

The Utilization of Learning Media for *Ayat Kauniyah* in Science-Based *Pesantren*: Integrating Science and the Qur'an in *Pesantrens*

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Abstract

This study examines the teaching materials used to integrate ayat-ayat kauniyah with the natural sciences at the Pesantren Trenssains in Tebuireng, Jombang, East Java. The Pesantren Trenssains is an Islamic educational institution that consistently combines the study of modern science with Islam, particularly through the approach of ayat-ayat kauniyah as a bridge between religious knowledge and the natural sciences. This study employs a qualitative approach with a single-case study design. Data were collected through participant observation, in-depth interviews with teachers, students, and boarding school administrators, as well as analysis of curriculum documents and teaching materials. Data analysis utilised the Miles and Huberman technique, comprising data reduction, data presentation, and drawing conclusions. The research findings reveal three key points: firstly, Pesantren Trenssains has developed integrative and multimodal learning materials that creatively combine visual aids, science laboratories and digital technology to illustrate the meaning of the verses of creation; secondly, the implementation of these learning materials is supported by an integrated curriculum specifically designed to align the text of the Qur'an with observations of natural phenomena; thirdly, the learning materials on the verses of creation at this pesantren have been shown to enhance students' motivation to learn whilst strengthening their integrative understanding of the relationship between religion and science. This study presents an innovative model for integrating verses of creation and science through multimodal learning media based on empirical evidence and makes a significant contribution to the development of Islamic education.

Keywords: Integration, Islam- Science, Kauniyah Verses, Learning Media, *Pesantren*.

Introduction

The social sciences and humanities have a long history of engagement with the study of religion. However, within the context of Islamic studies, the intersection between sociology, anthropology, and Islamic scholarship has often been fraught with tension. On one hand, classical Islamic studies scholars tend to view social science approaches as a threat to the purity of normative-theological inquiry. On the other hand, social scientists frequently view Islam merely as a social variable or phenomenon to be explained, without deeply

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understanding its normative and theological dimensions. This epistemological tension serves as the starting point for this research. As the oldest Islamic educational institution in Indonesia, the existence of *pondok pesantren* (Islamic boarding schools) as centers for *taffaquh fiddin* (deepening religious knowledge) in a broad sense continues to experience significant development.¹ Among these developments is how *pesantrens* respond to advancements in science and technology without losing the Islamic identity that forms their foundation.² In this context, the integration between religious sciences and natural sciences, frequently referred to as the science-Islam integration, has become a central issue in Islamic education discourse.³ The integration of science and Islam is not an additive project, but rather an epistemic transformation that utilizes science as an instrument to read *sunnatullah* (divine laws of nature) without losing the *pesantren's* identity.

The Qur'an explicitly invites humans to observe, examine, and contemplate natural phenomena as signs of Allah's greatness.⁴ Everything created in the universe is not an entity separated from revelation, but rather a part of the signs of Allah's majesty arranged in cosmic order.⁵ From this perspective, science is not merely a secular intellectual activity, but a part of worship and devotion to Allah through the exploration of His creation.⁶ The integration of science and Islam in *pesantrens* is not a reconciliation of two separate entities, but an acknowledgment of the greatness and majesty of God. Furthermore, there is no dichotomy among revelation, science, and natural phenomena, as they all originate from the same source.

Pesantren Trenssains Tebuireng Jombang is one of the educational institutions attempting to integrate science and Islam in Indonesia. Trenssains has developed a curriculum that explicitly combines modern scientific studies with an understanding of *ayat kauniyah* (verses concerning natural phenomena).⁷ What distinguishes Trenssains from other Islamic educational institutions is its consistent commitment to developing learning media capable of making the relationship between the Qur'an and natural phenomena real and

¹ Akhmad Fauzi Hamzah and Barlian Fajri, "Pesantren Ramah Perempuan dan Anak Di Indonesia: (Studi Pada Pondok Pesantren Bahrul Ulum Tambakberas, Jombang, Jawa Timur Dan Boarding School Education Mu'allimat, Muhammadiyah, Yogyakarta)," *Ta'wiluna: Jurnal Ilmu Al-Qur'an, Tafsir Dan Pemikiran Islam* 5, no. 2 (2024): 399–418.

² Muhammad Najihul Huda et al., "Pesantren Technology-Friendly: Enhancing Learning Effectiveness in The Modern Era," *Nadwa: Jurnal Pendidikan Islam* 19, no. 1 (2025): 1–22, 2025, <https://doi.org/10.21580/nw.2025.19.1.26173>; Siti Halimah et al., "Pesantren Education Management: The Transformation of Religious Learning Culture in the Age of Disruption," *Nidhomul Haq : Jurnal Manajemen Pendidikan Islam* 9, no. 3 (2024): 648–66, <https://doi.org/10.31538/ndhq.v9i3.16>.

³ Mohamad Mustari and M. Taufik Rahman, *Nilai Karakter: Refleksi Untuk Pendidikan*, 2014.

⁴ Osman Bakar, *Tawhid and Science Islamic Perspectives on Religion and Science* (Arah Pendidikan Sdn Bhd, 2008).

⁵ Mohd Saiful Aqil Naim Saful Amin et al., "The Quranic Cosmological Argument in Islamic Intellectual History: Fakhr Al-Din Al-Razi on the Creation of Heavens In Verse 1 of Surah Al-An'am," *Journal Al-Muqaddimah* 13, no. 2 (2025): 59–71, <https://doi.org/10.22452/muqaddimah.vol13no2.4>.

⁶ Seyyed Hossein Nasr, "Islamic Science: An Illustrated Study.," *Islamic Science: An Illustrated Study*, 1976, <https://ui.adsabs.harvard.edu/abs/1976isai.book.....N/abstract>.

