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Exploring Kauniyah Verses via Botanical Project: Integrating Early Science and Tauhid Values in Kindergarten

Eksplorasi ayat kauniyah melalui Islamic-STEAM botanical project: Integrasi pembelajaran sains dan nilai tauhid di TK Assabil 2

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ABSTRACT
This study aims to examine and enhance the integration of science learning and the cultivation of tawhid values in early childhood through the implementation of an Islamic-STEAM Botanical Project based on the exploration of ayat kauniyah. This research employs a Classroom Action Research (CAR) method with a qualitative case-study approach involving 10 Group B children (aged 5–6 years), designed directly by the classroom teacher at TK Assabil 2. Data collection was conducted participatively through observation and documentation during the mung bean botanical project experiments. The results indicate that the Islamic-STEAM approach brings about a shift in designing learning that integrates science, simple technology, engineering, art, and mathematics into a framework of tawhid values. This approach enhances early childhood science skills in observing, classifying, and understanding the orderliness of nature, while fostering the spontaneous recitation of tayyibah phrases such as subhanallah and alhamdulillah, as well as cultivating environmental awareness. In conclusion, the Islamic-STEAM Botanical activity implemented by the teacher is highly effective in introducing ayat kauniyah to young children without separating their logical thinking (derived from sensory-measured or proven observations) from religious thinking regarding the power of Allah SWT in mung bean growth. By combining both modes of reasoning, the children at TK Assabil 2 not only develop their

intellectual intelligence, but also grow in sensitivity and love for Allah SWT through the divine power they observe.
Keywords*: Islamic-STEAM, Kauniyah Verses, Botanical Project, Scientific Literacy, Early Childhood Education.*

INTRODUCTION

Every child is born with an innate disposition toward monotheism (*fitrah tauhid*) that requires holistic stimuli for balanced development. Kindergarten education serves as the foundational pillar in shaping a child's character, mindset, and spiritual growth (Rahmadani, 2024). Meanwhile, the essence of the universe consists of cosmic signs (*ayat kauniyah*) that illustrate the immense power of Allah SWT. In the context of Islamic education, learning implementation integrates religious values with introductions to science and technology (Adiyono et al., 2024). In reality, however, learning practices often integrate them separately; religious values are restricted to memorizing prayers without understanding the evidence of Allah's power, particularly in nature, while science focuses on basic environmental or botanical topics like stems, leaves, and flowers (Ariani et al., 2026)

In child developmental psychology and religious education, spiritual values do not emerge instantaneously; rather, they develop progressively through structured phases ranging from imitation to internalization. To ensure the validity of the action involving 10 research subjects across two cycles of Classroom Action Research (CAR), this study employs specific performance-based assessment indicators to distinguish mechanical responses driven by teacher instructions from genuine spiritual appreciation:

1. **The Imitation Stage:** At the initial phase, young children absorb knowledge by directly observing teacher modeling. When guiding students in preparing planting media and sowing mung bean seeds, the instructor consistently introduces noble expressions—such as reciting "Bismillah" before starting or saying "Subhanallah"

while observing dry seeds. As the seeds begin to crack and sprout, the students follow by uttering "Alhamdulillah" under the direct guidance of the instructor.

2. **The Habituation and Practice Stage:** Through the series of *Islamic-STEAM Botanical Project* activities executed repeatedly across the CAR cycles, children are actively engaged in caring for plants—ranging from arranging cotton pads and managing water moisture to measuring stem heights using rulers. This hands-on experience transforms abstract divine greatness into tangible, observable empirical reality. At this point, *tayyibah* phrases are routinely integrated into daily science activities, such as exclaiming "Maa syaa Allah" when fresh green leaves begin to flourish, or fostering a sense of responsibility when reminded to protect the Creator's creations.
3. **The Spontaneous Internalization Stage:** Over time, driven by consistent practice and logical reasoning verified by the children themselves (observing how a tiny seed grows into a thriving plant through water and sunlight regulated by Allah SWT), these values ultimately permeate the children's affective core. Entering Cycle II, the students no longer rely on teacher cues. They spontaneously articulate awe and faith in various real-life situations—such as cheerfully exclaiming "Maa syaa Allah, the stem is growing so high! Allah made it grow!" when observing plants outside of core learning hours, reminding peers to water plants because they are Allah's creations, or displaying profound emotional and spiritual sensitivity by feeling sorrow when their plants die due to over-watering ("Ummi... my plant died from too much water").

