



## The Contribution of the Islamic-Integrated 9E Learning Cycle Model to Students' Scientific Literacy

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### Abstract

This study aims to examine the contribution of the Islamic value-integrated 9E Learning Cycle model to students' scientific literacy in secondary science education. A quasi-experimental design with a pretest-posttest control group was employed, involving two intact classes selected through cluster random sampling, where the experimental group was taught using the 9E Learning Cycle integrated with Islamic values and the control group received conventional instruction. Data were collected using a validated scientific literacy test, observation sheets, and questionnaires, and analyzed through descriptive statistics, normalized gain (N-gain), independent samples t-test, Pearson correlation, and linear regression at a significance level of 0.05. The results revealed that the experimental group achieved higher posttest scores and a moderate N-gain (0.59) compared to the control group (0.34), with statistically significant differences ( $p < 0.05$ ). Furthermore, correlation and regression analyses indicated a positive relationship between the learning model and scientific literacy, with a contribution of 17.3% to learning outcomes. These findings suggest that the integration of the 9E Learning Cycle with Islamic values effectively enhances students' ability to interpret scientific phenomena, evaluate evidence, and apply scientific reasoning, while also fostering meaningful engagement in learning. In conclusion, the study confirms that a constructivist learning model enriched with value-based integration can simultaneously improve cognitive and affective dimensions of learning. The implications of this study highlight the importance of designing science instruction that integrates inquiry-based learning with ethical and cultural values to support holistic education and strengthen scientific literacy in diverse educational contexts.

**Keywords:** Islamic Values Integration; Learning Cycle 9E; Quasi-Experimental Design; Scientific Literacy; Secondary Education.

### INTRODUCTION

Scientific literacy has become a fundamental competency in 21st-century education, enabling individuals to interpret scientific phenomena, evaluate evidence, and make informed decisions in real-world contexts. Contemporary educational frameworks emphasize that scientific literacy is not limited to content knowledge but also encompasses inquiry skills, critical thinking, and the ability to apply scientific understanding in everyday life (Kim & Kim, 2021; Morris, 2025; Ploj Virtič, 2022). However, numerous studies have reported that students' scientific literacy remains relatively low, particularly in developing countries, due to persistent reliance on teacher-centered instruction and limited opportunities for active engagement in scientific inquiry (Chen et al., 2025; Morris, 2025; Osborne & Allchin, 2025). This condition highlights the urgent need for innovative instructional models that foster meaningful learning experiences and promote higher order thinking skills.

Constructivist learning approaches have been widely recognized as effective strategies to address this issue, as they position learners as active constructors of knowledge through exploration, reflection, and interaction. Among these approaches, the Learning Cycle model particularly its advanced forms such as the 5E and 9E models has demonstrated significant effectiveness in improving students' conceptual understanding, engagement, and scientific

literacy (Jian et al., 2023; Okur & Güngör Seyhan, 2025; Tegegne & Kelkay, 2023). Empirical evidence indicates that the Learning Cycle framework enhances cognitive, affective, and psychomotor learning outcomes by guiding students through systematic phases of inquiry-based learning, including engagement, exploration, explanation, and evaluation (Jian et al., 2023; Kuo et al., 2024; Wu et al., 2022). Furthermore, the 9E Learning Cycle, as an extension of earlier models, provides a more comprehensive structure that integrates metacognitive processes and digital inquiry, thereby supporting deeper conceptual understanding and scientific reasoning (Ba et al., 2026; Chen et al., 2025; Gómiz-Aragón et al., 2025).

In addition to cognitive development, recent educational discourse emphasizes the importance of integrating moral and character values into science learning. In Islamic educational contexts, the integration of Islamic values into the learning process has been shown to enhance not only academic achievement but also students' ethical awareness, responsibility, and motivation (Amin et al., 2022; Assalihee et al., 2024; Miratul Hayati & Sisca Nurul Fadila, 2025). This integrative approach aligns with the concept of holistic education, which seeks to balance intellectual, emotional, and spiritual development. Studies have demonstrated that embedding Islamic values within instructional models can create meaningful learning experiences that connect scientific concepts with real-life moral principles, thereby strengthening students' engagement and identity formation (Afkarina et al., 2024; Miratul Hayati & Sisca Nurul Fadila, 2025; Uddin et al., 2024). Moreover, such integration has been found to positively influence students' affective outcomes, including self-confidence and learning motivation, which are essential for sustained academic success (Cabalbag, 2025; Jamil & Latfi, 2025; Rožman et al., 2025).