⁷ Zainal Arifin et al., "Modernization of Islamic Religious Education Learning Based on Science at SMA Trensains Muhammadiyah Sragen: Ismail Raji Al-Faruqi's Perspective," *Proceeding International Conference on Islam, Law, and Society (INCOILS)* 4 (February 2025), <https://doi.org/10.70062/incoils.v4i1.269>.

deeply understandable for the *santris* (students).⁸ This innovation transforms the study of science into an internalized intellectual worship rather than mere additional knowledge.

Studying *ayat kauniyah* presents complex challenges in bridging the realm of text (revelation) and the realm of context (the universe/science). The correlation between *ayat qauliyah* (sacred texts) and *kauniyah* (natural phenomena) often faces the risk of semantic reduction or scientific inaccuracy.⁹ Therefore, effective learning media are required to facilitate a learning experience that is cognitively rich yet spiritually resonant for the *santris*.¹⁰ Without effective media, integration will collapse into confirmation bias and a Procrustean approach, causing Islamic education to fail in building an awareness of God's greatness through a holistic integration of religion and science.

Research on learning media for understanding *ayat kauniyah* or scientific verses in *pesantrens* remains relatively limited compared to studies on curriculum or teaching methodologies. More specifically, research that explicitly examines learning media within the context of integrating science and *ayat kauniyah* in *pesantrens* is still very rarely conducted.¹¹ In fact, learning media is one of the most critical variables determining the quality of the *santris*' learning experience and the successful transmission of Islamic-science integration values.¹² Consequently, learning media represents a vital variable that determines the quality of the student learning experience and the success of transmitting the values of Islam-science integration.

Research by Maulida,¹³ Islam et al.,¹⁴ and Zainiyati and Yaumi¹⁵ has identified various types of media commonly used in PAI (Islamic Religious Education) instruction; however, these studies remain general and have not specifically touched upon the utilization of media for teaching *ayat kauniyah* (verses on natural phenomena), let alone contextualizing it within the *pesantren* ecosystem, which possesses a unique curriculum, culture, and scientific approach. Thus, the research gap lies in the absence of study regarding how learning media are concretely designed, developed, and implemented to teach *ayat kauniyah*

⁸ Yenny Wahid, "Mematasi Para Pelanggar: Laporan Tahunan Kemerdekaan Beragama Berkeyakinan Wahid Foundation 2018," Jakarta, 2018.

⁹ Mu'min Fata, "Implementasi Integrasi-Interkoneksi Ilmu Agama Islam Dan Ilmu Pengetahuan Umum Dalam Pembelajaran Al-Qur'an Hadis Di Man 1 Banyumas" (skripsi, UIN Prof. K. H. Saifuddin Zuhri, 2025), <https://repository.uinsaizu.ac.id/34893/>.

¹⁰ Muhammad Yaumi, *Media Dan Teknologi Pembelajaran* (Prenada Media, 2018), [https://www.google.com/books?hl=id&lr=&id=2uZeDwAAQBAJ&oi=fnd&pg=PA122&dq=Yaumi,+M.+\(2018\).+Media+dan+Teknologi+Pembelajaran.+Prenadamedia+Group.&ots=RF4G6hBjnU&sig=ZkjiIw0Q70OiUjScYBJKqEyIFuc](https://www.google.com/books?hl=id&lr=&id=2uZeDwAAQBAJ&oi=fnd&pg=PA122&dq=Yaumi,+M.+(2018).+Media+dan+Teknologi+Pembelajaran.+Prenadamedia+Group.&ots=RF4G6hBjnU&sig=ZkjiIw0Q70OiUjScYBJKqEyIFuc).

¹¹ Muhaimin Muhaimin, *Pemikiran Dan Aktualisasi Pengembangan Pendidikan Islam* (Rajawali Press, 2011), <http://repository.uin-malang.ac.id/1114/>.

¹² Azhar Arsyad, "Media Pembelajaran, Edisi Revisi Cet 17," Jakarta: Rajawali Pers, 2014.

¹³ Maulida Maulida, "Implementasi Discovery Learning Dalam Pembelajaran Al-Qur'an Hadis Guna Meningkatkan Literasi Digital Kelas Xii Ipa Pada Man Kapuas Kalimantan Tengah Tahun 2024/2025" (PhD Thesis, Universitas Islam Sultan Agung Semarang, 2024), <https://repository.unissula.ac.id/37644/>.

¹⁴ Muhammad Hifdil Islam et al., "Pemanfaatan Tumbuhan Sekitar Sebagai Media Pembelajaran PAI Untuk Meningkatkan Pemahaman Ayat Kauniyah Siswa Kelas I dan II di Madrasah Ibtidaiyah Darul Lughah Wal Karomah Probolinggo," *Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah* 10, no. 2 (2026): 1139, <https://doi.org/10.35931/am.v10i2.6502>.

¹⁵ Husniyatus Salamah Zainiyati, "Pengembangan Media Pembelajaran Berbasis ICT: Konsep Dan Aplikasi Pada Pembelajaran Pendidikan Agama Islam," Kencana Rawamangun Jakarta, 2017, <http://repository.uinsa.ac.id/id/eprint/1461/>.

within a *pesantren* environment, as well as how such media contribute not only to the cognitive aspects but also to the affective (motivational) dimensions of the *santris*.

This research aims to fill that gap by examining in depth the learning media for *ayat kauniyah* at Pesantren Trenssains Tebuireng. A case study was chosen as the methodological approach because it allows for a holistic and contextual understanding of the investigated phenomenon. Through a comprehensive exploration of various dimensions of learning media—spanning from planning, development, implementation, to evaluation—this study aims to provide a comprehensive and nuanced picture of best practices in teaching *ayat kauniyah*.

More specifically, this study seeks to answer three primary questions: (1) What are the forms and characteristics of the learning media for *ayat kauniyah* developed at Pesantren Trenssains Tebuireng? (2) How are these learning media implemented in the daily teaching and learning process? (3) What is the impact of using *ayat kauniyah* learning media on the *santris*' understanding and learning motivation? These three questions align with the three main sub-chapters of discussion presented in this article.

