Chapter 9
Using Artificial Intelligence to Evaluate the Nature of Science Myths:
A Comparison of Pre-Service Science Teachers and ChatGPT

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ABSTRACT

This chapter aims to compare the performances of pre-service science teachers (PSTs) and generative artificial intelligence (AI) application (ChatGPT) in answering nature of science (NoS) myths. In this study, which was designed according to a qualitative descriptive research design, the 15 most frequently encountered NoS myths were addressed to 104 PSTs and the ChatGPT. The data were analyzed using content analysis. As a result of the research, when the items related to all myths were analyzed, approximately 48% of the PSTs had myths about the NoS, while 66% of the ChatGPT answers included correct information. Therefore, ChatGPT can be effective in seeking answers to NoS myths. However, since the resources used by ChatGPT are limited to certain books, contents, or resources of certain countries, it may not be efficient enough in terms of providing information diversity. According to these results, comparison of PSTs and ChatGPT's answers are discussed.

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INTRODUCTION

Individuals may often lack sufficient knowledge and experience about how science works and how it affects them although they are intertwined with science in daily life. (Bell et al., 2011). However, they may need to make science-based decisions on issues that affect their lives (McComas et al., 1998). In such cases, they are expected to get help from the nature of science (NoS) (Dorji et al., 2022). According to Driver et al. (1996), NoS benefits in terms of understanding the scientific process, making informed decisions on socioscientific issues, appreciating science as an element of contemporary culture, being aware of scientific studies, and learning science content in depth. However, myths about NoS that still exist among individuals and may cause misunderstandings may affect their informed decision-making. Moreover, it is also discussed whether individuals can access this information accurately on the internet, which is frequently used by them to be informed about scientific studies. Therefore, artificial intelligence (AI) applications are considered important in accessing accurate information and appreciating science. Detailed information on the myths of NoS and AI in education is given below.

ARTIFICIAL INTELLIGENCE IN EDUCATION

Artificial intelligence in education (AIE) has accelerated its progress in the last 30 years (Zawacki-Richter et al., 2019). In the use of AIE, 77% of parents and 92% of students are interested in AI tools to help them learn (Verma et al., 2023). In October 2023, according to a systematic review conducted by the author, it was concluded that AI studies in education in Türkiye have progressed in the last 20 years, especially in the last five years, AI applications have a rapid acceleration (Author, 2023). A striking feature of this systematic review study, the most studied study group is pre-service teachers (PSTs) and other undergraduate students. However, it was concluded that studies on AI in teacher education are still quite limited. Therefore, this chapter on the use of AI in teacher education can be effective.

ChatGPT as an Artificial Intelligence Application in Science Education

As in many fields today, ChatGPT is one of the most used tools for individuals to access information. ChatGPT is also highly preferred among the generative AI applications used in education. ChatGPT is an AI-based chatbot developed by OpenAI (Birer, 2023). ChatGPT is a tool that generates text by compiling information from books, news articles, websites and Wikipedia (Scharth, 2022). However, there