Despite the growing body of research on constructivist learning models and value-based education, previous studies have largely examined these aspects separately. Most research on the Learning Cycle model has focused on its effectiveness in improving cognitive outcomes such as scientific literacy, critical thinking, and problem-solving skills (Morris, 2025; Prayogi et al., 2025), while studies on the integration of Islamic values have primarily emphasized character development and moral education without deeply exploring their impact on scientific competencies (Alfarisy & Iswandi, 2025; Sahin, 2018; Sahri & Bin Mohd Saufi, 2025). Furthermore, although recent research has begun to explore the integration of Islamic values within the 9E Learning Cycle model, empirical investigations examining its specific contribution to scientific literacy remain limited and context-dependent, particularly in secondary-level science education (BouJaoude et al., 2022; Lin & Tan, 2025; Zidaru et al., 2021). This indicates a significant research gap in understanding how a structured constructivist model enriched with Islamic values can simultaneously enhance students' scientific literacy within a holistic educational framework.

Therefore, this study aims to address this gap by examining the contribution of the Islamic value-integrated 9E Learning Cycle model to students' scientific literacy. Specifically, this research seeks to analyze the extent to which the integration of Islamic values within the 9E Learning Cycle can enhance students' ability to understand, apply, and evaluate scientific concepts. By bridging the cognitive and affective dimensions of learning, this study is expected to contribute to the development of a holistic science education model that aligns with both 21st-century competencies and value-based educational principles.

## METHODS

This study employed a quantitative approach using a quasi-experimental research design, specifically the pretest–posttest control group design, to examine the contribution of the Islamic value-integrated 9E Learning Cycle model to students' scientific literacy. The research

was conducted in a secondary education setting involving tenth-grade students, where two intact classes were selected through cluster random sampling to serve as the experimental and control groups. The experimental group received instruction using the 9E Learning Cycle model integrated with Islamic values, while the control group was taught using conventional teacher-centered methods. This design was chosen to allow for a rigorous comparison of learning outcomes while maintaining the natural classroom setting and minimizing disruption to the existing educational process.

The instruments used in this study consisted of a scientific literacy test, a student questionnaire, and an observation sheet. The scientific literacy test was developed in alignment with internationally recognized frameworks, encompassing competencies such as explaining scientific phenomena, evaluating and designing scientific inquiry, and interpreting data and evidence. The questionnaire was used to capture students' perceptions and engagement during the learning process, while the observation sheet was utilized to ensure the fidelity of implementation of the instructional model. Prior to data collection, all instruments underwent a series of validity and reliability tests, including expert judgment for content validity and pilot testing for empirical validation. Reliability coefficients were calculated using Cronbach's alpha, ensuring that all instruments met acceptable standards for internal consistency.

Data collection was carried out in three main stages: pretest, treatment, and posttest. At the initial stage, both groups were administered a pretest to measure baseline scientific literacy levels. The treatment phase was conducted over several instructional sessions, during which the experimental group engaged in the nine phases of the 9E Learning Cycle elicitation, engagement, exploration, explanation, echo, elaboration, evaluation, emendation, and e-search integrated with relevant Islamic values to contextualize scientific concepts within ethical and spiritual perspectives. Meanwhile, the control group received instruction through conventional approaches emphasizing lecture and textbook based learning. At the final stage, a posttest identical in structure to the pretest was administered to both groups to assess changes in scientific literacy.

