International Conference on Teaching and Learning Proceeding
Faculty of Education and Teacher Training – Universitas Terbuka
UTCC, South Tangerang, Banten, May 13th, 2026
Volume 4, pg. 525 – 535
ISSN: 3046-594X

ASSESSING STUDENTS CRITICAL THINKING IN ELEMENTARY SCHOOLS: RELEVANCE TO STEAM LEARNING AND THE SDGS

Sheryl Mutiara Putri [1*], Agung Purwanto [2], Irwanto [3]
[1]Graduate School, Universitas Negeri Jakarta, Jakarta, Indonesia
email: sheryl.mutiara@mhs.unj.ac.id

Abstract: Critical thinking is a crucial 21st-century competency. However, science education in elementary schools often limits opportunities for students to engage in interdisciplinary and contextual learning experiences that foster thinking skills. Therefore, this study aims to assess students' critical thinking skills and examine their relevance to STEAM learning and the SDGs framework that connects learning to real-world contexts. This study used a quantitative descriptive approach with a survey method involving 328 students in grades 3, 4, and 5 from elementary schools in Sukabumi, Indonesia. Data were collected through a Likert-scale questionnaire. Instrument validity was tested using Pearson Product Moment Correlation ($\alpha = 0.05$) with 30 out-of-sample students, indicating that all items were valid (r-count > r-table = 0.361). Reliability testing using Cronbach's Alpha produced a coefficient of 0.874, indicating high reliability. The results showed that students had moderate critical thinking skills, with an average score of 58.72. The highest achievement was found in procedural dimensions, while reasoning, interdisciplinary, and sustainability-related dimensions remained low. This situation highlights the need for a STEAM learning approach within the SDGs framework to foster critical thinking and sustainability awareness in daily life.

Keywords: STEAM SDGs; critical thinking; elementary schools

Accepted: 12 May 2026 Approved: 12 June 2026 Published: 29 Juni 2026

INTRODUCTION

Critical thinking is one of the important competencies needed in 21st century education because it enables students to analyze information, evaluate evidence, solve problems, and make rational decisions in everyday life (Rončević & Rieckmann, 2025). In elementary education, the development of critical thinking skills is also considered important because students begin to develop reasoning skills, curiosity, and problem-solving habits that will influence their future learning (Hartati, et al., 2022). Students with strong critical thinking skills tend to be more active in asking questions, analyzing situations, and building logical arguments based on evidence (Ngatminiati & Hidayah, 2024). Therefore, critical thinking

has become an important goal in contemporary educational practice, including at the elementary school level.

Science learning in elementary schools basically emphasizes scientific processes such as observing, identifying problems, asking questions, conducting investigations, analyzing data, and drawing conclusions based on evidence (Putri et al., 2021). Through this process, students can be trained to think logically, reflectively, and systematically in understanding various phenomena in the surrounding environment (Putri et al., 2024). Therefore, science learning in elementary schools should not only focus on mastering concepts but also serve as a means to develop students' critical thinking skills. However, the learning situation in the field still shows a different reality. Science learning in elementary schools is often dominated by a teacher-centered approach and memorization activities, resulting in students receiving more information than developing deep thinking skills (Putri et al., 2026). Students are more often asked to remember information than to explore problems, question phenomena, or construct reasoning independently. The results of the 2022 Programme for International Student Assessment (PISA) show that Indonesian students' scientific literacy skills are 359, which is far below the OECD average of 487 (OECD, 2022), particularly in the aspects of scientific reasoning, argumentation, and the use of evidence in problem-solving. These low abilities indicate that learning has not fully trained students to think reflectively and analytically in real-life contexts (Punto Aji & Nugraheni, 2023). These findings indicate an urgent need to present a learning approach that is more contextual, integrative, and oriented towards developing critical thinking skills.

