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Eco-Spiritual Learning as an Approach to Enhancing Ecological Awareness among Biology Students through Qur'an and Hadith Studies

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Abstract
This study describes the application of Eco-Spiritual Learning to strengthen Biology students' ecological awareness in the Qur'an and Hadith Studies course. Using a qualitative descriptive approach, data were collected from 39 sixth-semester Biology students through reflective open-ended questionnaires exploring ecological knowledge, ecological awareness, spiritual meaning, moral responsibility, and ecological action. The data were analyzed using the interactive model of Miles, Huberman, and Saldaña (data collection, condensation, display, and conclusion drawing and verification). The findings show that integrating biological knowledge with Qur'anic and Hadith values strengthened students' ecological awareness. Students understood ecosystems, pollution, environmental degradation, resource use, and human impacts on sustainability (ecological knowledge); showed greater sensitivity to waste, plastic use, excessive water and energy consumption, and declining green spaces (ecological awareness); viewed nature as Allah's creation, a sign of His greatness, and a trust given to humans as khalifah (spiritual meaning); regarded environmental protection as a personal, social, moral, and spiritual obligation (moral responsibility); and reduced single-use plastics, used tumblers, sorted waste, conserved resources, greened their surroundings, and encouraged others (ecological action). The study concludes that Eco-Spiritual Learning strengthens ecological awareness by integrating these five dimensions.

Keywords:
Eco-Spiritual Learning; Ecological Awareness; Biology; Qur'an and Hadith.

A. INTRODUCTION

Environmental degradation, pollution, waste accumulation, and the unsustainable use of natural resources have made ecological awareness an urgent issue in education. Biology education is especially relevant in this context because it directly addresses ecosystems, biodiversity, human impacts on nature, and life-supporting processes that are central to sustainability. As a result, biology learning is well positioned to foster environmentally responsible attitudes and behaviors among students.

Recent studies indicate that integrating environmental education into biology learning can strengthen students' environmental literacy, conservation attitudes, and participation in real environmental action. Contextual strategies such as project- best learning, the use of local ecosystems as learning resources, and the reinforcement of ecological values in biology content have been identified as effective approaches for improving ecological consciousness. More broadly, sustainability adecation also emphasizes active participation, interactivity, and applied learning rather than knowledge transmission alone.

Environmental problems are not only scientific issues but also ethical and spiritual ones. Sustainability education increasingly stresses that learners should understand the consequences of human choices, connect ecological system with social life, and develop more holistic and integrative ways of thinking. For that reason, environmental education should not stop at knowledge acquisition, but should also encourage moral reflection and personal responsibility. In real-life educational settings, this approach is rational because environmental problems are shaped by everyday human choices. When students learn to connect biology concepts with habits such as saving water, reducing waste, avoiding excessive consumption, and taking responsibility for shared spaces, ecological awareness becomes more likely to persist beyond the classroom. For that reason, Eco-Spiritual Learning appears to offer a relevant pathway for developing students who are not only scientifically informed, but also morally responsible and practically engaged in sustainable living.

From an Islamic perspective, humans are viewed as khalifah, or stewards of the earth, with a moral duty to protect creation. Islamic ecological ethics emphasize stewardship, moderation, justice, compassion, and the avoidance of waste, all of which are closely aligned with environmental preservation and sustainable living. These values provide a meaningful framework for integrating spiritual principles into ecological learning.

This perspective is reflected in Eco- Spiritual Learning, an approach that connects biological knowledge with Qur'anic and Hadith values. The attached paper reports that Eco- Spiritual Learning strengthened biology students' ecological awareness by integrating biological knowledge with Qur'anic and Hadith teachings. In that study, ecological awareness developed across five interrelated dimensions: ecological knowledge, ecological awareness, spiritual meaning, moral responsibility, and ecological action. Students expressed spiritual meaning by viewing nature as Allah's creation and a trust for humans as khalifah, and this was linked to concrete actions such as reducing single-use plastics, sorting waste, conserving resources, and encouraging others to care for the environment. In addition, ecological awareness in biology education needs to be understood as a multidimensional capacity, not merely as cognitive understanding of environmental concepts. Eco-Spiritual Learning strengthened students' ecological awareness through five interconnected dimensions: ecological knowledge, ecological awareness, spiritual meaning, moral responsibility, and ecological action. This pattern suggests that effective environmental learning should help students move from understanding ecological problems to interpreting their ethical significance and translating that understanding into daily conduct.