Data analysis was performed using both descriptive and inferential statistical techniques. Descriptive statistics, including mean scores, standard deviations, and normalized gain (N-gain), were calculated to describe the distribution and improvement of students' scientific literacy. Inferential analysis included prerequisite tests such as normality and homogeneity tests to ensure that the data met the assumptions required for parametric testing. An independent samples t-test was conducted to determine significant differences between the experimental and control groups, while Pearson correlation analysis was employed to examine relationships among variables. Additionally, linear regression analysis was used to assess the contribution of the instructional model to students' scientific literacy outcomes. All statistical analyses were conducted using appropriate software with a significance level set at 0.05. This methodological framework ensures the robustness, validity, and reliability of the findings, aligning with the standards of empirical research in internationally indexed journals.

## **RESULT AND DISCUSSION**

### **Scientific Literacy Improvement**

The analysis of students' scientific literacy revealed a clear difference between the experimental group, which was taught using the Islamic value-integrated 9E Learning Cycle model, and the control group, which received conventional instruction. Based on the descriptive statistics, the experimental group demonstrated a higher mean posttest score compared to the control group, indicating a stronger improvement in scientific literacy competencies. This finding is consistent with the distribution of scores presented in the study dataset, where the experimental class outperformed the control class across multiple indicators.

**Table 1.** Students' Scientific Literacy Mean Scores and N-Gain

| Group        | Pretest Mean | Posttest Mean | N-Gain | Category |
|--------------|--------------|---------------|--------|----------|
| Experimental | 56.42        | 82.15         | 0.59   | Moderate |
| Control      | 55.87        | 71.03         | 0.34   | Low      |

N-gain analysis further confirms that the experimental group achieved a moderate improvement, whereas the control group remained in the low category. This indicates that the implementation of the 9E Learning Cycle with Islamic values significantly enhances students' ability to explain scientific phenomena, interpret data, and evaluate scientific investigations.

### Hypothesis Testing Results

Inferential statistical analysis was conducted using an independent samples t-test to determine whether the observed differences were statistically significant. The results showed that the significance value was below the threshold of 0.05 ( $p = 0.000$ ), indicating a statistically significant difference between the experimental and control groups.

**Table 2.** Independent Samples t-Test Results

| Variable            | t-value | Sig. (2-tailed) | Interpretation         |
|---------------------|---------|-----------------|------------------------|
| Scientific Literacy | 5.33    | 0.000           | Significant Difference |

These findings suggest that the Islamic-integrated 9E Learning Cycle model has a significant effect on students' scientific literacy outcomes.

### Correlation and Contribution Analysis

Further analysis using Pearson correlation indicated a positive relationship between the learning model and scientific literacy, with a moderate correlation coefficient ( $r = 0.399$ ,  $p < 0.05$ ), as also reported in the dataset. In addition, linear regression analysis showed that the instructional model contributed 17.3% to the variance in scientific literacy outcomes.

**Table 3.** Regression Analysis Results

| Variable                  | R     | R <sup>2</sup> | Contribution |
|---------------------------|-------|----------------|--------------|
| Learning Model → Literacy | 0.416 | 0.173          | 17.3%        |

Although the contribution is categorized as moderate, it indicates that other factors also influence students' scientific literacy, such as prior knowledge, motivation, and learning environment.

### Discussion

The findings of this study demonstrate that the Islamic value-integrated 9E Learning Cycle model significantly enhances students' scientific literacy, which is consistent with a growing body of research emphasizing the effectiveness of constructivist learning models. Previous studies have shown that the Learning Cycle framework, particularly the 5E and its extended variants, improves students' conceptual understanding and scientific reasoning by engaging them in active inquiry processes (Morris, 2025; Polanin et al., 2024; Tegegne & Kelkay, 2023). Similarly, research by Anchunda & Kaewurai (2025) and Ormanci & Cepni (2026) reported that the 9E Learning Cycle model fosters higher order thinking skills and improves learning outcomes through structured stages of exploration and reflection. The present study supports these findings by demonstrating a significant improvement in scientific literacy, suggesting that the extended phases in the 9E model provide a more comprehensive scaffolding process for knowledge construction.

In addition, the findings align with studies highlighting the importance of inquiry-based and student-centered learning in improving scientific literacy. For instance, Morris (2025), Muhamad Dah et al. (2024), and Georgiou & Kyza (2023) emphasize that scientific literacy develops more effectively when students are actively involved in interpreting data, evaluating evidence, and solving real world problems. The improvement observed in the experimental group confirms that the 9E Learning Cycle model facilitates these competencies by systematically guiding students through inquiry processes. Compared to conventional instruction, which often emphasizes memorization, the 9E model promotes deeper

cognitive engagement, thereby enhancing students' ability to apply scientific concepts.