To address the challenges outlined above, STEAM (Science, Technology, Engineering, Arts, and Mathematics) learning is gaining increasing attention as an interdisciplinary approach that has the potential to support the development of students' critical thinking skills (Perales-Palacios & Martín-Páez, 2021; Ananda et al., 2023). STEAM learning emphasizes the integration of multiple disciplines through contextual, collaborative, inquiry-based, and project-based learning experiences that are closely linked to real-world situations (Milara & Orduña, 2024). Through STEAM activities, students are encouraged to explore problems, investigate ideas, design solutions, collaborate with peers, and apply knowledge in authentic contexts rather than simply memorizing concepts (Cohrssen & Garvis, 2021). Küçük, Zeki et al., (2023) explains that a STEAM-oriented learning environment can help elementary school students develop critical thinking dispositions, problem-solving skills, and active involvement in the learning process.

In addition to developing academic competencies, 21st century learning is also expected to raise students' awareness of sustainability and real-world issues (Iqbal et al., 2023). Learning in elementary schools focuses not only on conceptual understanding but also helps students understand their roles and responsibilities in addressing social and environmental challenges in everyday life. In this regard, Education for Sustainable Development (ESD) and the Sustainable Development Goals (SDGs) framework are becoming increasingly relevant in contemporary education because they encourage contextual, meaningful, and sustainable

learning (Pham Xuan & Håkansson Lindqvist, 2025). Through sustainability-oriented learning, students can be introduced to issues such as environmental cleanliness, energy conservation, healthy living, social responsibility, and caring for others from an early age (Esentürk & Çetinkaya Yıldız, 2023).

The characteristics of STEAM learning are considered closely related to the ESD and SDGs because STEAM emphasizes interdisciplinary inquiry, collaboration, creativity, and real-world problem-solving. By connecting learning activities to authentic environmental and social issues, students can develop not only critical thinking skills but also awareness of sustainability and responsible decision-making (Zhao et al., 2024). For example, students can explore simple issues related to waste management, water use, energy conservation, or community well-being through project-based and inquiry-oriented activities. Such learning experiences allow students to apply scientific understanding in meaningful contexts while strengthening their awareness of sustainability challenges in everyday life. Therefore, integrating STEAM learning with the SDGs framework has the potential to create more contextual and transformative learning experiences relevant to the demands of 21st-century education (Erlina, 2021).

Previous research has extensively examined the implementation of STEAM learning and its impact through experimental research designs, intervention-based, inquiry-based activities, and project-based approaches can improve students' problem-solving skills, creativity, collaboration, and higher-order thinking skills (Küçük et al. 2023; Li et al. 2022; Quigley et al. 2020; Wu et al. 2022; Jurado et al. 2020). However, research specifically assessing the current state of elementary school students' critical thinking skills and examining their relevance to STEAM learning and the Sustainable Development Goals (SDGs) framework remains limited, particularly in the context of elementary education in Indonesia. Existing research tends to emphasize teaching implementation outcomes rather than identifying whether current classroom practices reflect the characteristics of interdisciplinary, contextual, and sustainability-oriented learning. Consequently, there is limited evidence to illustrate the extent to which students' critical thinking skills demonstrate the need for more integrative learning approaches connected to real-world social and environmental issues.

This research is a preliminary assessment study aimed at determining the critical thinking skills of elementary school students and their relationship to the characteristics of STEAM learning and the Sustainable Development Goals (SDGs) framework. Specifically, this study identifies the current state of students' critical thinking and examines the extent to which classroom learning provides interdisciplinary, contextual, and sustainability-related learning experiences. The results are expected to provide an initial overview of the importance of a more integrative learning approach to support the development of elementary school students' critical thinking skills.

METHOD

This study uses a quantitative descriptive research design to assess elementary school students' critical thinking skills and examine their relevance to the characteristics of STEAM learning and the Sustainable Development Goals (SDGs) framework. The study population consisted of 328 students from five elementary schools in Sukabumi Regency and City, Indonesia. The study sample included 328 students in grades 3, 4, and 5, who served as the primary respondents. This analysis is framed within a broader perspective regarding the characteristics of STEAM learning and sustainability-oriented education.

