

Editorial

Dear Readers,

The June 2026 issue of *Science Education International* presents 11 original research articles that reflect the international scope, methodological diversity, and thematic richness of contemporary science education research. The studies in this issue address critical topics such as inclusive educational practices, artificial intelligence (AI) integration, curriculum and material sustainability, dialogic teaching (DT), teacher professional development, and students' affective dimensions, including anxiety and self-efficacy.

The issue opens with a study conducted in Southern California that investigates the class-based science courses at an alternative education program for youth who have been “pushed out” of traditional schools. Authored by Anthony Peña, this research utilizes Structural Equation Modeling to demonstrate that the best predictors of student academic achievement are the relevance of science to students, students' sense of agency to create knowledge, and critical science education.

In the second article, Jui-Lien Tseng and Chih-Cheng Lin argue that a significant gap persists between museums' environmental messaging and their material practices, prompting them to introduce a new sustainability framework for science education. Derived from reflective practice at the National Science and Technology Museum, the “ECO-INSTRUCT” framework is built on five core principles: material circularity and regeneration, low-carbon and localized production, design for multi-functionality and reusability, design for durability and repairability, and digital integration for dematerialization to guide the development of sustainable instructional materials.

The third contribution, conducted by Soyeon Kim, examines the effects of supplementary learning using AI courseware in conjunction with regular elementary science instruction in S City. The findings reveal that while the additional AI courseware may support numerical information processing and foundational explanatory communication skills, it appears insufficient to foster higher-order inquiry skills and advanced forms of scientific communication without deliberate instructional mediation.

The fourth article reports a qualitative case study from a United Kingdom secondary school focusing on science teachers' perceptions of the barriers to implementing DT. Peter Munroe's research shows that teachers believe barriers exist, with the most commonly reported perceived barrier being student confidence and anxiety, a potential negative outcome of the COVID-19 pandemic – highlighting a critical need for high-quality training programs to improve understanding of DT.

The fifth study conducts a comparative analysis of chemistry teacher training programs in Türkiye and the Netherlands

from the perspective of the United Nations 2030 Sustainable Development Goals (SDGs). Rukiye Turan Bal and Ayhan Yilmaz examine the undergraduate curricula at Hacettepe University and Hogeschool Utrecht, concluding that while the Turkish program dominantly emphasizes the “Quality Education” goal (SDG 4), the Dutch program allocates significantly more space to “Industry, Innovation and Infrastructure” (SDG 9) and environmental sustainability, calling for a more balanced and holistic curriculum integration.

The sixth article, authored by Ali Abu-Nada, Rami Shariah, and Saud Al-Dajah, investigates the impacts of a GPT-based tutor in a foundation-level physics setting, focusing on Newton's Second Law. The experimental study reveals that students who used the AI tutor scored higher on quizzes and demonstrated significantly better metacognitive calibration (how closely confidence matches accuracy) while supporting student motivation and performance.

In the seventh article, Tomi Kiviluoma, Antti Laherto, and Ilona Södervik evaluate undergraduate biology students' systems thinking skills and conceptual knowledge using a scenario-based case focused on the effects of climate change on boreal forest ecosystems. The results highlight that the quality of conceptual knowledge about evolutionary processes was higher among students who exhibited advanced reasoning across systems, emphasizing the need for instructional strategies that integrate robust conceptual understanding into domain-specific curricula.

The eighth contribution explores how STEM teachers reflect on their identities, classroom practices, and school environments in relation to inclusion across 16 European countries. Kyriakos Demetriou, Christiana Karousiou, Maria Evagorou, and Evi Konstantinidou find that while teachers hold strong positive beliefs regarding the importance of inclusion, they report significantly lower confidence in practical applications, such as constructively addressing diversity-related conflicts and selecting inclusive curriculum materials.

The ninth article presents a systematic literature review analyzing 40 Scopus-indexed international journal articles (2016–2025) to explore the defining features of STEM project-based learning (STEM-PjBL) in science education. The analysis shows that quantitative approaches dominated, with major research contributions originating from Indonesia, the United States, and Taiwan. It confirms that STEM-PjBL emerges as an effective pedagogical strategy in cultivating critical thinking, creativity, and career interest.

The tenth study examines the impact of two instructional approaches to a DNA extraction activity in Biology and Geology in Spain: a cookbook-style laboratory practice and an inquiry-based science education activity. Fernando Morcillo

de Amuedo, Ainhoa Arana-Cuenca, and Guiomar Garrido Álvarez-Coto demonstrate that while both approaches led to improvements in immediate academic performance, only students in the inquiry-based condition showed evidence of deeper conceptual understanding, explicit references to the scientific method, and a sustained perception of meaningful learning.

Concluding the issue, the eleventh article presents the preliminary piloting of a multidimensional questionnaire on anxiety in STEM learning based on a retrospective convenience sample. Anne Mari Roost, Regina Soobard, Karin Täht, and Miia Rannikmäe examine subject-specific science anxiety, intolerance of uncertainty, and thinking-related anxiety, showing that physics and chemistry were most frequently identified by participants as the most anxiety-provoking science subjects.

Overall, the articles in this June 2026 issue collectively demonstrate how innovative pedagogical approaches, digital and AI tools, sustainable design frameworks, and inclusive practices can support the development of performance, systems thinking, inquiry skills, and affective growth in science education. Together, they provide valuable theoretical insights and practical implications for researchers, educators, and policymakers, reinforcing *Science Education International's* mission to advance high-quality science education on a global scale.

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