



BRILL

RESEARCH IN INTEGRATED STEM EDUCATION

1 (2023) 373–376

Research in Integrated

STEM Education

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# Learning and Teaching with Outdoor STEAM Education

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Published online 6 December 2023

## Abstract

In this special issue, the topic of Outdoor Education related to an integrated STEM approach is taken into consideration. Three articles focus on theoretical background and practical investigations of education outside the classroom. The issue aims at contributing to further research on the topic and providing an overview of activities that strengthen the link between the STEM disciplines and the students' environment.

## Keywords

outdoor education – modelling and application – motivation – embodiment–mathematics

If people reflect on their school education, they probably have a classroom situation in mind. Even nowadays, the school (building) is a prototypical educational place, and out-of-school situations and institutions are usually only considered for one-off excursions. Education should allow students to interact with the natural world to apply their skills and be aware that they can modulate their surroundings through knowledge. Still, everyday education does not exclusively have to take place inside a school building. Education outside the walls of the classroom or school building has gained importance in recent years. The practical initiatives of teachers and numerous international research contributions show the interest in education linked to realistic environments (e.g., Haas et al., 2021; Ludwig et al., 2020).

With outdoor education, we refer to the following quote: “Outdoor education is education in, about, and for the out of doors.” (Ford, 1986, p. 31). This quote clarifies that outdoor education is more than just leaving the classroom. It also includes the outdoors as a learning theme and goal. These three components (location, theme and goal), defined in the 1980s, are still the foundation of outdoor education today. Due to the demand for reality references and authentic teaching, outdoor education is an apparent enrichment of teaching in various subjects, including implementation. Especially in the STEAM (Sciences, Technology, Engineering, Arts and Mathematics) approach, where subjects are taught in a combined learning setting, reality makes it possible to discover, describe and model interdisciplinary phenomena. This goal of STEAM education is at the heart of outdoor education: Despite only referencing and explaining genuine and authentic situations in the classroom, outdoor education puts students in such situations and lets them discover phenomena. Having students engage in outdoor activities can contribute to their exploration of interdisciplinary and environmental awareness (Cahyono, 2018).

The Special Issue takes up these potentials and deals with current research results on the unique nature of outdoor learning using the STEAM approach as an example. In particular, it focuses on the special features and advantages of the outdoor learning setting. Furthermore, references to practical implementation are made through teaching examples, giving concrete ideas for teaching STEAM outdoors profitably.

The Special Issue comprises three articles encompassing this common theme of Outdoor STEAM education and illustrating the research's diversity involving motivation, modelling and embodiment. Still, the three articles connect the perspectives of the learners, and the research aims to identify the specificities of STEAM learning outside the environment. In the article "Out of doors and outdoors: The motivating effect of leaving the classroom", **Brigitta Békési, Tony Houghton, Eva Ulbrich and Zsolt Lavicza** focus on the students' motivation in the outdoor education setting. In particular, the authors present the use of educational technology in STEAM learning outdoors with pre-service teachers and inquire about learners' motivation. The authors promote STEAM learning by using outdoor mathematical trails, presenting an exciting approach for educators to start outdoor education from their class in a motivational setting. Mathematics can be the catalyst for STEAM education outdoors.

This perspective is enriched by the article "Indoors vs. outdoors – Student perception of different modelling settings" by **Simone Jablonski**. In this article, the students' perception of the outdoor learning setting is compared to indoor learning, whereby special attention is paid to modelling. The author describes how students could transfer possible learned skills outdoors in a real-life setting back into indoor class activities. The relation between a mixed learning setting, outdoors and indoors, is discussed and is especially interesting for upcoming experiments in school development settings on STEM education. Similar to the first article, we have mathematics and mathematical trails as a motor for the activities.

These considerations can be related to the article "STEAM Trails in Outdoor Learning Environments around the Egyptian Pyramids Complex" by **Shereen El Bedewy, Zsolt Lavicza, Ben Haas and Yves Kreis**, which focuses on outdoor heuristic trails connecting STEM skills to history and culture. They highlight new practices on learning skills and knowledge within STEM by applying them in outdoor education in a culturally relevant context. This approach could benefit different types of learners who present learning difficulties within a traditional approach indoors.

At a glance at the presented results, integrating a STEAM or STEM approach in teaching and learning favours new learning moments and strategies. The articles in this Special Issue offer new insights on harnessing the potential of outdoor space to afford integrative STEAM or STEM learning experiences for students from out-of-door to outdoor learning. The reader will experience research which tries to harmonise teaching settings where teachers could integrate regular outdoor education in their classes and support new or different learning and teaching approaches.

## References

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