Chapter 4
Adapting to the Industry 4.0 Era:
Transdisciplinary IoT Education

Aliye Saraç
Istanbul Topkapi University, Turkey

Nesrin Özdener
Marmara University, Turkey

ABSTRACT

The rapid advancement of technology and industrial transformation are leading to significant changes in education. This chapter focuses on transdisciplinary approaches, which play a crucial role in imparting 21st-century skills and reshaping the education system. Critical thinking, problem-solving, digital literacy, creative thinking, communication, and collaboration have become indispensable for the modern workforce and society. In this context, STEM (Science, Technology, Engineering, Mathematics) education emerges as a model aimed at developing interdisciplinary thinking skills. The integration of IoT (Internet of Things) technology into STEM education with a transdisciplinary approach can enhance the educational process by providing students with opportunities to work on real-world applications. This chapter thoroughly examines how teachers and students can use IoT technology to accelerate the transformation in transdiciplinary STEM education and adapt to Industry 4.0.

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1. INTRODUCTION

With the rapid development of technology and industrial transformation, a significant change process is taking place in education. This process plays a triggering role in providing 21st-century skills and reshaping the education system. Skills such as critical thinking, problem-solving, digital literacy, creative thinking, communication, and collaboration have become fundamental requirements for today's business world and society. For this reason, pedagogical approaches like problem-based learning, which focuses on real-world issues, are coming to the forefront. Considering global problems such as climate change, health inequalities, social problems, and technological developments, the importance of collaboration between different disciplines increases. However, the inability to effectively implement these approaches in an educational environment and the insufficient comprehension of educational philosophies cannot adequately ensure the training of individuals who can adapt to the needs of the age.

Integration of disciplines is directly related to educational philosophies and methods and plays an important role in the curriculum development process. In this context, the STEM (Science, Technology, Engineering, Mathematics) education model assumes a significant role in teaching environments. STEM offers a holistic approach by combining the disciplines of science, technology, engineering, and mathematics. This model focuses on providing students with interdisciplinary thinking skills to solve the problems they encounter in daily life. For these practices to be more effective, it is essential to understand how different disciplines can be integrated into the educational environment. A transdisciplinary approach can increase the benefits of this model. Although it is stated that STEM education has the potential to enter educational environments as a transdisciplinary form of integration in terms of covering many stakeholders and scientific fields and being aimed at solving current problems (Gencer et al., 2019), it is not clear which category it is combined with different disciplines due to the different forms of integration and partnerships with different stakeholders, and it stands out as an ongoing research area (İnci & Kaya, 2022). In this context, today STEM education is expected to be handled with different models in the integration of different disciplines and to adapt to technological developments in the 21st century. For this purpose, the integration of IoT (Internet of Things) technology, which encompasses network technologies and data sciences from Industry 4.0 components, into STEM education through a design process with a transdisciplinary approach can elevate this educational model to a higher level. IoT can enhance the impact of STEM education by providing students with opportunities to work on real-world applications, preparing them for the technological era of the future.