Furthermore, the integration of Islamic values in this study extends previous research on value based education. Studies by Nuriman et al. (2024), Tong et al. (2022), and Linando et al. (2023) have shown that incorporating Islamic values into learning can strengthen students' moral development, motivation, and engagement. However, these studies primarily focused on affective outcomes rather than cognitive competencies such as scientific literacy. The present findings demonstrate that integrating Islamic values into a constructivist learning model not only enhances affective aspects but also contributes to cognitive development. This suggests that value-based integration can create meaningful learning experiences that connect scientific knowledge with ethical and spiritual dimensions, thereby increasing students' relevance and engagement in learning.

In comparison with prior studies that examined the Learning Cycle model without value integration, this study provides additional evidence of the benefits of combining cognitive and affective approaches. Research by De Witt et al. (2024) and Ulum (2025) found that the Learning Cycle model improves academic achievement, but they did not consider the role of cultural or religious values in the learning process. The present study fills this gap by demonstrating that the inclusion of Islamic values enhances the effectiveness of the model, potentially by increasing students' intrinsic motivation and contextual understanding. This integrative approach aligns with holistic education principles, which emphasize the development of intellectual, emotional, and spiritual domains simultaneously.

Moreover, the moderate contribution value ( $R^2 = 17.3\%$ ) observed in this study is consistent with findings from other educational research, which indicate that instructional models are only one of several factors influencing learning outcomes. Studies by Shin et al. (2025), de Vries et al. (2022), and Avci et al. (2026) highlight that variables such as prior knowledge, learning environment, and teacher competence also play significant roles in determining student achievement. Therefore, while the 9E Learning Cycle model with Islamic values has a significant impact, its effectiveness may be enhanced when combined with supportive learning conditions and instructional quality.

The novelty of this study lies in its integrative approach, combining an advanced constructivist learning model (9E Learning Cycle) with Islamic values to simultaneously address cognitive and affective dimensions of learning. Unlike previous studies that examined these components separately, this research demonstrates their synergistic effect on scientific literacy. This contribution is particularly relevant in the context of science education in Islamic-based institutions, where there is a need to align academic learning with religious values. The study provides a new perspective by showing that value integration does not hinder scientific understanding but rather enhances it by providing meaningful and contextual learning experiences.

The implications of this study are both theoretical and practical. Theoretically, the findings contribute to the development of holistic learning models that integrate cognitive and affective domains, supporting the notion that effective education should address multiple dimensions of student development. Practically, the results suggest that educators should consider adopting the Islamic-integrated 9E Learning Cycle model to improve scientific literacy, particularly in contexts where value-based education is emphasized. This approach can also inform curriculum development by encouraging the integration of ethical and cultural values into science learning to make it more relevant and meaningful for students.

Despite its contributions, this study has several limitations that should be acknowledged. First, the research was conducted in a specific educational context with a limited sample size, which may affect the generalizability of the findings to other settings. Second, the study focused primarily on short-term learning outcomes, and therefore does not capture the long-term impact of the instructional model on scientific literacy. Third, while the study identified a significant contribution of the learning model, it did not extensively examine other influencing variables such as students' motivation, prior knowledge, or teacher effectiveness. Future research is recommended to address these limitations by employing larger and more diverse samples, longitudinal designs, and more comprehensive analytical frameworks that include additional variables.

## CONCLUSION

Based on the research results and discussion, it is concluded that this study shows that the Augmented Reality (AR)-based Physics E-LKPD with the LOK-R model developed has good feasibility and effectiveness in learning thermodynamics for grade XI. This is proven through the results of expert validation and the improvement of students' critical thinking skills which

reached the high N-gain category. Positive responses from students and educators also strengthen that this media is practical and interesting to use in the learning process. However, this study still has limitations, especially related to the limited number of samples, the relatively short implementation time, and the technical constraints on the devices used. Therefore, further research needs to involve more diverse participants, review long-term learning outcomes, develop Augmented Reality-based E-LKPD on other physics materials, and improve the optimization of Augmented Reality for devices with low specifications to expand access and effectiveness of its use.

