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ENHANCING TRANSVERSAL COMPETENCIES IN ENVIRONMENTAL ENGINEERING THROUGH INTERDISCIPLINARY LEARNING APPROACHES

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Abstract – Environmental engineering studies develop knowledge and skills for solving complex environmental problems, including both in-depth technical knowledge and transversal competencies, including collaboration, communication, critical thinking, problem-solving and time management skills. In the labor market, environmental engineers are increasingly required to work interdisciplinary, collaborating with specialists from various sectors and stakeholders, therefore, it is essential to integrate learning approaches that promote the development of these skills into the study process. Riga Technical University Institute of Energy Systems and Environment implements an interdisciplinary study course (12 ECTS, 40 % of transversal competencies, 60 % technological competencies), within which students apply problem-based learning approach. In the fall semester of 2025, bachelor's students of the study program "Environmental Engineering" addressed a topical sustainable campus challenge – how to improve mobility planning on the RTU student campus in Kipsala neighborhood (Riga, Latvia). The identified mobility problem stems from the goals mentioned in the RTU sustainability strategy and is one of the priorities defined by the RTU administration. The existing problem covers a wide range of stakeholders – RTU employees, students, residents, and visitors, which outlines the complex nature of the problem. During the project, students analysed the existing transport infrastructure, assessed mobility habits, identified key problems, and developed proposals for improving sustainable mobility, presenting the results to a wide range of stakeholders. In this study, based on an online survey (46 students out of 51 course participants responded), an assessment of students' transversal skills development as a result of an interdisciplinary project was conducted. The results of the student survey show that a problem-based and interdisciplinary approach significantly contributes to the development of students' collaboration, communication, analytical thinking and problem-solving skills, as well as improves students' ability to work with real, complex environmental problems. The study confirms the importance of interdisciplinary projects in improving the quality of environmental engineering studies and indicates the need to continue developing similar teaching approaches in higher education.

Keywords – Higher education; learning methods; problem-based learning; sustainable campus; sustainable mobility

Framework

Interdisciplinary study course

Problem-based learning methods

Group work on problem-solving
Tackling real cases
Meeting project deadlines
Analyzing complex data
Presenting solutions to stakeholders

Transversal competencies gained

Teamwork
Problem-Solving
Time Management
Critical Thinking
Communication

The framework of interdisciplinary course in environmental engineering

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