

## Chapter 15

# Smart Energy, Smart Schools: Project–Based Learning About Energy Transition and Digitalization

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### ABSTRACT

*This chapter presents the project “Smart Energy Smart Schools” (SENSOr), which develops project-oriented learning environments on the topic of energy in public school buildings. The project builds bridges between education for sustainable development and digitalization. In the chapter, three different educational modules, the environmental measuring station, the history of light sources, and the planetarium are dealt with in more detail. They show a useful connection between ESD and digitalization or digital media. Another focus is the evaluation of the first feedback from the students and teachers. This leads to the formulation of initial theses that can be derived from this. Finally, various opportunities and challenges that arose on an individual and institutional level during the implementation of the project are described.*

### INTRODUCTION

Topics of the energy transition confront society worldwide with complex challenges. Digitalization and new forms of connectivity promise smart solutions for the efficient usage of energy. Thus, not only technological, and institutional changes towards sustainable power sources are necessary, also new practices in dealing with energy in everyday life are becoming important. The explorative project “SENSOr - Smart Energy Smart Schools” brings together potentials of digitalization on the one hand and Education for

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Sustainable Development (ESD) on the other hand. It aims to promote interest for the topics of energy transition, climate change and sustainability with the help of learning arrangements. This paper will discuss whether it successfully initiates this and triggers a potentially longer process. Thereby, the project uses the example of energy use in public school buildings in project-based learning environments and offers a contribution to a whole school approach (Mathie & Wals, 2022).

Based on theoretical considerations of transformative learning in the context of sustainable development and digitalization, the first chapter postulates central challenges that should be taken into account in conceptual considerations for designing learning opportunities. Subsequently, it is discussed, how the project SENSOr should meet the described challenges. The implementation of the project is concretised by using the example of three educational modules. These are representative for the usage and integration of digital tools in educational environments, as well as the promotion of new practices in everyday life for a sustainable transformation in the energy sector. The utilized questionnaire is briefly explained, and first feedbacks are evaluated. Ending with a discussion about the first preliminary theses, the opportunities and risks arising from educational practice are concerned.

## **THEORETICAL BACKGROUND**

The need for a sustainable, future-oriented development is unquestioned and is described in the WBGU<sup>1</sup> report “*World in Transition*” (WBGU, 2011) as a comprehensive social transformation process. Especially in the confrontation with multiple crises, shaping social debates currently, it is postulated that education for sustainable development can have an important impact. Although many people are interested in sustainability and associate great chances to a sustainable future development, they have little faith in the achievability of the desired future (Grund & Brock, 2020). These insights are contradictory to a certain extent to the requirements of a social transformation process in which actors participate as responsible citizens in designing a sustainable development. The project on which this article is based addresses the issue and examines the chances and limitations of designing learning opportunities in the context of the energy transition.

ESD aims to empower people to think and act in a sustainable way which requires critical reflection on one’s own actions and active participation in social decision-making processes (de Haan, 2008). Regarding this, learning opportunities should be designed to enable own experiences of self-efficacy (Bandura, 1977; Oberrauch et al., 2021), as well as encouragement. These actions demand reflection in the context of sustainability concepts. Research projects in the context of ESD have shown that proactive action and self-efficacy experiences have a great impact on students’ sustainability-related awareness, interest formation and attitudes (e.g., Fisman, 2005; Malberg Dyg & Wistoft, 2018).

Changing social circumstances, like those found expression in or through digitalization, pose a challenge. In a culture of digitality (Stalder, 2016), all areas of life are digitally permeated and shaped. The WBGU (2019) also links digitalization and sustainability together and questions which framework could promote positive effects on resource consumption and environmental protection. This is also based on the demand that digitalization should be oriented towards a global transformation for sustainability. On the one hand, it can be stated that information and communication technologies undeniably make an important contribution to the global sustainability goals in the field of science, technology, and innovation. Thus, they represent a central instrument of sustainable development (Leal Filho et al., 2021). On the other hand, learning and education cannot be understood independently of the material and social

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