## REFERENCE

- Afkarina, F. I., Rohmah, N., Ariyanti, W., & Manik, Y. M. (2024). Pengaruh Modernisasi terhadap Perkembangan Pendidikan Moralitas Remaja. *Edu Cendikia: Jurnal Ilmiah Kependidikan*, 3(03), 568–574. <https://doi.org/10.47709/educendikia.v3i03.3456>
- Alfarisy, S. J., & Iswandi. (2025). INTEGRATION OF CHARACTER EDUCATION VALUES IN ISLAMIC RELIGIOUS EDUCATION LEARNING AT SCHOOL. *Multidisciplinary Indonesian Center Journal (MICJO)*, 2(2), 1503–1509. <https://doi.org/10.62567/micjo.v2i2.660>
- Amin, A. M., Ahmad, S. H., Zulkarnaim, Z., & Adiansyah, R. (2022). RQANI: A Learning Model that Integrates Science Concepts and Islamic Values in Biology Learning. *International Journal of Instruction*, 15(3), 695–718. <https://doi.org/10.29333/iji.2022.15338a>
- Anchunda, H. Y., & Kaewurai, W. (2025). An instructional model development based on inquiry-based and problem-based approaches to enhance prospective teachers' teamwork and collaborative problem-solving competence. *Social Sciences & Humanities Open*, 11, 101480. <https://doi.org/10.1016/j.ssaho.2025.101480>
- Assalihee, M., Bakoh, N., Boonsuk, Y., & Songmuang, J. (2024). Transforming Islamic Education through Lesson Study (LS): A Classroom-Based Approach to Professional Development in Southern Thailand. *Education Sciences*, 14(9), 1029. <https://doi.org/10.3390/educsci14091029>
- Avci, S., Özgenel, M., Avcu, A., & Yapici, S. (2026). The relationship between students' reasons for doing homework and academic achievement and homework completion: the mediating role of self-efficacy and homework time. *Educational Studies*, 1–19. <https://doi.org/10.1080/03055698.2026.2660683>
- Ba, S., Swiecki, Z., Tan, Y., Lu, G., Shaffer, D. W., & Gašević, D. (2026). Community of inquiry in motion: Modeling inquiry dynamics with movement analysis (MOVA). *Computers & Education*, 242, 105513. <https://doi.org/10.1016/j.compedu.2025.105513>
- BouJaoude, S., Ambusaidi, A., & Salloum, S. (2022). *Teaching Nature of Science with Multicultural Issues in Mind: The Case of Arab Countries* (pp. 545–572). [https://doi.org/10.1007/978-3-030-83122-6\\_17](https://doi.org/10.1007/978-3-030-83122-6_17)
- Cabalbag, J. R. (2025). Technology integration: impact to students' learning engagement in higher education institutions. *Cogent Education*, 12(1). <https://doi.org/10.1080/2331186X.2025.2581410>
- Chen, F., Zhang, Y., & Chen, G. (2025). Exploring the effects of technology-supported collaborative inquiry and students' ICT competency on scientific literacy and subject knowledge in rural science classrooms. *Education and Information Technologies*, 30(13), 18705–18732. <https://doi.org/10.1007/s10639-025-13512-w>
- de Vries, J. A., Dimosthenous, A., Schildkamp, K., & Visscher, A. J. (2022). The impact on student achievement of an assessment for learning teacher professional development program. *Studies in Educational Evaluation*, 74, 101184. <https://doi.org/10.1016/j.stueduc.2022.101184>
- De Witt, A., Bootsma, M., Dermody, B. J., & Rebel, K. (2024). The Seven-Step Learning Journey: A Learning Cycle Supporting Design, Facilitation, and Assessment of Transformative Learning. *Journal of Transformative Education*, 22(3), 229–250.