The significance of this research can be viewed from at least three dimensions. First, from a theoretical dimension, this study contributes to the development of a conceptual framework regarding learning media in integrative Islamic education, particularly linking theology (*tafsir kauniyah*) and science. Second, from a practical dimension, the findings of this study can serve as an empirical reference for other *pesantrens* and Islamic educational institutions wishing to develop similar programs, while simultaneously serving as a repository of best practices in designing contextual instructional media. Third, from a policy dimension, this research can provide strategic input for Islamic education policymakers, such as the Ministry of Religious Affairs and *pesantren* administrators, in formulating standards and curricula that support the integration of science and religion in a more systematic, measurable, and qualitative manner.

Research Method

This research employs a qualitative approach with a single case study design as proposed by Yin and Creswell.¹⁶ This approach was selected because the researcher intends to obtain a profound and contextual understanding of the learning media for *ayat kauniyah* at Pesantren Trenssains, which represents a unique and representative case of the science-Islam integration phenomenon in Indonesian *pesantren* education.

The study was conducted at Pesantren Trenssains Tebuireng Jombang due to its consistent integration of science and Islam, its national and international reputation, and its favorable accessibility. Research subjects were selected using a purposive sampling technique, which included the director, vice director, science and PAI teachers, as well as students from grades X-XII chosen through stratified random sampling. Data validity was ensured through source triangulation (comparing information from various informants), technical triangulation (cross-checking results from observations, interviews, and document analysis), and member checking, where preliminary findings were confirmed back with key

¹⁶ Robert K. Yin, *Case Study Research and Applications*, vol. 6 (Sage Thousand Oaks, CA, 2018), https://www.academia.edu/download/106905310/Artikel_Yustinus_Calvin%20Gai_Mali.pdf.

informants to ensure interpretive accuracy. Additionally, the researcher conducted peer debriefing sessions with academic colleagues possessing expertise in the fields of Islamic education and instructional technology.

Data were gathered through three primary techniques. First, participant observation, focusing on the types of media, demonstration methods, interactions, and student responses, which were recorded in field notes taken in classrooms, science laboratories, and various other learning activities. Second, semi-structured in-depth interviews, which were recorded using an audio recorder and transcribed verbatim, featuring distinct focal points: policy frameworks for the school principal and vice principal, the media development process for teachers, and the learning experience/motivation for students. Third, a documentation study that collected syllabi, lesson plans (RPP), teaching modules, as well as visual documentation (photos/videos) from the past 2 years to track the alignment between planning and field execution. Data analysis follows the interactive model of Miles, Huberman, and Saldaña, comprising: (1) data collection, (2) data condensation (selecting, focusing, simplifying, abstracting, and transforming into thematic codes/categories), (3) data display presented in descriptive narratives, comparative matrices, and flowcharts, and (4) drawing and verifying conclusions, which were re-verified through member checking to guarantee the credibility of the findings.¹⁷

Results and Discussion

Forms and Characteristics of Learning Media for *Ayat Kauniyah*

Pesantren Trenggsemba Tebuireng developed multimodal and integrative learning media for *ayat kauniyah*. These media were not developed on an *ad hoc* basis, but are rather the products of a systematic planning process involving collaboration among the team of religious teachers, the team of science teachers, and instructional technology experts. This structured and evidence-based media development approach aligns with the instructional design principles proposed by Dick, Carey, and Carey, as well as Smaldino, Lowther, and Russell.¹⁸ Pesantren Trenggsemba Tebuireng systematically developed multimodal media for *ayat kauniyah* through the collaboration of religious, scientific, and educational technology teams.

The first and most fundamental form is Qur'an-based visual media. The Trenggsemba development team created a series of posters, infographics, and display boards that fuse the texts of *ayat kauniyah* in Arabic with accurate scientific illustrations. For example, the verse regarding the water cycle (Q.S. Az-Zumar: 21) is visualized alongside a detailed hydrological diagram, while the verse concerning human creation (Q.S. Al-Mu'minun: 12-14) is paired with illustrations of embryological development. This type of visual media functions as a cognitive anchor that helps *santris* construct mental connections between the Qur'anic message and scientific facts.¹⁹ According to one senior *ustadz*:

¹⁷ Matthew B. Miles Et Al., *Qualitative Data Analysis* (Sage, 2014).

¹⁸ Walter Dick et al., *The Systematic Design of Instruction*, 1985, <https://studentebookhub.com/wp-content/uploads/2024/preview/9780135824146.pdf>.

¹⁹ Richard E. Mayer, "Incorporating Motivation into Multimedia Learning," *Learning and Instruction* 29 (2014): 171–73.

“We designed these visual media so that santri do not merely memorize the verses, but can see with their own eyes that what the Qur'an mentioned 14 centuries ago aligns with the discoveries of modern science.”

The second form is the *kauniyah*-based science laboratory. This represents one of the most distinctive innovations of Trenssains. This laboratory does not merely provide ordinary experimental facilities, but is designed specifically as an exploration space for *ayat kauniyah*. Each experimental station is equipped with a guide card containing the relevant Qur'anic verse for the phenomenon being studied, accompanied by its interpretation from a scientific perspective. The concept of this *kauniyah*-based laboratory corresponds with the view of Bakar, who asserts that natural science in Islam is fundamentally an effort to understand the signs (*ayat*) of Allah in the universe.²⁰ The science laboratory based on *ayat kauniyah* at Trenssains transforms conventional experimental spaces into verse exploration stations by simultaneously integrating scientific phenomena, Qur'anic texts, and scientific interpretations.

This aligns with the opinion of Azra, who emphasizes that *pesantrens* capable of providing excellent laboratory facilities tend to produce graduates with more competitive scientific skills while possessing a deeper religious understanding.²¹ This erodes the traditional dichotomy of the *pesantren*, demonstrating that the laboratory is no longer a secular space, but an integrative arena that matures the critical reasoning of the *santris* without diminishing theological awareness.