Data were collected using a structured questionnaire designed to capture students' perceptions of learning experiences related to the development of critical thinking skills. This questionnaire uses a Likert scale with four answer options: always, often, sometimes, and never. The questionnaire grid is compiled based on critical thinking skill indicators adapted from the Ennis framework, and adapted to the context of STEAM learning in elementary schools, presented the questionnaire grid refers to the dimensions of Ennis, (2011) in Table 1 and the criteria for students' critical thinking refers to (Tawil et al., 2026) in Table 2.

Table 1. Questionnaire Grid

No	Critical Thinking Dimensions	Indicator	No. Item	Number of Items
1	Elementary clarification	Students get the opportunity to explain science concepts related to everyday life.	1,2	2
2	Basic support	Students are accustomed to giving reasons or opinions based on the results of observations or experiments.	3,4	2
3	Inference	Students are trained to predict the impact of an action on the environment or daily life.	5,6	2
4	Advanced clarification	Students are invited to connect learning outcomes with sustainability values.	7,8	2
5	Strategy and tactics	Students get the opportunity to find ways to improve or enhance the solutions they create.	9,10	2
6	**STEAM Integration**	Students feel the connection between science, technology, engineering, art, and mathematics in learning.	11,12	2
7	**ESD Principles within the SDGs Framework**	Students can connect learning with environmental problems and everyday life.	13,14,15	3

Table 2 Average Criteria for Students' Critical Thinking Skills

Assessment	Criteria
86 - 100	Very High
71 - 85	High
56 - 70	Medium
41 - 55	Low
< 40	Very Low

Prior to data collection, the validity of the research instrument was tested using the Pearson Product Moment Correlation technique with a significance level of $\alpha = 0.05$. The trial was conducted on 30 students outside the research sample. With $n = 30$, the r-table value = 0.361. The validity test results showed that all questionnaire items had a calculated r-value > r-table, thus declared valid. Meanwhile, the reliability test was carried out using the Cronbach's Alpha formula to measure the internal consistency of the instrument. The reliability test results showed that the overall reliability coefficient of the instrument was $\alpha = 0.874$, which is included in the very high category. This indicates that the instrument has very good internal consistency and is suitable for use in research data collection.

Data were collected and analyzed using descriptive statistical techniques, including mean values, frequencies, and percentages. This analysis was conducted to provide an overview of students' critical thinking skills and their relevance to the characteristics of STEAM learning and the Sustainable Development Goals (SDGs) framework. This analysis aims to describe students' critical thinking skills and identify their relevance to the characteristics of STEAM learning and sustainability-oriented learning contexts.

RESULT AND DISCUSSION

The survey results show that elementary school students' critical thinking skills are categorized as moderate, with an average score of 58.72. Analysis based on Ennis' critical thinking indicators revealed variations across various dimensions (see Figure 1). The Strategy and Tactics indicator achieved the highest percentage at 68%, followed by Basic Clarification at 64%. Furthermore, the Inference indicator achieved 58%, while Basic Support and Advanced Clarification achieved relatively lower percentages, at 54% and 52%, respectively.

In addition to the critical thinking dimension, this study also examined the relevance of current learning practices to the characteristics of STEAM and ESD principles within the SDGs framework. The findings indicate that the STEAM Integration dimension achieved a percentage of 49%, while ESD within the SDGs showed the lowest percentage at 46%. These results indicate that students still have limited experience in connecting interdisciplinary learning and relating classroom learning to sustainability issues and everyday life contexts.

