


Chapter 15

Inquiry-Based Learning Projects Design for STEAM Education Addressing Sustainability Challenges

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ABSTRACT

This chapter presents insights from inquiry-based learning (IBL) cases in schools within the context of the international project ‘Teachers & Researchers Networking for Inquiry-based Learning.’ The action research involved collaboration between teachers and researchers to design and implement project-based learning using the IBL approach. The 18 IBL projects created by the students demonstrated that IBL in the context of STEAM education is an effective method to tackle sustainability issues.

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Project-based learning (PJBL) enables students to explore real-world challenges and develop problem-solving skills. By designing learning projects that address sustainability challenges, students gain a deeper understanding of the subject matter while contributing to a more sustainable future. The researchers presented potential sustainable changes in schools, including the learning process design, educational content, and the roles of teachers and students. Practical recommendations summarizing the researchers' experience are provided as insights for further IBL and PJBL implementation.

INTRODUCTION

In recent decades, societal changes and sustainable development have prompted revisions to educational goals, content, and the learning process. Currently, there is a trend in schools that emphasizes science and integrative curricula of science, technology, engineering, arts and math (STEAM) education (European Commission, 2021; OECD, 2020; Thibaut et al., 2018). Recent studies have shown that inquiry-based learning is an effective pedagogical approach to science and STEAM education (Weiss et al., 2022). This approach can help with real-world problem-solving and raising awareness of sustainability. Sustainable development and sustainability are currently key priorities in education. Sustainability can be measured using three sets of indicators: social, economic, and ecological (Bossel, 1999). Education for sustainable development aims to equip learners with the knowledge, skills, values, and attitudes necessary to make informed choices and take responsible action toward environmental integrity, economic viability, and a just empowering society for current and future generations of people of all genders, while respecting cultural diversity (UNESCO, 2020). In addition to understanding sustainable development, learners must have a critical and contextualized understanding of sustainable development that encourages them to take active steps. Therefore, it is important to transform the learning environment sustainably to ensure the participation of the entire school community in collective action. According to UNESCO (2020), empowering teachers with the necessary knowledge, skills, tools, and collaborative opportunities is crucial for the success of this process.

Due to global societal and economic changes, educators are increasingly challenged to integrate interdisciplinary approaches into their teaching. This requires a revision of educational content management principles. Implementing STEAM education in schools is particularly challenging for teachers with a narrow professional specialization. Therefore, teamwork among teachers is necessary. One challenging aspect is the need to change the roles of teachers in learning organizations. To develop and apply learner-oriented methods and forms of learning, the efforts

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