The *kauniyah*-based science laboratory at Trenssains serves as an epistemic materialization of the unity of knowledge paradigm, wherein each experiment station functions as a hermeneutic space that allows *santris* to perform empirical verification while experiencing spiritual resonance over the verses of Allah. Consequently, science is no longer studied as a secular product, but as a process of scientific worship. This innovation shatters the dichotomy between reason and faith that has historically haunted *pesantren* education.

The third form is application-based digital media and technology. Trenssains developed or adapted various digital platforms to support *kauniyah* learning. Among these are mobile applications containing an encyclopedia of *ayat kauniyah* that *santris* can access anytime and anywhere, animated instructional videos illustrating natural phenomena mentioned in the Qur'an, and computer simulations for scientific experiments that cannot be conducted directly.

The utilization of these digital media is relevant to the findings of Hamid, Salleh, and Laxman, which indicate that the integration of digital technology in PAI learning significantly increases students' engagement and conceptual understanding.²² Within the

²⁰ Bakar, *Tawhid and Science Islamic Perspectives on Religion and Science*.

²¹ Menurut Azyumardi Azra, “Modernisasi Kurikulum Pesantren,” tt, n.d., accessed April 24, 2026, <https://ejournal.kopertais4.or.id/mataraman/index.php/perspektif/article/view/3329>.

²² Muliadi Abdul Hamid et al., “A Study on the Factors Influencing Students' Acceptance of Learning Management Systems (LMS): A Brunei Case Study,” *International Journal of Technology in Education and Science* 4, no. 3 (2020): 203–17; Selena Aulia et al., “The Influence of the Islamic Education Curriculum on Reducing Epistemological Fragmentation and Synthesizing the Islamic Weltanschauung Amid the Dichotomy of Knowledge,” *Adabuna: Jurnal Pendidikan Dan Pemikiran* 5, no. 2 (2026): 144–63, <https://doi.org/10.38073/adabuna.v5i2.4706>.

pesantren context, the management of these digital media is conducted selectively and under control to ensure that the accessed content remains aligned with Islamic values.

The fourth form is open-air media (*outdoor learning media*). Pesantren Trenssains utilizes the surrounding natural environment as a learning medium. Visits to the *pesantren*'s botanical garden, night sky observations, river ecosystem observations, and field trips to rice paddy areas are all designed as structured *kauniyah* exploration activities. Each outdoor activity is linked to relevant Qur'anic verses and accompanied by reflective questions that encourage *santris* to contemplate the spiritual meaning of the phenomena they observe.

This approach is in harmony with the concept of spiritual value-based environmental education developed by Palmer and Nasr, which emphasizes the importance of direct experience with nature in forming an ecological consciousness grounded in faith.²³ This turns direct sensory experience into a field of contemplation to know and understand the greatness of God, reconciling the ecological reasoning of Palmer-Nasr with the signature *pesantren* tradition of *tadabbur alam* (nature contemplation).

The fifth form is integrative textual media consisting of integrated textbooks and learning modules. The researcher found that Trenssains developed its own textbooks and learning modules that combine scientific content with the interpretation of *ayat kauniyah*. These books were written collaboratively by *ustadzs* and science teachers, thereby guaranteeing quality in terms of both scientific accuracy and interpretive validity. The development of such contextual instructional materials matches the recommendations of Mulyasa and Prastowo concerning the importance of teaching materials developed in accordance with the specific context and needs of the educational institution.²⁴

In terms of its characteristics, the learning media for *ayat kauniyah* at Trenssains demonstrate four main variables. First, *integrative*: each medium is designed to explicitly connect scientific content with the texts of the Qur'an and Hadith, rather than placing the two separately. Second, *contextual*: the media are developed by specifically considering the background, needs, and ability levels of the *santris*. Third, *inquiry-based*: most media are designed to encourage *santris* to ask questions, explore, and discover for themselves the interconnectedness between science and *kauniyah*, rather than merely receiving information passively. Fourth, *affective-spiritual*: the media target not only the cognitive domain but also the affective domain by cultivating a sense of awe and *tafakkur* (reflection) toward the greatness of Allah through natural phenomena. These characteristics align with the Islamic education framework developed by Al-Attas and Wan Daud, which emphasizes the importance of the spiritual dimension in every aspect of learning.²⁵

The media development process at Trenssains also exhibits a systematic pattern. Based on document analysis and interviews, it was found that media development passes through at least five stages: (1) identification of *ayat kauniyah* relevant to the scientific topic to be studied; (2) in-depth study of the interpretation of the verses by trusted scholars; (3)

²³ Joy Palmer, *Environmental Education in the 21st Century: Theory, Practice, Progress and Promise* (Routledge, 2002), <https://api.taylorfrancis.com/content/books/mono/download?identifierName=doi&identifierValue=10.4324/9780203012659&type=googlepdf>.

²⁴ Enco Mulyasa, *Pengembangan Dan Implementasi Kurikulum 2013*, 2014.

²⁵ Syed Muhammad Al-Naquib al-Attas, *Aims and Objectives of Islamic Education*, 1979, <https://www.sidalc.net/search/Record/dig-unesdoc-ark:-48223-pf0000101217/Description>.

consultation with science experts to ensure the accuracy of scientific content; (4) prototyping and trialing the media with a small group of *santris*; and (5) revision and finalization based on feedback.

This process reflects the instructional design principles proposed by Branch in the ADDIE model (*Analysis, Design, Development, Implementation, Evaluation*),²⁶ although it has been adapted for the *pesantren* context, which possesses its own unique characteristics.

These findings highlight the role of learning media in Islamic education, particularly within *pesantrens*, which have previously tended to receive less attention in academic literature. The existence of Trenssains with its rich and structured collection of *kauniyah* learning media provides a concrete model that can serve as a developmental reference for other Islamic educational institutions.