Through this method, the economical practice of planting mung beans serves as an effective medium that harmoniously integrates empirical science with tawhid education (Apriyani et al., 2025). Notably, this *Islamic-STEAM* project encompasses five disciplines—including science, simple technology, engineering, arts, and mathematics—which were designed, implemented, and evaluated directly by the classroom teacher at TK Assabil 2.

This separation of religious values and science risks fostering a mindset that views science and religion as two compartmentalized domains. Therefore, hands-on learning

experiences—such as green bean germination experiments—are essential, as active engagement builds a far deeper understanding of science than listening to teacher explanations alone.(Pasaribu, 2025). This is because children do not merely read about or listen to plant growth; they observe the transition from seed to sprout and witness how sunlight and water affect development. This aligns with Piaget's theory that kindergarten-aged children still require tangible objects they can see and manipulate (Adawiyah et al., 2025). According to Herlina, experimental media drives learning innovation and heightens children's curiosity about natural phenomena as a form of exploring *ayat kauniyah*. Green bean experiments offer an affordable, practical medium that delivers direct, real-world experiences (Apriyani et al., 2025). This approach requires teachers to act as facilitators who foster an engaging learning environment through the exploratory Islamic-STEM Botanical Project approach. Uniquely, this framework spans five disciplines: science/biology, technology, engineering, arts, and mathematics (Dewi, 2023) Based on Classroom Action Research (CAR) conducted at Assabil 2 Kindergarten, the classroom teacher structured the experimental process so that children's scientific reasoning (observation and measurement) developed alongside spontaneous religious expression (*subhanallah*, *alhamdulillah*), fostering an awareness that Allah SWT causes plants to grow.(Farwati et al., 2021)

The novelty of this study lies in addressing a fundamental pedagogical issue: whereas previous studies generally integrated religion and science superficially—relying solely on rote memorization or segregated narratives—this research combines empirical scientific investigation and faith reflection into a single hands-on model for early childhood. For children aged 5 to 6 years, a developmental phase where Piaget emphasizes sensory exploration and concrete operational readiness, abstract religious concepts are often difficult to connect with children's real-world experiences. (Laminah & Anwar, 2024) To overcome this challenge, the Islamic-STEAM Botanical Project is presented as an applicable solution. Designed, implemented, and evaluated directly by the classroom teacher at Assabil 2 Kindergarten through Classroom Action Research (CAR), this project successfully unites

scientific observation activities (such as measuring plant growth rates) with the cultivation of spiritual values (fitrah tauhid). Consequently, this research enhances scientific competence while simultaneously building the foundation of children's faith in a harmonious manner. (Ramadhan & Nadhira, 2022)

RESEARCH METHOD

This study employed a qualitative approach utilizing a case study design through Classroom Action Research (CAR) conducted at Assabil 2 Kindergarten(Musafir et al., 2023). This study involved 10 children from Group B, aged 5-6 years. It aimed to investigate the integration of science learning and tawhid values at Assabil 2 Kindergarten through an Islamic-STEAM botanical project based on the exploration of kauniyah verses. The implementation of this study was carried out in two cycles, progressively structured through planning, action, observation, and reflection(Ade Rahayu & Arna Saskia, 2025). In the planning stage, the researcher prepared activities, media, materials, and observational instruments tailored to botanical needs.

In Cycle I, activities focused on introducing green beans and the method of planting them. Here, children were actively and directly engaged in preparing the growth medium, counting the green beans according to the given instructions, watering them, and observing the initial changes in the green beans. The researcher observed the children's ability to express the changes occurring over several days of planting(Setiawan et al., 2023), as well as their responses when connected to the omnipotence of Allah SWT. The results of these observations served as a basis for reflection to improve the implementation of activities in Cycle II (Widiyanti, 2021).



