Book of Abstracts
SCITEED 2025

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3rd International Congress & Exhibition on Current Trends on Science Technology Education (SCITEED)

Oludeniz, Turkey

October 21-27, 2025

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PLENARY SPEAKER

Id-187

From Memorization to Meaning: Teaching Natural Units and the Conservation of Universal Constants

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Abstract. Max Planck kickstarted the quantum revolution 125 years ago by introducing the constant of proportionality that bears his name. Planck showed that his constant and other universal constants contain natural units in their dimensions known as Planck units. Students learn dimensional analysis as a technique for manipulating natural correlations concealed by arbitrary units. Setting universal constants equal to 1 normalizes the units yielding proportionally significant results. While this method is mathematically convenient, it is an opaque form of analysis in which students memorize rules rather than gaining a genuine understanding of fundamental physics. A better approach to teaching natural units is stating universal constants as Planck units in their unit dimensions. The reward is a dimensional view of the equations in which non-dimensional quantities of length, mass, time, and electric charge are conserved. Universal constants stated in arbitrary units like meters and seconds change with the unit system, but these non-dimensional quantities are invariant to changes in unit system, revealing a natural structure underlying the equations.

Keywords: Natural Units; Universal Constants; Conservation; Planck Units; Dimensional Analysis

PLENARY SPEAKER

Id-196

Empowering Principals to Be "Future-Ready" to Effectively Lead Schools in the 21st Century and Beyond

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Abstract. In many emerging economies in developing countries, substantial investments are made in education, with the hope of generating a highly skilled labor force and high proportion of employment. Despite these investments, there is growing concern that many public schools are not functioning at their optimum, and that learner performance is generally of a low standard. However, many nations around the world have undertaken wide-ranging reforms with the intention of better preparing principals for the educational demands of life and work in the 21st century. The rapid rate at which changes have taken place, and are still taking place, together with the increased volume of administrative work, has placed principals under enormous pressure. Changes in the new system of governance in schools have unfortunately resulted in principals being unprepared for their leadership role. Fundamentally, principals should be empowered to effectively deal with challenges facing them in the 21st century and to be future prepared to lead schools beyond the 21st century. Future-ready principals should proactively prepare their schools for constantly changing educational environment by fostering adaptability, innovation, and a forward-thinking mindset. In this paper, it will be argued that principals should be provided professional development that will enable them to be "future ready" to lead schools effectively in the 21st century and beyond. They should navigate the complexities of cutting-edge education and embrace new technologies, adapting to changing demographics, and fostering a culture of innovation and continuous improvement. Being future-ready implies that learning outcomes must be relevant and aligned to new realities that emerge over time. In future ready schools, technology and digital learning expand access to high-quality, ongoing, job-embedded opportunities for professional learning for principals. Using qualitative research within an interpretivist paradigm, this case study will explore the importance of promoting a culture of professional development that will prepare principals to confront education challenges and obstacles facing them now and in the future. Ten principals will be purposefully selected and interviewed to determine their perceptions and experiences of how professionally developed to lead and manage schools in and beyond the 21st century. Data will be analyzed using Tesch's method of coding.

Keywords: Empowerment; Future-Ready; Professional Development; Principal; Mentoring and Coaching

PLENARY SPEAKER

Id-210

The Evaluation of the Impact of E-Learning Modules Integrating Climate Action and Scientific Process Skills to Empower Secondary School Students as Agents of Change

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Abstract. Climate change and environmental degradation constitute some of the most pressing global challenges, and schools are uniquely positioned to foster the knowledge, skills, and values that empower younger generations to respond. In this context, the integration of Scientific Process Skills into teaching and learning has gained renewed importance, particularly within the new Turkish national curriculum, as a means of cultivating observation, questioning, experimentation, and evidence-based reasoning. Addressing this need, the Erasmus+ funded PATHWAYS project was designed to strengthen teacher competences, engage students in sustainability action, and promote collaboration among European schools to embed environmental and climate education. The project developed multilingual e-learning modules—delivered in Dutch, English, French, Greek, and Turkish—focused on climate action and the development of scientific process skills. These modules were complemented by national workshops, where teachers and students applied their learning by co-designing sustainability projects targeting real environmental issues such as waste reduction, plastic use, and water conservation. The methodological framework was based on the action research model, emphasizing iterative practice, reflection, and collaboration. The evaluation of the impact involved a multi-layered process: (i) rubrics for project quality, assessing clarity of objectives, alignment with sustainability goals, student participation, innovation, and feasibility; (ii) documentation review, including project logs, timelines, and student journals ; and (iii) focus groups with teachers who participated in workshops and the international Pathways conference. In addition, the evaluation addressed learning outcomes, measuring the extent to which students enhanced their scientific process skills, developed environmental awareness, and applied inquiry-based learning to authentic sustainability challenges. Findings indicate that the integration of e-learning modules with workshops and student-led initiatives improved both environmental outcomes (e.g., measurable reductions in waste and resource use) and pedagogical outcomes, including stronger inquiry skills, increased student agency, and greater teacher confidence in embedding sustainability across curricula.