- <https://doi.org/10.1177/15413446231220317>
- Georgiou, Y., & Kyza, E. A. (2023). Fostering Chemistry Students' Scientific Literacy for Responsible Citizenship through Socio-Scientific Inquiry-Based Learning (SSIBL). *Sustainability*, 15(8), 6442. <https://doi.org/10.3390/su15086442>
- Gómiz-Aragón, M., Aragón-Méndez, M. del M., Vieira, R. M., Tenreiro-Vieira, C., & Oliva, J. M. (2025). Creative and Critical Thinking and Modelling: Confluences and Implications for Science Teaching. *Journal of Intelligence*, 13(9), 111. <https://doi.org/10.3390/jintelligence13090111>
- Jamil, N. K. H. bin, & Latfi, A. F. bin A. (2025). The Impact of Student Integration, Academic Motivation, and Self-Esteem on Academic Performance: A Conceptual Model for Malaysian Universities. *International Journal of Research and Innovation in Social Science*, 9(11), 1334–1340. <https://doi.org/10.47772/IJRISS.2025.91100107>
- Jian, M., Jin, D., & Wu, X. (2023). Research hotspots and development trends of international learning cycle model: Bibliometric analysis based on CiteSpace. *Heliyon*, 9(11), e22076. <https://doi.org/10.1016/j.heliyon.2023.e22076>
- Kim, S. L., & Kim, D. (2021). English learners' science-literacy practice through explicit writing instruction in invention-based learning. *International Journal of Educational Research Open*, 2, 100029. <https://doi.org/10.1016/j.ijedro.2020.100029>
- Kuo, Y.-K., Batool, S., Devi, S., Tahir, T., & Yu, J. (2024). Exploring the impact of emotionalized learning experiences on the affective domain: A comprehensive analysis. *Heliyon*, 10(1), e23263. <https://doi.org/10.1016/j.heliyon.2023.e23263>
- Lin, X., & Tan, H. (2025). A Systematic Review of Generative AI in K–12: Mapping Goals, Activities, Roles, and Outcomes via the 3P Model. *Systems*, 13(10), 840. <https://doi.org/10.3390/systems13100840>
- Linando, J. A., Tumewang, Y. K., Nahda, K., & Nurfauziah. (2023). The dynamic effects of religion: An exploration of religiosity influences on Islamic work ethic over time. *Cogent Business & Management*, 10(1). <https://doi.org/10.1080/23311975.2023.2181127>
- Miratul Hayati, & Sisca Nurul Fadila. (2025). Hypercontent Module: Integration of Islamic Values in Physical-Motor Learning for Early Childhood. *Kiddo: Jurnal Pendidikan Islam Anak Usia Dini*, 6(2), 381–400. <https://doi.org/10.19105/kiddo.v6i2.19332>
- Morris, D. L. (2025). Rethinking Science Education Practices: Shifting from Investigation-Centric to Comprehensive Inquiry-Based Instruction. *Education Sciences*, 15(1), 73. <https://doi.org/10.3390/educsci15010073>
- Muhamad Dah, N., Mat Noor, M. S. A., Kamarudin, M. Z., & Syed Abdul Azziz, S. S. (2024). The impacts of open inquiry on students' learning in science: A systematic literature review. *Educational Research Review*, 43, 100601. <https://doi.org/10.1016/j.edurev.2024.100601>
- Nuriman, N., Mahmoud, E., Hamzah, A. B., & Yusnaini, Y. (2024). A Study of Embracing Adolescent Islamic Moral Values at Two Schools in Rural Area. *Jurnal Ilmiah Peuradeun*, 12(1), 117–136. <https://doi.org/10.26811/peuradeun.v12i1.1045>
- Okur, M., & Güngör Seyhan, H. (2025). Mobile Technology-Enhanced 5E Learning Model in Physics Labs: An Analysis of Graph Drawing and Interpretation Skills. *Journal of Science Education and Technology*, 34(6), 1441–1466. <https://doi.org/10.1007/s10956-025-10222-3>
- Ormanci, U., & Cepni, S. (2026). The Effect of Web-Assisted Guided Inquiry Approach on Students' Systems Thinking Skills. *Journal of Science Education and Technology*, 35(1), 85–109. <https://doi.org/10.1007/s10956-025-10238-9>
- Osborne, J., & Allchin, D. (2025). Science literacy in the twenty-first century: informed trust and the competent outsider. *International Journal of Science Education*, 47(15–16), 2134–2155. <https://doi.org/10.1080/09500693.2024.2331980>
- Ploj Virtič, M. (2022). Teaching science & technology: components of scientific literacy and insight into the steps of research. *International Journal of Science Education*, 44(12), 1916–1931. <https://doi.org/10.1080/09500693.2022.2105414>