International Conference on Teaching and Learning Proceeding
Faculty of Education and Teacher Training – Universitas Terbuka
UTCC, South Tangerang, Banten, May 13th, 2026
Volume 4, pg. 525 – 535
ISSN: 3046-594X

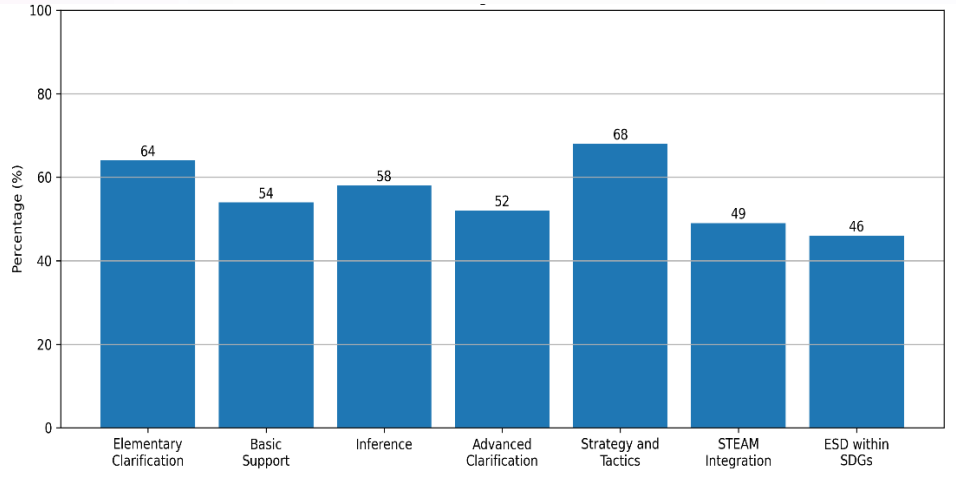

Figure 1. Students' Critical Thinking and STEAM-SDGs Dimensions

The findings indicate that elementary school students' critical thinking skills are still at a moderate level. The highest achievement in the Strategy and Tactics dimension indicates that students are relatively capable of identifying alternative strategies and following procedural steps in solving problems. This finding suggests that students have developed basic procedural thinking and flexibility in simple problem-solving. This condition is indicated because classroom learning activities at the elementary school level often emphasize following instructions, completing structured tasks, and implementing procedural steps rather than engaging students in deeper reflective reasoning processes (Stylos, 2026).

However, relatively low achievement in the Advanced Clarification and Basic Support dimensions indicates that students still experience difficulties in constructing logical explanations, critically evaluating information, and developing evidence-based arguments. These findings suggest that classroom learning does not fully facilitate analytical and reflective thinking processes. Students are still rarely engaged in activities that require discussion, argumentation, investigation, and contextual problem-solving that foster higher-order thinking skills (Yadav & Singh, 2026). As a result, students may be more accustomed to procedural learning than reasoning-oriented learning experiences. (Raximboyevna, 2026). This condition is consistent with the research results Hussain, (2026) and Rokhmah et al.,(2026) which emphasizes that critical thinking skills can develop more effectively through active learning environments involving collaboration, inquiry, discussion, and authentic problem-solving experiences. Therefore, strengthening contextual and student-centered learning approaches is crucial in supporting the development of deeper critical thinking among elementary school students.

Furthermore, the results above also reveal relatively low scores in STEAM and ESD Integration within the SDGs dimension. The low percentage in STEAM Integration indicates that students still have limited experience connecting science, technology, engineering, arts,

and mathematics in classroom learning. This condition reflects the persistence of disciplinary fragmentation in classroom instruction, where subjects are generally taught separately rather than through interdisciplinary and contextual learning experiences (Widarti & Roshayanti, 2021; Auh, 2026). As a result, students may have fewer opportunities to apply knowledge collaboratively and holistically in solving real-world problems (Dhika et al., 2026). Similarly, low achievement in the Education for Sustainable Development (ESD) dimension within the SDGs framework indicates that classroom learning has not yet strongly connected academic content to sustainability-related issues in students' daily lives. Students still show limited awareness of how learning can relate to environmental cleanliness, energy conservation, social responsibility, and sustainable living practices. These findings suggest that sustainability-oriented learning experiences are still not sufficiently integrated into elementary school classroom practices (Azzahra et al., 2023).