The Utilization of Learning Media at Pesantren Trenssains

The findings regarding the implementation indicate that the utilization of learning media for *ayat kauniyah* at Trenssains is not conducted in a sporadic or incidental manner, but is rather structured within a specially designed integrated curriculum framework. This curriculum integrates vertically (across grade levels) and horizontally (across subjects), ensuring that the lessons on *kauniyah* become the common thread that connects the various disciplines studied by the *santris*. This integrative curriculum approach aligns with the *integrated curriculum* model proposed by Fogarty and Jacobs, which emphasizes the vital importance of connections between disciplines to build a comprehensive understanding.²⁷

The daily implementation of *kauniyah* learning media at Trenssains follows a relatively consistent pattern. In every science learning session, the *ustadz* begins by presenting the *ayat kauniyah* relevant to that day's topic, accompanied by a brief interpretation that is easily understood by the *santris*. Following this, visual media or digital simulations are utilized to illustrate the interconnectedness between the Qur'anic message and the scientific phenomena to be studied. A deep exploration of the scientific content is subsequently carried out through laboratory experiments or group discussions, where the *santris* are actively engaged in the discovery process. The session concludes with a collective reflection on the spiritual meaning of the lesson within the context of reinforcing faith (*iman*) and piety (*taqwa*). This implementation pattern is consistent with the contextual teaching and learning model developed by Johnson as well as the Qur'an-based inquiry approach advocated by Akhiruddin.²⁸

One of the most prominent aspects of implementation is the utilization of laboratory media in teaching *ayat kauniyah*. Observations demonstrate that laboratory experiments at Trenssains always begin and end with the reading and reflection of the relevant *ayat kauniyah*. For instance, when *santris* conduct a biology experiment on photosynthesis, they are guided to connect the process with Q.S. Al-An'am: 95 regarding how Allah brings forth

²⁶ Robert Maribe Branch, *Instructional Design: The ADDIE Approach* (Springer US, 2009), <https://doi.org/10.1007/978-0-387-09506-6>.

²⁷ Robin J. Fogarty And Brian M. Pete, *How To Integrate The Curricula* (Corwin Press, 2009),.

²⁸ Elaine B. Johnson, *Contextual Teaching and Learning: What It Is and Why It's Here to Stay* (Corwin Press, 2002), [https://www.google.com/books?hl=id&lr=&id=2HRoigMMdQMC&oi=fnd&pg=PR7&dq=Johnson,+E.+B.+\(2010\).+Contextual+Teaching+and+Learning:+What+It+Is+and+Why+It%27s+Here+to+Stay.+Corwin+Press.&ots=sXoRWDElMM&sig=cXM8wXmbKjU8rthADqHekJlw6qk](https://www.google.com/books?hl=id&lr=&id=2HRoigMMdQMC&oi=fnd&pg=PR7&dq=Johnson,+E.+B.+(2010).+Contextual+Teaching+and+Learning:+What+It+Is+and+Why+It%27s+Here+to+Stay.+Corwin+Press.&ots=sXoRWDElMM&sig=cXM8wXmbKjU8rthADqHekJlw6qk).

the living from the dead. When studying the law of gravity, they are connected to Q.S. Al-Baqarah: 74 regarding stones from which rivers gush forth. This type of integration is not merely a religious decoration applied to scientific content, but a conscious effort to construct an integrative worldview within the *santris*, showing that science and religion fundamentally speak about the same reality from different perspectives.

Classroom management in *kauniyah* instruction also exhibits distinctive characteristics. The *ustadzs* at Trenssains utilize active learning approaches combined with elements of Islamic critical pedagogy. Small group discussions are used intensively, wherein *santris* are encouraged to debate, argue, and exchange their understandings regarding the correlation between the *ayat kauniyah* and the natural phenomena being studied. This approach conforms with the principles of *dialogic teaching* proposed by Alexander and is highly relevant to the Islamic pedagogical tradition concerning the importance of dialogue and question-and-answer exchanges in the learning process.²⁹ The teacher does not act as a sole authority delivering truth, but rather as a facilitator guiding the *santris* on their intellectual and spiritual journeys.

The utilization of digital media in the implementation of *kauniyah* learning shows a well-planned and measured pattern. Trenssains maintains a strict schedule for learning media utilization within the curriculum, with strictly limited and monitored times. Digital media are reserved solely for independent learning activities inside the classroom, while computer simulations and instructional videos are integrated into specific face-to-face sessions. This prudent technology management policy is relevant to the concerns raised by several researchers regarding the potential negative impacts of digital technology on the *pesantren* environment. Trenssains has successfully harnessed the potential of digital technology without sacrificing the values and spiritual atmosphere that characterize the *pesantren*.

The implementation of outdoor learning media within the context of cosmic verses also yields fascinating results. Outdoor learning activities at Trenssains are carried out on a scheduled basis, typically at the end of each thematic unit, as a form of consolidation and deepening of the learning that has taken place inside the classroom. For example, after studying the unit on ecosystems, *santris* are taken to the *pesantren*'s rice fields or gardens to directly observe the interactions between various organisms. This observation is linked to *ayat kauniyah* concerning ecology and the balance of nature, such as Q.S. Al-Hijr: 19 regarding the balance on earth.

This experiential learning approach coupled with *kauniyah* reflection aligns with Kolb's ideas regarding the experiential learning cycle as well as the concept of *tafakkur* in Islam as a form of intellectual worship.³⁰ This model not only enhances ecological understanding but also converts scientific activity into intellectual worship, making it highly worthy of replication as a best practice in cosmic-verse-based Islamic education.

²⁹ Robin John Alexander, *Towards Dialogic Teaching: Rethinking Classroom Talk*, 2008, https://pure.york.ac.uk/portal/en/publications/towards-dialogic-teaching-rethinking-classroom-talk-4th-edition/?utm_source=chatgpt.com.

