes. When asked what would enhance their understanding of scientific concepts, 68% of students suggested that hands-on experiments and

real-life applications would make science more relatable to their religious beliefs. This finding emphasizes the need for a curriculum that actively engages students in scientific inquiry while contextualizing it within an Islamic framework.

2. Challenges in Harmonizing Science and Religious Values

The interviews conducted with teachers revealed several recurring challenges in integrating scientific literacy with Islamic values. The most frequently mentioned issue was the perceived conflict between certain scientific theories, particularly evolution, and traditional Islamic teachings about creation. Educators reported feeling pressure from parents and community members to avoid topics that might contradict religious beliefs. One teacher noted, "When we discuss evolution, I often have to reassure parents that we are not undermining their faith, but rather exploring the wonders of creation."

Furthermore, resistance from the broader community regarding the teaching of certain scientific concepts emerged as a significant barrier. 65% of educators reported encountering opposition from parents or community leaders when attempting to introduce scientific topics that are seen as controversial. This resistance highlights the importance of community engagement and education to facilitate discussions around the integration of science and religion.

3. Strategies for Successful Integration

Despite the challenges, several effective strategies were identified through qualitative data analysis. Educators reported employing various pedagogical techniques to harmonize scientific literacy with Islamic values:

- a. **Contextual Learning:** Many teachers emphasized the importance of contextualizing scientific concepts within Qur'anic teachings. For example, lessons on biology often included discussions about the Qur'anic verses related to the creation of life, allowing students to view scientific facts through the lens of their faith.
- b. **Inquiry-Based Learning:** A significant number of educators utilized inquiry-based learning methods, which encourage students to ask questions and explore scientific concepts through experimentation. Teachers noted that this approach fosters a deeper understanding of both science and Islam, as students learn to appreciate the natural world while being encouraged to seek knowledge actively.
- c. **Professional Development:** Several educators highlighted the importance of ongoing professional development focused on integrating science and religion. Workshops and training sessions that equip teachers with the necessary skills to address conflicts between scientific knowledge and religious beliefs were deemed essential for improving teaching practices.

4. Student Perceptions of Science and Religion

Focus group discussions with students revealed a complex relationship between their understanding of scientific concepts and their religious beliefs. While many students expressed excitement about

learning science, there were also feelings of confusion and concern regarding topics that seemed at odds with their Islamic teachings. For instance, one student shared, "I love science class, but when we talk about evolution, I feel like it goes against what I learned about how Allah created everything." Despite these concerns, students generally showed a willingness to engage with scientific content when it was framed positively. A recurring theme in the discussions was the desire for teachers to facilitate open conversations about difficult topics, allowing students to express their thoughts and questions in a safe environment. This need for dialogue emphasizes the role of educators in fostering a supportive atmosphere where scientific inquiry can coexist with faith-based education.

5. Implications for Educational Practices

The findings of this study suggest several implications for educational practices in Islamic schools. Firstly, there is a pressing need for curriculum development that explicitly integrates scientific literacy with Islamic values. Developing materials that frame scientific inquiry within an Islamic context can help bridge the perceived gap between faith and science. Secondly, teacher training programs must address the integration of science and religion more comprehensively. Providing educators with strategies to navigate controversial topics while maintaining the integrity of both scientific principles and Islamic teachings will empower them to teach with confidence and clarity. Finally, engaging the community in discussions about the importance of scientific literacy can help mitigate resistance to teaching modern scientific concepts in Islamic schools. By highlighting the compatibility of faith and scientific inquiry, educators can foster a culture of curiosity and learning within the community.

The findings from this study underscore the intricate relationship between scientific literacy and Islamic education. Islamic schools face the dual responsibility of nurturing students' understanding of scientific principles while instilling strong religious values. The results indicate that while educators recognize the importance of integrating scientific literacy into their curricula, significant

challenges remain. These challenges are multifaceted and deeply rooted in the cultural, religious, and educational contexts in which these schools operate.

Discussion

Harmonizing Science and Religion

A central theme that emerged is the perceived conflict between certain scientific concepts, particularly evolutionary theory, and traditional Islamic teachings. As noted by (Berkman and Plutzer, 2011), "students often experience cognitive dissonance when they encounter scientific theories that appear to contradict their religious beliefs," highlighting a common challenge in education systems that blend faith with science. This finding resonates with educators in Islamic schools, who reported feeling pressure to navigate these discussions carefully. One teacher remarked, "When we discuss evolution, I often have to reassure parents that we are not undermining their faith but rather exploring the wonders of creation." To address these concerns, educators are employing strategies to harmonize scientific literacy with religious teachings. The emphasis on contextual learning and the use of Qur'anic verses to frame scientific concepts demonstrate a proactive approach to bridging the gap. (Ziauddin Sardar, 2007) asserts that "the pursuit of knowledge is a religious duty," emphasizing that scientific inquiry can deepen one's understanding of faith and encourage a more integrated educational experience. This perspective reinforces the idea that contextualizing scientific inquiry within the framework of their faith can lead students to engage positively with the material.