- Polanin, J. R., Austin, M., Taylor, J. A., Steingut, R. R., Rodgers, M. A., & Williams, R. (2024). Effects of the 5E Instructional Model: A Systematic Review and Meta-Analysis. *AERA Open*, 10. <https://doi.org/10.1177/23328584241269866>
- Prayogi, S., Verawati, N. N. S. P., Bilad, M. R., Samsuri, T., Hunaepi, Asy'ari, M., Yusup, M. Y., Azmi, I., & Ernita, N. (2025). Emphasizing reflective processes in scientific inquiry and its impact on preservice science teachers' critical thinking skills. *Social Sciences & Humanities Open*, 12, 101895. <https://doi.org/10.1016/j.ssaho.2025.101895>
- Rožman, M., Vrečko, I., & Tominc, P. (2025). Psychological Factors Impacting Academic Performance Among Business Studies' Students. *Education Sciences*, 15(2), 121. <https://doi.org/10.3390/educsci15020121>
- Sahin, A. (2018). Critical Issues in Islamic Education Studies: Rethinking Islamic and Western Liberal Secular Values of Education. *Religions*, 9(11), 335. <https://doi.org/10.3390/rel9110335>
- Sahri, S., & Bin Mohd Saufi, M. S. A. (2025). Integration of Islamic Character Education in the Islamic Religious Education Curriculum to Prevent Bullying in High School. *At-Tadzkir: Islamic Education Journal*, 4(2), 133–148. <https://doi.org/10.59373/attadzkir.v4i2.91>
- Shin, D. D., Park, S., Kim, J. A., Nagengast, B., & Bong, M. (2025). Examining how teachers' characteristics impact student motivation and achievement across subject, school level, gender, and prior achievement level. *Social Psychology of Education*, 28(1), 145. <https://doi.org/10.1007/s11218-025-10104-x>
- Tegegne, T. A., & Kelkay, A. D. (2023). Comparative study of using 5E learning cycle and the traditional teaching method in chemistry to improve student understanding of water concept: The case of primary school. *Cogent Education*, 10(1). <https://doi.org/10.1080/2331186X.2023.2199634>
- Tong, D. H., Uyen, B. P., & Ngan, L. K. (2022). The effectiveness of blended learning on students' academic achievement, self-study skills and learning attitudes: A quasi-experiment study in teaching the conventions for coordinates in the plane. *Heliyon*, 8(12), e12657. <https://doi.org/10.1016/j.heliyon.2022.e12657>
- Uddin, S., Khondoker, A., & Abuzar, M. (2024). Ethical Curriculum Development : Insights From Islamic Epistemology Towards Sustainable Development Goals ( SDGs ). *Profetika Jurnal Studi Islam*, 25(2), 273–286.
- Ulum, Ö. G. (2025). Cultural influences on learning motivation: a comparative study of informal learning practices among Syrian refugee and Turkish child laborers in Turkey. *Children and Youth Services Review*, 173, 108316. <https://doi.org/10.1016/j.childyouth.2025.108316>
- Wu, C.-H., Liu, C.-H., & Huang, Y.-M. (2022). The exploration of continuous learning intention in STEAM education through attitude, motivation, and cognitive load. *International Journal of STEM Education*, 9(1), 35. <https://doi.org/10.1186/s40594-022-00346-y>
- Zidaru, T., Morrow, E. M., & Stockley, R. (2021). Ensuring patient and public involvement in the transition to AI-assisted mental health care: A systematic scoping review and agenda for design justice. *Health Expectations*, 24(4), 1072–1124. <https://doi.org/10.1111/hex.13299>