³⁰ David A. Kolb, *Experiential Learning: Experience as the Source of Learning and Development* (FT press, 2014), [https://www.google.com/books?hl=id&lr=&id=jpbeBQAAQBAJ&oi=fnd&pg=PR7&dq=Kolb,+D.+A.+\(2014\).+Experiential+Learning:+Experience+as+the+Source+of+Learning+and+Development+\(2nd+ed.\).+Pears+on+Education.&ots=Vp9UIP-WMe&sig=qfsaasx7danrH9W_uFWxiHnmVpw](https://www.google.com/books?hl=id&lr=&id=jpbeBQAAQBAJ&oi=fnd&pg=PR7&dq=Kolb,+D.+A.+(2014).+Experiential+Learning:+Experience+as+the+Source+of+Learning+and+Development+(2nd+ed.).+Pears+on+Education.&ots=Vp9UIP-WMe&sig=qfsaasx7danrH9W_uFWxiHnmVpw).

Another vital finding from the implementation of learning media at Pesantren Trenssains is the role of the *ustadz* as a competent mediator between the Qur'anic text and scientific knowledge. The effectiveness of implementing *kauniyah* learning media at Trenssains relies heavily on the *ustadz*'s ability to credibly bridge these two distinct domains of knowledge. To support this, Trenssains routinely organizes professional training and development for the *ustadzs*, including in-depth Qur'anic study programs, science methodology training, and integrative pedagogy workshops.

Such professional development programs align with the recommendations of Rosnani Hashim, Imron Rossidy, and Mohamad Kamarul Kabilan concerning the dual competency (religious and scientific) that must be possessed by integrative Islamic education teachers.³¹ This finding reinforces the framework of Rosnani Hashim, Imron Rossidy, and Kabilan regarding the urgency of continuous teacher professionalism in integrative Islamic education, while simultaneously elevating the status of the *ustadz* from a mere facilitator to a transformative intellectual who reunites the epistemologies of revelation and reason.

The evaluation of learning media implementation at Trenssains is also conducted in a structured manner. In addition to the formative evaluations regularly carried out by each *ustadz*, the *pesantren* also administers semester-based summative evaluations specifically designed to assess the *kauniyah* competency achievement of the *santris*. This evaluation instrument measures not only cognitive abilities (understanding of scientific content and *kauniyah*), but also affective abilities (integrative attitudes toward science and religion) and psychomotor skills (the ability to apply *kauniyah* understanding in daily life). This holistic evaluation approach aligns with the principles of authentic assessment proposed by Mueller³² and is highly relevant to the Islamic education framework that emphasizes the development of the whole human being (*insan kamil*).

Overall, the implementation of learning media for cosmic verses at Trenssains demonstrates a mature and structured pattern, with a high level of consistency between the curriculum design and its execution in the field. This differs from the findings in many other Islamic educational institutions where a gap exists between the written curriculum (*intended curriculum*) and the curriculum that is actually implemented (*implemented curriculum*), as reported by Muhaimin and Nata.³³ This success confirms that the synchronization among integrative curriculum design, the mediator competence of the *ustadz*, and structured outdoor learning frameworks constitutes a key prerequisite for the transformation of Islamic science education that is operational-substantive rather than merely symbolic.

Implications of Learning Media on the Integrative Understanding and Learning Motivation of Santris

The impact of utilizing learning media on the study of *ayat kauniyah* at Trenssains targets two primary aspects: the *santris*' integrative understanding of the relationship between science and Islam, and their learning motivation. Data for this section were obtained

³¹ Rosnani Hashim and Imron Rossidy, "Islamization of Knowledge: A Comparative Analysis of the Conceptions of AI-Attas and AI-Fārūqī," *Intellectual Discourse* 8, no. 1 (2000), <https://journals.iium.edu.my/intdiscourse/index.php/id/article/view/479>.

³² Jon Mueller, "What Is Authentic Assessment," *Dalam Http://Jfmueller. Faculty. Noctrl. Edu. Diakses Pada* 13 (2006).

³³ Muhaimin, *Pemikiran Dan Aktualisasi Pengembangan Pendidikan Islam*.

primarily from in-depth interviews with *santris* and alumni, observations of learning behavior, as well as analyses of academic records and student portfolios. In terms of integrative understanding, the research findings demonstrate a significant shift in how *santris* perceive the relationship between natural sciences and religion. Before participating intensively in the *kauniyah* learning program, most *santris* (according to their own admissions in interviews) viewed science and religion as two separate and, in some cases, conflicting domains.

This dichotomy is a legacy of the dualistic educational pattern that has long dominated the Indonesian education system, wherein public schools teach science and religious schools teach Islamic sciences, without any systematic effort to integrate the two.³⁴ This indicates that the integration of religion and science at Trenssains has successfully transformed the *santris'* perspective from a dichotomy (science and religion as separate and conflicting domains) toward a holistic integration, directly addressing the epistemic problem inherited from Indonesia's dualistic education system.

After participating in the *kauniyah* learning program at Trenssains, the *santris* demonstrated a clear development in their integrative understanding. They no longer see science as a value-free or secular domain, but rather as a scientific activity laden with spiritual meaning. One grade 11 student described it as follows:

"I used to think that science and the Qur'an were different worlds. Now I see that they actually complement each other. When we learned about the structure of DNA, the ustadz showed us the verse about perfect creation. I immediately felt that wonder."

The experience expressed by this *santri* reflects what Barbour calls the integration position—the most mature form of the science-religion relationship, where the two complement and enrich each other.³⁵ This reinforces that science and religion are no longer understood dichotomously, but rather as two epistemic gateways toward a single reality that demonstrates the majesty and greatness of Allah SWT.