The relatively low performance in the STEAM and ESD Integration dimension within the SDGs framework also suggests that students' critical thinking development may be affected by the limited availability of interdisciplinary and sustainability-oriented learning experiences (Nugroho et al., 2025). In this regard, STEAM learning has the potential to be integrated with the principles of Education for Sustainable Development (ESD) and the Sustainable Development Goals (SDGs) framework to create more meaningful and contextual learning experiences (Wahyuni et al., 2023). Through project-based inquiry, collaboration, and authentic problem-solving activities, students can be encouraged not only to develop critical thinking skills but also to build sustainability awareness and apply their understanding to real-life situations (Khoiri et al., 2023). Therefore, integrating STEAM and SDGs can be a relevant alternative to support more holistic 21st-century learning in elementary schools.

CONCLUSION

This study aimed to assess elementary school students' critical thinking skills and examine their relevance to STEAM learning and the Sustainable Development Goals (SDGs) framework. The findings revealed that students' critical thinking skills were still categorized as moderate, with an average score of 58.72. Among the critical thinking dimensions, Strategy and Tactics showed the highest achievement, while Advanced Clarification and Basic Support remained relatively low. These results indicate that students are more accustomed to procedural problem-solving than to constructing logical explanations, evaluating evidence, and developing argumentative reasoning.

In addition, the relatively low scores on the STEAM Integration and ESD within SDGs dimensions indicate that current classroom learning has not fully provided interdisciplinary, contextual, and sustainability-oriented learning experiences. Learning activities are still less connected to real-world social and environmental issues, limiting students' opportunities to develop critical thinking skills in meaningful contexts.

Therefore, more integrative and contextual learning approaches are needed in elementary education. Integrating STEAM learning with the SDGs framework has the potential to support students' critical thinking skills through collaborative, inquiry-based, and real-world learning experiences while also fostering sustainability awareness and problem-solving abilities related to everyday life.

REFERENCES

Ananda, L. R., Rahmawati, Y., & Khairi, F. (2023). Critical Thinking Skills of Chemistry Students By Integrating Design Thinking With Steam-Pjbl. *Journal of Technology and Science Education*, *13*(1), 352–367. https://doi.org/10.3926/jotse.1938

Auh, Y. (2026). STEAM education for sustainable futures : A pedagogical framework for education for sustainable development. *Pedagogical Research*, *11*(1), 1–16.

Azzahra, M., Pramudiyanti, P., Rohman, F., & Nurwahidin, M. (2023). Education for Sustainable Development (ESD): Analysis of System Thinking Competencies of Primary School Learners. *International Journal of Recent Educational Research*, *4*(6), 689–699. https://doi.org/10.46245/ijorer.v4i6.403

Cohrssen, C., & Garvis, S. (2021). Embedding STEAM in Early Childhood Education and Care.

Dhika, D. F., Safitrianingrum, A., Farida, N., & Setiadi, H. W. (2026). Pengembangan Modul Pembelajaran Berbasis Problem-Based Learning Untuk Meningkatkan Keterampilan Kolaboratif Siswa Sekolah Dasar. *Jurnal Inovasi Pendidikan, Sosial, Dan Humaniora*, *2*(1), 96–110.

Ennis, R. H. (2011). *The nature of critical thinking: An outline of critical thinking dispositions and abilities*. Urbana–Champaign, IL. Retrieved from https://education.illinois.edu/docs/default-source/faculty-documents/robertennis/thenatureofcriticalthinking_51711_000.pdf

Erlina, N. (2021). Kesiapan Calon Guru IPA dalam Pengembangan Rencana Pembelajaran Berbasis Education for Sustainable Development. *Jurnal Pendidikan Dan Pembelajaran Sains Indonesia (JPPSI)*, *4*(2), 142–150. https://doi.org/10.23887/jppsi.v4i2.39740

Esentürk, E., & Çetinkaya Yıldız, E. (2023). The Effect of Respect for Diversity Education Program on Primary School Students. *International Journal of Psychology and Educational Studies*, *10*(3), 624–637. https://doi.org/10.52380/ijpes.2023.10.3.1106

Hartati, T., Damaianti, V. S., Gustiana, A. D., Aryanto, S., & Jannah, W. N. (2022). *Berpikir Kritis dan Kreatif Siswa Sekolah Dasar*. Tasikmalaya: Perkumpulan Rumah Cemerlang Indonesia.