In real- life terms, this approach is rational because environmental responsibility depends not only on knowing ecological facts but also on having values that shape everyday behavior. When students connect sustainability with practical habits such as reducing waste, using resources carefully, protecting living beings, and participating community-based environmental action, ecological awareness becomes more likely to sense, integrating biology, ethics, and spirituality offers a realistic educational pathwayfor translating environmental knowledge into consistent action in daily life.

B. METHODS

This study employed a descriptive qualitative approach to explore the implementation of Eco-Spiritual Learning as an approach to enhancing Biology students' ecological awareness through the Qur'an and Hadith Studies course. A qualitative approach was chosen because the study aimed to gain an in-depth understanding of participants' experiences, perceptions, and reflections within their natural learning context (Creswell & Poth, 2018; Merriam & Tisdell, 2016). The study was conducted in the Biology Education Study Program and involved 39 sixth-semester undergraduate students enrolled in the Qur'an and Hadith Studies course. Participants were selected using a total sampling technique, as all students experienced the implementation of Eco-Spiritual Learning during the course.

Data were collected using two instruments: a 25-item closed-ended questionnaire using a Likert scale and a reflective open-ended questionnaire. The closed-ended questionnaire was used to obtain supporting descriptive data regarding students' responses to Eco-Spiritual Learning, while the open-ended questionnaire was designed to explore students' experiences and reflections concerning ecological knowledge, ecological awareness, spiritual meaning, moral responsibility, and ecological action. Before data collection, the instruments were reviewed for content validity by experts. The validation focused on the relevance, clarity, and suitability of the items with the theoretical dimensions examined in the study. The instruments were revised based on the experts' suggestions before being administered to the participants.

The collected data were analyzed using the interactive model proposed by Miles, Huberman, and Saldaña (2020), consisting of data collection, data condensation, data display, and conclusion drawing and verification. The responses to the reflective open-ended questionnaire were analyzed qualitatively to identify recurring themes related to the five dimensions of ecological awareness. Meanwhile, the responses to the closed-ended questionnaire were analyzed descriptively using frequencies and percentages and were treated as supporting data. The findings from both instruments were subsequently compared to strengthen the interpretation of the qualitative findings.

To ensure the trustworthiness of the findings, methodological triangulation was conducted by comparing data obtained from the closed-ended and reflective open-ended questionnaires. This process was intended to enhance the credibility and consistency of the findings.

C. RESULT & DISCUSSION

1. Integration of Eco-Spiritual Learning Concepts into Students' Ecological Awareness

The findings show that the integration of Eco-Spiritual Learning developed students' ecological awareness through the connection between biological knowledge and Qur'anic and Hadith values. Based on the analysis of students' reflective open-ended responses, five interrelated dimensions emerged: ecological knowledge, ecological awareness, spiritual meaning, moral responsibility, and ecological action. In the dimension of ecological knowledge, students demonstrated an understanding of ecosystems, pollution, environmental degradation, resource use, and human impacts on sustainability. Students also related biological concepts to the natural signs of Allah's creation, indicating that biological knowledge was understood together with Islamic values.

The ecological awareness dimension was reflected in students' sensitivity to environmental problems, including waste, pollution, plastic use, excessive consumption of water and energy, and the reduction of green spaces. This awareness was further connected to spiritual meaning, in which students viewed nature as Allah's creation and as a trust entrusted to humans as khalifah. The dimension of moral responsibility appeared through students' understanding that protecting the environment is not only

a scientific responsibility but also a personal, social, moral, and spiritual obligation. This understanding was reflected in students' descriptions of environmentally responsible actions, such as reducing single-use plastics, sorting waste, conserving water and energy, and encouraging others to care for the environment.

These findings indicate that Eco-Spiritual Learning encouraged students to understand ecological issues in an integrated manner. Environmental problems were not viewed solely as scientific matters, but were also interpreted through ethical and spiritual values derived from the Qur'an and Hadith.