Figure 1. Arranging cotton pads



Figure 2. Watering plants



Figure 3. Counting Green Beans

In Cycle II, children were provided with the opportunity to observe the growth of the green bean plants as they began to sprout. At this stage, children were asked to reflect on the

changes that occurred from Cycle I to Cycle II, allowing them to freely share their opinions based on their observational results(Ramadhani et al., 2026). Furthermore, the reinforcement of tawhid was further developed through guided questions and conversations directed at helping children understand that plant growth is part of a natural process demonstrating the greatness of Allah SWT(Ujung et al., 2026).





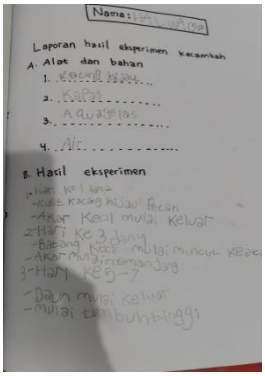


Figure 4. Seed coat splitting **Figure 5. The plant grows a stem** **Figure 6. Experiment Repor**

Research data were collected through observations, children's portfolios/works, documentation, and experiment result sheets. Observations were crucial in examining children's behavior, engagement, reasoning skills, capacity to observe changes, and responses to the reinforcement of tawhid values. Meanwhile, documentation in the form of activity photos and experiment result sheets served as supporting data for the research. The data were subsequently analyzed descriptively by categorizing observation results based on the research indicators. Data validity was reinforced through technical triangulation, which involved comparing the results of observations, documentation, experiment sheets, and children's works (Rozikin et al., 2026). The findings indicate that Classroom Action Research (CAR) plays a significant role in improving the quality of learning (Utomo et al., 2024). Consequently, not only did the children become active, but educators also became more professional and creative, making it easier for them to evaluate the teaching and learning process (Agustin & Dewi, 2025)

DISCUSSION

1. Theological and Epistemological Foundations (Integration-Interconnection)

Science and religion are often perceived as separate, even though both play a role in enriching human understanding of nature and life. This stigma needs to be rectified,

highlighting the need for a more solution-oriented new paradigm that harmoniously combines religious studies with science (Wijayanti, 2023). Islamic education in kindergarten requires an epistemological foundation as a balancing element in integrating religious knowledge with general knowledge or science. To overcome the problem of the dichotomy of knowledge, Amin Abdullah introduced the Integration-Interconnection paradigm using the scientific triangle of Hadharah al-Nash (religious texts), Hadharah al-Ilm (empirical science), and Hadharah al-Falsafah (humanities ethics) (Masyitoh, 2020). In the context of kindergarten education, this paradigm transforms M. Quraish Shihab's perspective in dividing the two forms of divine greatness into qauliyah verses (revealed texts of the Qur'an) and kauniyah verses (signs of Allah SWT's greatness across all His creations in the universe) (Mukmin & Arikarani, 2025). Meanwhile, theologically, introducing science to kindergarten children is not merely about teaching basic biology; rather, it is a process of introducing the greatness of Allah SWT, such that through Integration-Interconnection, experimental activities become a spiritual experience that can strengthen the foundation of tawhid from an early age (Hafiz et al., 2025).

Epistemological Foundation	Theological Foundation	Kindergarten Learning Integration	Child Development Goals
Qauliyah Verses	Al-Qur'an QS. Al-An'am ayat 95	Introduction to the Concept of Allah (Al-Khaliq—The Creator and Al-Muhyi—The Giver of Life)	Building children's foundational tawhid from an early age / Nurturing the foundation of

			children's tawhid early on
Kauniyah Verses	Hands-on experience	Observing green bean seed growth, water requirements, and the role of sunlight.	Building a sharp mindset, scientific literacy, and an understanding of the laws of nature
Spiritual Ethics	Environmental stewardship ethics	Habituation of caring for and watering plants	Cultivating a sense of environmental care in children