Hussain, S. (2026). Volume 5 Issue 1 , 2026. *Inverge Journal of Social Sciences*, *5*(1).

Iqbal, M., Shabbir, Z., & Khan, U. A. (2023). Investigating the Effects of Education for Sustainable Development on Students' Pro-Environmental Attitudes and Behaviors.

Global Educational Studies Review, *VIII*(I), 118–127. https://doi.org/10.31703/gesr.2023(viii-i).11

Jurado, E., Fonseca, D., Coderch, J., & Canaleta, X. (2020). Social steam learning at an early age with robotic platforms: A case study in four schools in Spain. *Sensors (Switzerland)*, *20*(13), 1–23. https://doi.org/10.3390/s20133698

Kelley, T. R., & Knowles, J. G. (2016). A conceptual framework for integrated STEM education. *International Journal of STEM Education*, *3*(1). https://doi.org/10.1186/s40594-016-0046-z

Khoiri, N., Roshayanti, F., & Widarti, R. (2023). Integration of STEAM and ESD: Improving the understanding of fluid concepts and creativity. *Journal of Education and E-Learning Research*, *10*(3), 578–584. https://doi.org/10.20448/jeelr.v10i3.4987

Küçük, H., Zeki, C. P., ˙Iskifo˘glu, G., & Caner, H. (2023). The Impact of a Sustainable Progressive STEAM Program on Primary School Students' Critical Thinking Dispositions and Mathematics Achievements. *Sustainability (Switzerland)*, *15*(21). https://doi.org/10.3390/su152115356

Li, J., Luo, H., Zhao, L., Zhu, M., Ma, L., & Liao, X. (2022). Promoting STEAM Education in Primary School through Cooperative Teaching: A Design-Based Research Study. *Sustainability (Switzerland)*, *14*(16). https://doi.org/10.3390/su141610333

Liani, K. D., & Redhana, I. W. (2025). STEM and STEAM in improving critical thinking skills: A systematic literature review. *The 5Th International Conference on Information Technology, Advanced Mechanical and Electrical Engineering*. https://doi.org/10.1063/5.0259402

Milara, I. S., & Orduña, M. C. (2024). *Possibilities and challenges of STEAM pedagogies*. Retrieved from http://arxiv.org/abs/2408.15282

Mutiara Putri, S., Sopandi, W., Sujana, A., & Sukardi, R. (2021). the Elementary Students ' Skills in Predicting and Understanding Concepts Using Predict- Observe-Explain (Poe) Strategy in Zoom- Meeting Learnings. *Metodik Diktatik*, *17*(1), 51–57.

Ngatminiati, Y., & Hidayah, Y. (2024). KETERAMPILAN BERPIKIR KRITIS UNTUK SISWA SEKOLAH DASAR. *Jurnal Review Pendidikan Dan Pengajaran*, *7*, 8210–8216.

Nugroho, U. E., Nugroho, A. S., Hayat, M. S., & Patonah, S. (2025). Bridging Sustainability and Pedagogy: A Narrative Review of Education for Sustainable Development (ESD) Implementation in Indonesian Science Education. *Prisma Sains : Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *13*(2), 348. https://doi.org/10.33394/j-ps.v13i2.15116

OECD. (2022). PISA 2022 Results Indonesia. In *Journal Pendidikan*. Retrieved from https://www.oecd.org/publication/pisa-2022-results/country-notes/malaysia-1dbe2061/

Pham Xuan, R., & Håkansson Lindqvist, M. (2025). Exploring Sustainable Development Goals and Curriculum Adoption: A Scoping Review from 2020–2025. *Societies*, *15*(8), 1–25. https://doi.org/10.3390/soc15080212

