

<https://doi.org/10.7250/CONNECT.2026.094>

## THE LABORATORY OF MAD IDEAS

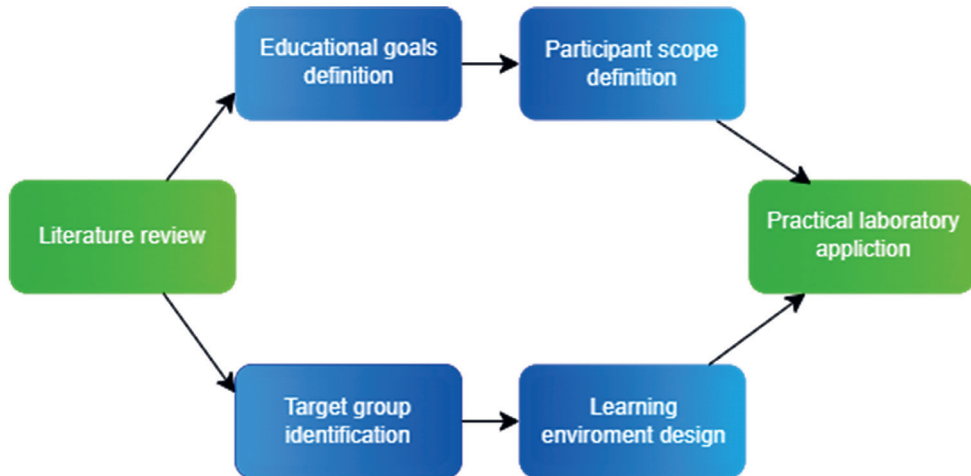
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**Abstract** – In recent years, the younger generation in Latvia and Europe has shown more interest in sustainability, climate change mitigation, and environmental protection. However, this interest often remains fragmented and does not integrate into long term engagement with science, technology, engineering, and mathematics (STEM) education. One of the key challenges includes insufficient combinations of formal education style and real-world problem-solving environment, considering technological processes, particularly in the context of relevant word problems, where systemic thinking and practical experience are essential. Experience-based learning and an active educational environment are recognised as effective approaches to strengthening understanding of complex environmental and engineering systems. If integrated with STEM education, the study environment allows learners to engage directly with real processes, experiment with materials and modern technologies, and analyse causality relationships across technological, environmental, and social aspects. This learning approach supports the improvement of engineering thinking by identifying and promoting deeper, more meaningful learning content. “The lab of mad ideas” is an open-type interdisciplinary learning environment developed within the Institute of Energy Systems and Environment at Riga Technical University (IESE RTU). The laboratory is designed as a tool between theoretical education and practical research, offering students and pupils the opportunity to implement experimental projects, develop scientific research work, and explore institute’s sustainability-driven activities and goals. In addition, it functions as a transition space between secondary school education and university-level studies, allowing pupils to become familiar with an academic research environment before selecting higher education. The laboratory integrates principles of experimental learning, STEM education, and creative thinking, aligned with the institute’s research direction. The proposed laboratory models are based on analysis of successful educational practices and comparable initiatives in European technical universities, highlighting the role of open laboratories and makerspace-type environments in increasing student motivation, interdisciplinary collaboration, and applied research skills. The lab of mad ideas aims to function as a scientifically structured yet flexible platform that supports early engagement in environmental engineering and sustainability topics.

**Keywords** – *Active learning environment; engineering; makerspace-based education; mathematics (STEM); science, secondary-to-higher education transition laboratory; technology*



Conceptual structure of "The laboratory of mad ideas."