Keywords: Climate Action; Secondary Education; Scientific Process Skills; E-learning; Learning Outcomes

Acknowledgment: This study is part of the project “Building Pathways for Empowering Secondary School Students to Become Agents of Change for Environmental and Climate Action” (Project No: 2023-1-FR01-KA220-SCH-000153897), co-funded by the European Union through the Erasmus+ Programme, Key Action 220 – Cooperation Partnerships in School Education. Project Duration: 01.10.2023 – 30.09.2025.

INVITED SPEAKER

Id-185

The Teacher as Creator: The Impact of Creative Digital Practices on the Motivation and Professional Preparation of Pre-service Biology Teachers

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Abstract. In today’s rapidly evolving educational landscape, equipping pre-service biology teachers with innovative, adaptable, and learner-centered pedagogical skills is more crucial than ever. Traditional methods of instruction, while foundational, often fall short in fostering sustained motivation and active engagement among students. As digital technologies and creative media become increasingly integral to contemporary classrooms, there is a growing need to integrate these tools into teacher education programs. This study explores the influence of creative digital practices on the motivation and professional preparation of pre-service biology teachers. By integrating multimodal pedagogical tools such as educational comics, drama-based learning, and educational podcasts within a digital learning environment, the research aims to evaluate how these innovative methods enhance student engagement, content comprehension, and teaching readiness. Data collected through surveys, interviews, and reflective journals indicate that active involvement in creating digital educational content fosters higher motivation, deeper understanding of biological concepts, and the development of key teaching competencies. The findings suggest that incorporating creative digital media in biology teacher education not only enriches the learning experience but also equips future educators with vital skills for contemporary classrooms. Implications for curriculum design and teacher training programs are discussed.

Keywords: Creative Digital Practices; Educational Comics; Educational Podcasts; Drama-Based Learning; Pre-Service Biology Teachers; Innovative Teaching Methods

INVITED SPEAKER

Id-189

Educational Diplomacy: Soft Power or Smart Power

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Abstract. Educational diplomacy is typically associated with soft power—tools of attraction and cultural exchange. Yet this view underestimates its strategic potential. This talk introduces the Strategic Educational Diplomacy (SED**)** framework, which reconceptualizes education as a versatile instrument of statecraft that operates across both soft and hard power domains. Drawing on Bourdieu, Foucault, and Gramsci, the framework shows how states use education to embed ideological narratives, cultivate elite networks, and align academic initiatives with broader political and security objectives. Rather than viewing education as benign, SED highlights its role in shaping influence, reinforcing hegemony, and advancing strategic interests in competitive global contexts.

Keywords: Educational Diplomacy

INVITED SPEAKER

Id-191

The Digital Mirror: What Student Behaviour, Engagement, and Immersive Tools Reveal About Online Postgraduate Experience