The Role of Inquiry-Based Learning

The results also indicate that inquiry-based learning methods are effective in promoting scientific literacy while respecting religious values. (Bennett and Holman, 2002) emphasize that "active learning strategies are essential for effective science education," advocating for pedagogical techniques that foster critical thinking and engagement. Inquiry-based learning encourages students to explore, question, and experiment, allowing them to appreciate the natural world as part of their

religious understanding. In Islamic education, this method enables students to ask questions about their faith in the context of scientific exploration, promoting a culture of inquiry that aligns with both Islamic tradition and scientific practice.

Moreover, the findings show that hands-on experiments and real-life applications resonate with pedagogical approaches that enhance understanding. According to (Lynch et al., 2014), "experiential learning significantly improves students' grasp of scientific concepts," suggesting that interactive methods can bridge the gap between faith and scientific inquiry. By engaging in practical scientific activities, students can grasp complex ideas while seeing their relevance to their daily lives and faith. This active engagement is crucial for developing a positive attitude toward science, particularly in an Islamic educational.

Teacher Training and Community

Engagement Another significant finding is the necessity for targeted teacher training programs. Educators expressed a need for professional development that equips them to effectively teach both religious and scientific content. (Akbar et al., 2019) highlight that "comprehensive training programs can enhance teachers' confidence in delivering integrated curricula," underscoring the importance of teacher preparedness in navigating the complexities of teaching integrated content²⁷. Training that emphasizes the harmonization of science and religion can empower educators to address controversial topics constructively, fostering a learning environment that promotes open dialogue among students. Community engagement is equally vital for the successful integration of scientific literacy in Islamic schools. The resistance faced by educators from parents and community members regarding the teaching of certain scientific topics illustrates the importance of involving the community in discussions about the value of scientific literacy. (Sulaiman and Rahman, 2020) assert that "community support is essential for educational reforms," emphasizing that engaging parents and community leaders in conversations about the compatibility of scientific knowledge with Islamic teachings can foster a

more supportive environment for students and teachers alike.

Implications for Educational Practices

The implications of this study are profound for educational practice and future research. First, there is a clear need for curriculum development that explicitly integrates scientific literacy with Islamic values. Educational materials that frame scientific inquiry within an Islamic context will help bridge the perceived gap between faith and science. Furthermore, schools should consider developing partnerships with universities and research institutions to enhance the quality of science education in Islamic contexts. Future research should focus on longitudinal studies that examine the long-term impact of integrated curricula on students' scientific literacy and religious beliefs. Such studies would provide valuable insights into how students reconcile their faith with scientific knowledge over time. Additionally, exploring the experiences of educators in various Islamic contexts can yield additional strategies for effective integration, ultimately contributing to a more robust understanding of scientific literacy in faith-based education.

Conclusions

This study highlights the crucial interplay between scientific literacy and religious values within Islamic schools, revealing both the opportunities and challenges that arise from integrating these two domains. The findings suggest that while educators recognize the importance of fostering scientific literacy, they often face significant obstacles, particularly concerning the perceived conflicts between certain scientific concepts, such as evolution, and traditional Islamic teachings. Despite these challenges, the proactive strategies employed by educators such as contextual learning and inquiry-based methods demonstrate a commitment to harmonizing scientific and religious education. The emphasis on contextualizing scientific knowledge within an Islamic framework allows students to appreciate

the natural world as a reflection of divine creation. This approach not only enriches students' understanding of science but also reinforces their religious beliefs, fostering a holistic educational experience. The results indicate that students are eager for interactive and engaging science education, which can be effectively facilitated through hands-on experiments and real-life applications that relate back to their faith. However, the study also underscores the necessity for improved teacher training programs and community engagement initiatives. Professional development that equips educators with the skills to navigate the complexities of teaching both science and religion is essential. Additionally, involving parents and community leaders in discussions about the value of scientific literacy can help mitigate resistance and foster a supportive environment for students. Overall, this research emphasizes the potential for Islamic schools to produce individuals who are not only scientifically literate but also deeply rooted in their faith. By adopting a balanced approach to education that integrates scientific inquiry with religious values, Islamic schools can prepare students to tackle the complexities of modern life while remaining committed to their Islamic identity. Future research should explore longitudinal impacts of these educational strategies and further investigate how diverse Islamic contexts can contribute to the development of effective integrative curricula.

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