This increase in integrative understanding is also evident in the *santris'* ability to perform scientific interpretations of the cosmic verses. Classroom observations showed that upper-grade *santris* (grades 10-12) are capable of independently identifying relevant *ayat kauniyah* when studying specific science topics, and conversely, they are able to associate scientific concepts with the *ayat kauniyah* they have memorized. This high-level cognitive ability, which encompasses analysis, synthesis, and evaluation, serves as an indicator of deep understanding that goes far beyond mere rote knowledge. This finding aligns with Maulida's research, which demonstrates that learning based on the integration of Islamic values and science significantly enhances students' critical thinking skills.³⁶

³⁴ Azyumardi Azra, "Paradigma Baru Pendidikan Nasional: Rekonstruksi Dan Demokratisasi," (*No Title*), 2002, <https://cir.nii.ac.jp/crid/1971149384786571905>.

³⁵ Ian G. Barbour, *When Science Meets Religion: Enemies, Strangers, or Partners?*, 2000, <https://geoviz.coas.oregonstate.edu/pufmnl3h4izd/14-prof-jerry-jast-sr-1/read-when-science-meets-religion-enemies-strangers-or-w.pdf>.

³⁶ Maulida, "Implementasi Discovery Learning Dalam Pembelajaran Al-Qur'an Hadis Guna Meningkatkan Literasi Digital Kelas Xii Ipa Pada Man Kapuas Kalimantan Tengah Tahun 2024/2025."

The impact of the *kauniyah* learning media is also visible in the *santris'* affective dimension. Interviews with *santris* and observations of their behavior revealed an increase in their sense of wonder and attitude of *tafakkur* (deep reflection) when confronting natural phenomena. Many *santris* reported that the *kauniyah* learning experience changed the way they view and perceive the world around them, transforming ordinary natural phenomena into sources of spiritual inspiration.

This is consistent with the objective of Islamic education formulated by Al-Attas and Wan Daud, which is to cultivate humans who possess *ma'rifah* (experiential knowledge) of Allah acquired through the contemplation of His creation.³⁷ The development of the affective dimension through this learning media also aligns with the concept of spiritual value-based character education developed by Lickona.³⁸ This success demonstrates that the use of cosmic-verse learning media to develop this affective dimension simultaneously actualizes Lickona's spiritual value-based character education framework, proving that epistemic integration (science-revelation) cannot be separated from the moral-ecological formation of *santris* as leaders on this earth.

Regarding the aspect of learning motivation, the research findings reveal an exceptionally positive impact. *Santris* participating in the *kauniyah* learning program at Trenggeng consistently demonstrate higher levels of intrinsic motivation in studying science compared to their state prior to entering the program (based on the *santris'* self-reports in interviews and teacher reports). This phenomenon can be explained through self-determination theory, which posits that intrinsic motivation increases when individuals perceive the relevance and meaning of what they are learning.³⁹ Within the context of Trenggeng, *kauniyah* learning successfully creates a dual meaning for *santris*: a scientific meaning (understanding how nature works) and a spiritual meaning (understanding the majesty of Allah through the orderliness of His creation).

This study also reveals a high pattern of active engagement during *kauniyah* learning sessions. *Santris* actively ask questions, participate in discussions, and propose their own ideas regarding the links between science and the Qur'an. Several *santris* even conduct independent exploration outside of class hours, looking for *ayat kauniyah* related to natural phenomena they encounter in daily life. This high level of engagement serves as a strong indicator of robust learning motivation.⁴⁰

This finding is in line with Widodo's research, which indicates that the use of contextual and meaningful learning media significantly increases student engagement and

³⁷ Al-Naqib al-Attas, *Aims and Objectives of Islamic Education*.

³⁸ Thomas Lickona, *Character Matters: How to Help Our Children Develop Good Judgment, Integrity, and Other Essential Virtues* (Simon and Schuster, 2004), [https://www.google.com/books?hl=id&lr=&id=Pz7ZDwAAQBAJ&oi=fnd&pg=PR1&dq=Lickona,+T.+\(2010\).+Character+Matters:+How+to+Help+Our+Children+Develop+Good+Judgment,+Integrity,+and+Other+Essential+Virtues.+Simon+%26+Schuster.&ots=XbvJF_Gy4M&sig=nETGCmbCPCSz4YeBfhPdraW7o](https://www.google.com/books?hl=id&lr=&id=Pz7ZDwAAQBAJ&oi=fnd&pg=PR1&dq=Lickona,+T.+(2010).+Character+Matters:+How+to+Help+Our+Children+Develop+Good+Judgment,+Integrity,+and+Other+Essential+Virtues.+Simon+%26+Schuster.&ots=XbvJF_Gy4M&sig=nETGCmbCPCSz4YeBfhPdraW7o).

³⁹ Edward L. Deci and Richard M. Ryan, "The 'What' and 'Why' of Goal Pursuits: Human Needs and the Self-Determination of Behavior," *Psychological Inquiry* 11, no. 4 (2000): 227–68, https://doi.org/10.1207/S15327965PLI1104_01.

⁴⁰ Dale H. Schunk et al., "Motivation in Education: Theory, Research, and Applications," (*No Title*), 2014, <https://cir.nii.ac.jp/crid/1130282269392970880>.

learning motivation.⁴¹ This reinforces Widodo's thesis that contextual and meaningful instructional media foster engagement, while simultaneously identifying a unique factor within the *pesantren* context—namely, when nature is read as the verses of God, scientific curiosity transforms into an existential longing (*shauq*) that serves as the engine for lifelong learning.

The long-term impact of *kauniyah* media instruction was also identified through interviews with Trenssains alumni. The interviewed alumni, who currently work in various fields ranging from education and science to entrepreneurship, consistently cite their *kauniyah* learning experience at Trenssains as one of the most memorable formative experiences in their academic journeys. They report that the integrative understanding they developed at Trenssains helps them avoid inner conflict between their Muslim identity and their professional identity in the fields of science and technology.