2. The Islamic-STEAM Learning Framework in Early Childhood

The STEM (Science, Technology, Engineering, Arts, Mathematics) learning framework introduced by Georgette Yakman is considered effective for developing cognitive thinking, creativity, problem-solving skills, and enjoyable collaboration (Haka et al., 2025). The advantage of this STEAM learning approach lies in its ability to serve as a collaborative platform that refines cognitive skills while building spiritual sensitivity (Mentari & Yuhaswita, 2022). For children aged 5–6 years, the five Islamic-STEAM concepts in the green bean planting experiment go beyond merely watering plants; they encompass the five STEAM elements as follows (Safitri, 2022):

a. Science: Children are introduced to basic biology, such as green bean seeds, water, sunlight, as well as root and stem growth.

b. Technology: Children are introduced to the tools required in the green bean planting experiment, such as spray bottles, smartphone cameras to photograph development, and others.

c. Engineering: Children are guided to design the planting medium, such as arranging cotton wool in plastic cups and making name labels for ownership.
d. Art: Children are encouraged to illustrate the plant development process using writing media.
e. Mathematics: Children are invited to count the number of green bean seeds to be planted, measure plant height using a ruler, and count the days of growth.

All of the aforementioned STEM outcomes are integrated with Amin Abdullah's concept, which connects the integration-interconnection paradigm (Nurhasanah et al., 2019). According to M. Amin Abdullah, integration-interconnection is not merely intended to dismantle the dichotomy of knowledge, but rather serves as a paradigm constructed to unite methods, concepts, and theories from various disciplines to help deepen understanding and solve problems (Yusuf, 2025).

STEAM Components	Focus of Learning Activities	Science Skill Indicators	Tawheed and Character Values
Science	Observing the changes in green bean growth into sprouts and leaves	Recognizing the changes occurring in the plants, both in color and shape	Seeing and realizing that the growing plant is the creation of Allah SWT
Technology	Utilizing tools such as water spray bottles, rulers, and smartphone cameras to further understand the growth process	Using supporting tools	Fostering a sense of gratitude for the beauty of Allah SWT's creation

Engineering	Being able to prepare planting media, such as arranging cotton, water, and containers for planting	Being able to troubleshoot plant problems such as under-watering or over-watering	Fostering an attitude of meticulousness, neatness, and patience in carrying out activities
Art	Writing observation results and illustrations in the experimental report	Expressing ideas through creative works	Appreciating the beauty of plants as the creation of Allah
Mathematics	Counting the number of green beans, measuring stem height using finger joints and rulers	Recognizing quantity, size, and the sequence of days	Knowing that Allah creates everything in balance

3. Indikator Capaian Penelitian

The integration-interconnection paradigm unites religious knowledge with natural and social sciences to produce a philosophical balance in viewing the reality of life (Astuti et al., 2024) The success of integration-interconnection in this study is measured based on the development of children aged 5-6 years old.

Main Achievement Indicator	Observable Student Behaviors
Observational skills	Able to state or describe the changes that occur in detail
Ability to understand cause and effect	Stating the relationship between plant freshness and water and sunlight
Simple measurement	Comparing plant heights using fingers and a ruler

Spontaneous Thayyibah expressions	Reflection on plant growth through the spontaneous expression of Thayyibah phrases stemming from children's spiritual awareness, triggered directly by their scientific observations of biological phenomena (plant growth stages).
Awareness of the greatness of Allah SWT	Stating with conviction that the plant is created by Allah, not by humans
Islamic Ecoliteracy	Caring for plants independently at home

CONCLUSION

The implementation of the Islamic-STEAM Botanical Project through the exploration of kauniyah verses at TK Assabil 2 demonstrates a complementary relationship between science learning and the reinforcement of kauniyah verses in early childhood. The green bean planting experiment activities provided children with the direct opportunity to observe the process of planting and caring for plants. In addition, children were able to compare and recognize changes occurring in the plants with their classmates(Juita et al., 2024) The implementation of this Islamic-STEAM Botanical Project also helped children comprehend the magnificence of Allah SWT as the Creator through various phenomena encountered during the learning process. This encouraged children to begin preserving and caring for the environment as a form of gratitude and to become accustomed to uttering thayyibah expressions when observing Allah's creations.(Marthinus et al., 2023)

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