Punto Aji, G., & Nugraheni, B. I. (2023). Critical Thinking Skills of High School and Vocational School Students in Indonesia: a Literature Review. *International Journal of Education and Social Science Research*, *06*(03), 353–367. https://doi.org/10.37500/ijessr.2023.6328

Putri, S. M., Maksum, A., & Nurhasanah, N. (2024). Equality of Learning Services through ESD-Oriented RADEC in Elementary School. *PrimaryEdu: Journal of Primary Education*, *9*(1), 1–15.

Putri, S. M., & Purwanto, A. (2026). Assessing Sustainable Awareness of Madrasah Ibtidaiyah Students Within the Education for Supporting Sustainable Development Goals (SDGs) Framework. *ASEAN Journal of Educational Research and Technology*, *5*(2), 167–180.

Quigley, C. F., King, E., & Plank, H. (2020). STEAM Designed and Enacted : Understanding the Process of Design and Implementation of STEAM Curriculum in an Elementary School. *Journal of Science Education and Technology*, 499–518.

Raximboyevna, M. M. (2026). Enhancing Primary School Students ' Reasoning Abilities. *International Journal of Pedagogics*, *06*(44). https://doi.org/10.37547/ijp/Volume06Issue01-10

Rokhmah, T. I., Restian, A., & Am, I. A. (2026). Developing Critical Thinking in Digital Learning Environments : Challenges and Opportunities. *Nusantara: Jurnal Pendidikan Indonesia*, *6*(1).

Rončević, K., & Rieckmann, M. (2025). Education for Sustainable Development and Inclusive Education with particular consideration of learners with special needs: a scoping literature review. *Frontiers in Education*, *10*(July), 1–14. https://doi.org/10.3389/feduc.2025.1593060

Stylos, G. (2026). Transforming Understanding of Scientific Inquiry : The Impact of a Year - Long Explicit - Reflective Intervention on Greek Preservice Primary Teachers. In *Science & Education*. Springer Netherlands. https://doi.org/10.1007/s11191-026-00742-8

Tawil, M., Putra, A. S. U., & Alqadri, Z. (2026). JURNAL PENDIDIKAN DAN PEMBELAJARAN SAINS INDONESIA Pengembangan Asesmen Keterampilan Berpikir Kritis Mahasiswa Pendidikan Ilmu Pengetahuan Alam. *Jurnal Pendidikan Dan Pembelajaran Sains Indonesia*, *9*(April), 23–34.

Wahyuni, S., Novita, M., Khoiri, N., & Roshayanti, F. (2023). Analisis Bahan Ajar Fisika Kelas X Berdasarkan Pilar Education for Sustainable Development (ESD) dan Science, Technology, Engineering, Art, and Mathematics (STEAM). *Jurnal Inovasi Pendidikan Fisika Dan Riset Ilmiah*, *7*(2), 106–114. https://doi.org/10.30599/jipfri.v7i2.2152

Widarti, R., & Roshayanti, F. (2021). Potensi Implementasi STEAM (Science, Technology, Engineering, Art and Mathematic) berorientasi ESD (Education for Sustainable Development) dalam Pembelajaran Fluida. *Unnes Physics Education Journal*, *10*(3), 291–295.

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*. https://doi.org/10.1186/s40594-022-00346-y

Yadav, A. R., & Singh, C. K. (2026). An Exploration of Teaching Strategies That Promote Problem-Solving and Higher-Order Thinking Skills. *International Journal of Engineering, Science and Humanities*, *16*(01), 100–109.

Zhao, A. L., Dermody, J., Koenig-Lewis, N., & Hanmer-Lloyd, S. (2024). Cultivating sustainable consumption: The role of harmonious cultural values and pro-environmental self-identity. *Journal of Consumer Behaviour*, *23*(2), 1014–1031. https://doi.org/10.1002/cb.2261