This finding addresses the issue of identity dichotomy frequently experienced by educated Muslims in the contemporary era, which has been analyzed in depth by Tibi and Ramadan.⁴² This elevates the status of cosmic-verse instruction from a mere pedagogical innovation to an instrument of self-identity, enabling alumni to navigate the modern world without experiencing a crisis in their identity as a *santri*.

It is also interesting to note that the positive impact of *kauniyah* learning media at Trenssains is not uniform among all *santris*. There are quite distinct variations in the levels of integrative understanding and motivation shown by *santris*, which appear to be influenced by several factors: their educational background prior to entering Trenssains (students with a stronger public education background tend to integrate scientific content more easily), individual learning styles, and the level of parental involvement in supporting *kauniyah* learning at home. This diversity indicates that although the learning media developed by Trenssains are excellent, finer differentiation is still required to accommodate the diverse learning needs and characteristics among *santris*.

This is in alignment with the principles of Universal Design for Learning (UDL) put forward by Rose and Meyer, which advocate designing flexible curricula and learning environments that eliminate barriers to learning and provide equal access for all students, including those with disabilities.⁴³ The success of the science-revelation integration program cannot rely solely on curriculum design and the competency of the *ustadz*, but also on the system's flexibility in accommodating the diversity of *santri* learning profiles fairly and inclusively.

Overall, the findings in this third sub-chapter confirm that the learning media for *ayat kauniyah* developed and implemented at Pesantren Trenssains Tebuireng exert a significant and multidimensional impact on the *santris*. The impact is not only cognitive (an increase in integrative understanding) but also affective (an increase in spiritual wonder and religious sensitivity) and motivational (an increase in intrinsic motivation in studying science and

⁴¹ Suryo Widodo, "Variabel-Variabel Tersembunyi Dalam Guru Matematika Kreatif," *Repository Publikasi Ilmiah*, 2013, <https://repository.ciptamediaharmoni.id/index.php/repo/article/view/41>.

⁴² Bassam Tibi, *Islam between Culture and Politics* (Palgrave Macmillan UK, 2005), <https://doi.org/10.1057/9780230204157>.

⁴³ David H. Rose and Anne Meyer, *A Practical Reader in Universal Design for Learning*. (ERIC, 2006), <https://eric.ed.gov/?id=ED515447>.

religion). These findings provide strong empirical evidence regarding the effectiveness of the *kauniyah*-based integrative educational approach, which forms the core vision of Pesantren Trenssains.

The results of this study also carry important implications for the broader discourse on Islamic education in Indonesia and the Muslim world in general. Amid concerns over the secularization of knowledge and the deeply rooted science-religion dichotomy, Pesantren Trenssains offers an alternative model demonstrating that a sincere and profound integration between science and Islam is not only theoretically possible but can be practically realized through the development of appropriate learning media, a well-designed curriculum, and strong institutional commitment. This model has the potential to be adapted and further developed by Islamic educational institutions in various different local contexts, taking into account the uniqueness and needs of each institution.

Conclusion

This research has examined in depth the learning media for *ayat kauniyah* at Pesantren Trenssains Tebuireng Jombang through a qualitative case study approach. Based on the findings obtained from observations, in-depth interviews, and document analysis, three main conclusions can be drawn, reflecting the three primary sub-chapters of discussion in this study.

First, Pesantren Trenssains developed multimodal, integrative, and systematic learning media for *ayat kauniyah*, encompassing Qur'an-based visual media, *kauniyah*-based science laboratories, application-based digital media and technology, open-air media (*outdoor learning*), as well as integrated textual instructional materials. These media were developed through a structured process involving the collaboration of teams of religious and science teachers, simultaneously paying close attention to scientific accuracy and interpretive validity. The primary characteristics of these media are their integrative, contextual, inquiry-based nature, which is oriented toward developing the *santris'* affective-spiritual dimension.

Second, the implementation of *kauniyah* learning media at Trenssains is carried out within an integrated curriculum framework that vertically and horizontally integrates science and religious lessons. A consistent daily implementation pattern, well-planned and controlled utilization of digital media, the use of active and dialogic learning approaches, and holistic evaluations covering cognitive, affective, and psychomotor dimensions are the defining characteristics that make the Trenssains *kauniyah* program effective in practice. The role of the *ustadz* as a competent mediator between the Qur'anic text and scientific knowledge also represents a key factor in the success of the implementation.

Third, the utilization of learning media for *ayat kauniyah* exerts a significant and multidimensional impact on the *santris*, including an increase in integrative understanding of the relationship between science and Islam, a heightened sense of spiritual wonder and attitude of *tafakkur* toward natural phenomena, and an increase in intrinsic motivation in studying science and religion. The long-term impact experienced by Trenssains alumni—manifested in the formation of an integrative Muslim identity capable of pursuing professions in science and technology fields without undergoing inner conflict with their

Islamic identity—is clear evidence of the success of the *kauniyah* educational approach developed by Trensains.

This study has several limitations that need to be acknowledged. First, as a single case study, the findings of this research cannot be statistically generalized to other contexts. However, analytical generalizations in the form of principles and lessons learned from this case can still be selectively applied to other contexts with similar characteristics. Second, the duration of the research, which was limited to two semesters, might not have fully captured the long-term dynamics of the *kauniyah* learning program. Longitudinal research over a longer period is required to understand the developmental trajectories of the *santris* more comprehensively.

Based on the findings and conclusions of this study, several recommendations can be proposed. For Islamic education policymakers in Indonesia, the *kauniyah*-based science-Islam integration model implemented by Trensains is highly worthy of being used as a reference in formulating the national curriculum for Islamic education. For other *pesantrens* and madrasahs wishing to develop similar programs, the keys to Trensains' success—which include systematic media development, a well-designed integrative curriculum, continuous professional development for teachers, and strong institutional commitment—can serve as a guide for adaptation. For future researchers, comparative studies among various Islamic educational institutions developing science and *kauniyah* integration programs would be highly valuable to identify success factors that apply more universally.

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