2. Students' Application of Eco-Spiritual Learning in Ecological Awareness and Environmental Action

The second finding concerns the application of Eco-Spiritual Learning in students' daily environmental attitudes and actions. The thematic analysis of students' reflective responses identified five recurring themes: environmental stewardship, integration of Biology and Islam, responsibility as khalifah, behavioural change, and environmental action.

Theme	Description
Environmental stewardship	The environment is perceived as a trust (amanah) from Allah.
Integration of Biology and Islam	Biological knowledge strengthens students' understanding of Qur'anic teachings.
Responsibility as khalifah	Protecting nature is understood as part of human responsibility and worship.
Behavioural change	Students describe reducing plastic waste and conserving water and electricity.
Environmental action	Students encourage others to maintain environmental cleanliness and participate in environmental care.

The most prominent theme was environmental stewardship, showing that students understood environmental conservation as a religious responsibility in addition to a scientific obligation. The integration of Biology and Islam also appeared consistently, indicating that students perceived biological knowledge as supporting their understanding of environmental values in the Qur'an and Hadith.

The responsibility as khalifah theme further showed that students associated environmental care with their role as stewards of the Earth. Meanwhile, behavioural change was reflected in reported practices such as reducing plastic consumption and conserving water and electricity. Some students also described encouraging family members, friends, and peers to maintain environmental cleanliness.

Overall, the findings suggest that Eco-Spiritual Learning supported the internalisation of environmental values into students' everyday behaviour. The learning process therefore connected ecological knowledge with spiritual meaning, moral responsibility, and concrete environmental action.

3. Discussion in Relation to Previous Studies

The findings demonstrate that Eco-Spiritual Learning connects scientific knowledge with spiritual values in developing students' ecological awareness. Students not only understood ecological concepts through Biology but also interpreted environmental conservation as a moral and religious responsibility based on the Qur'an and Hadith. This finding is consistent with Noor and Anwar (2025), who explain that integrating Qur'anic and Hadith ecological values in primary education can strengthen ecological awareness and character through spiritual and moral learning.

This finding is consistent with previous studies that emphasize the importance of integrating environmental education with contextual, ethical, and spiritual values. Such integration can help learners connect environmental knowledge with attitudes and

behaviours in everyday life. In this study, the connection between Biology and Islamic teachings was reflected in students' understanding of nature as Allah's creation and in their reported environmental practices.

The findings also reinforce the view that ecological awareness is multidimensional. It involves not only understanding environmental concepts, but also developing sensitivity to environmental problems, recognising moral and spiritual responsibilities, and translating these understandings into environmentally responsible actions.

4. Implication

The findings indicate that Eco-Spiritual Learning can be adapted to other learning contexts and educational levels by connecting scientific concepts with Qur'anic and Hadith values. This approach may support the development of ecological awareness while strengthening students' understanding of environmental responsibility from scientific, moral, and spiritual perspectives.

D. CONCLUSION

Based on the findings and discussion, two main conclusions can be drawn. First, the implementation of the Eco-Spiritual Learning approach was effective in strengthening the ecological awareness of Biology students. This was evidenced by consistently high mean scores across all ecological awareness indicators, ranging from 3.35 to 3.64 on a four-point scale, as well as an overall positive response rate of 98.3%.The findings indicate that students were able to integrate their scientific understanding of biology with the environmental values embedded in the Qur'an and Hadith.

Second, through the *Qur'an and Hadith Studies* course, students successfully translated this integrated understanding into positive attitudes and concrete environmental practices. These included reducing the use of single-use plastics, conserving water during *wudu* (ablution), disposing of waste responsibly, and encouraging others to participate in environmental conservation. Students perceived these actions not only as environmentally responsible behaviours but also as expressions of *amanah* (trust), *ibadah* (worship), and their responsibility as *khalifah* (stewards) of the Earth. Therefore, the integration of Eco-Spiritual Learning into the *Qur'an and Hadith Studies* course effectively fostered Biology students' ecological awareness in a holistic manner, encompassing cognitive, affective, and conative dimensions.

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