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Abstract. Online learning has become much more common in recent years, making education more accessible to a broader range of students. However, it also introduces new challenges that affect how students engage with learning. Many recent studies focus on the technical aspects of planned online programs or emergency teaching methods developed during the pandemic. These studies often overlook key issues, such as the rise of group behaviour in large online classes, and clear ways to measure engagement, making it difficult to assess whether students are meaningfully involved in the learning process. Facilitators of online postgraduate programmes also face the complex challenge of making digital learning feel authentic and engaging. As technology evolves, universities increasingly adopt tools like virtual reality to support this goal. There is now a strong movement toward creating online environments that are accessible but also interactive and immersive. This study investigates how behavioural patterns, engagement strategies, and technological design features influence the overall student experience in a fully online postgraduate programme. Data was collected from several sources, such as personal communications to the facilitators, learning management system analytics (773 records), and online questionnaires completed by 87 students. The analysis followed various methods such as Colaizzi's method (case study 1), the Online Engagement Framework and Moore's three types of engagement (case study 2), and the 7 Steps for Designing and Executing an Implementation Pilot Study (case study 3). The findings of case study 1 showed that the relative anonymity of online learning can lead students to behave in ways they would not in face-to-face settings. They also showed poor judgment and continued believing false information, even when clear evidence proved it wrong. The study highlights that herd mentality is a real risk in online programmes. Student codes of conduct should be updated to protect staff and students from intentional or accidental harm. In Case Study 2, feedback rubrics and weekly announcements demonstrated strong student-lecturer interaction, enhancing performance engagement. Social engagement was supported through group work and an informal "Coffee Shop" space, while submission deadlines, achievement badges, and timed access boosted behavioural engagement. These strategies led to 1,113 student interactions—far exceeding the required 117. The findings suggest a new form of online engagement and provide a model for assessing its sufficiency. A structured, programme-wide assessment strategy effectively sustains student engagement in fully online programmes. After engaging in a virtual reality "Interview" environment, most students in case study 3 could use the platform's features, including 360° images, PDFs, whiteboards, videos, and integration with the learning management system. However, the study pointed out areas for improvement in how students navigate the platform and understand the instructions. Making these improvements could enhance the usefulness of virtual reality tools in creating realistic and engaging learning experiences for postgraduate students. The three case studies show that improving student experience in online programmes requires more than just access to technology ; it demands thoughtful design that considers behaviour, engagement, and usability. Using targeted frameworks and practical design strategies, this research offers new ways to enhance meaningful engagement and support ethical, inclusive online learning environments.

Keywords: Herd Mentality; Online Engagement; Online Learning; Postgraduate Studies; Virtual Reality

INVITED SPEAKER

Id-205

The Visual Art of Biology: An Interdisciplinary STEM Experience

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Abstract. Scientific literacy is crucial for developing informed citizens who question the "why" and "how" of the world around them. People are naturally curious and learn best when content connects to real-life experiences. Yet, many science courses rely on memorization and passive lectures, which can hinder engagement and understanding. To address this, an interdisciplinary, co-taught course titled "The Visual Art of Biology" was developed at the University of Mary Hardin-Baylor. A collaboration between the Biology and Art departments, the course integrated biological concepts with artistic expression. Students explored topics like global warming, species invasions, habitat destruction, and biodiversity, while reflecting on the environmental impact of their art. Through active learning, students investigated biological themes, created both scientific and artistic representations, and shared their work with peers helping to bridge the gap between science and art in a meaningful way.

Keywords: Scientific Knowledge; İnformed Citizens; Non-Majors Biology Class; Active Learning; İnterdisciplinary Course; Artistic Creations; Biodiversity; Student Exploration

INVITED SPEAKER

Id-209

The AI Wake-Up Call: Are Academics Ready to Redesign Assessment?

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Abstract. The emergence of generative AI has prompted a critical reassessment of traditional academic practices, particularly in the realm of student assessment. Many conventional assessment methods now risk evaluating what AI can produce rather than what students genuinely understand and can demonstrate. This presentation argues that ineffective assessments are not a reflection of student shortcomings, but of academic systems that have failed to evolve. If educators cannot design assessments that distinguish human competence from machine-generated output, the integrity of learning outcomes is compromised. To investigate current academic responses to this challenge, three knowledge cafés were conducted with academics across disciplines. These sessions explored how educators are approaching assessment redesign in light of AI's growing capabilities. The findings revealed a widespread recognition of the issue, but also a lack of clarity and confidence around how to implement meaningful change. In response to these insights, a five-point framework was developed to support academics in redesigning assessments. This framework offers practical guidance for creating assessment tasks that are AI-resilient, aligned with module learning outcomes, and focused on authentic student competence. It encourages a shift from product-based evaluation to process-oriented and experiential learning assessments. This presentation will introduce the framework, share examples of innovative assessment redesigns, and invite reflection on institutional readiness for change. It calls on academics to move beyond outdated models and embrace a more human-centered approach to assessment—one that ensures students are evaluated for what they can do, not what AI can replicate.

Keywords: Generative AI; Student Assessment; Academic Integrity; Assessment Redesign; Authentic Learning; Knowledge Cafés; Higher Education

All Submissions & Topics

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