

STEM and Artificial Intelligence: A Bibliometric Analysis of Integrated Approaches in Education (2006–2025)*

Çağrı AVAN^a, Selçuk AÇIKGÖZ^b

^aKastamonu Provincial Directorate of National Education, Measurement and Evaluation Center Kastamonu/Turkey

cagriavan@gmail.com <https://orcid.org/0000-0002-4068-7631>

^bMersin University, Anamur Vocational School Mersin / Turkey

selcukacikgoz@mersin.edu.tr <https://orcid.org/0000-0001-6549-576X>

Received: March,09 2026

Accepted: May 04, 2026

Keywords:

STEM education,
artificial
intelligence,
bibliometric
analysis,
learning analytics

Paper Type:

Research

Abstract

This study aims to analyze the academic literature produced at the intersection of STEM (Science, Technology, Engineering, and Mathematics) education and artificial intelligence (AI) technologies between 2006 and 2025 through a bibliometric approach. As personalized learning approaches and interdisciplinary integration become increasingly vital in education, the convergence of these two domains necessitates a comprehensive investigation. In this context, the study seeks to reveal publication trends, citation performance, conceptual structures, collaboration networks, and intellectual clusters within the STEM-AI literature.

The data were obtained from the Web of Science Core Collection on July 7, 2025, and include 449 peer-reviewed publications published between 2006 and 2025. Using the bibliometrix R package and its biblioshiny interface, analyses such as annual publication trends, citation distributions, co-citation networks, keyword co-occurrence, and thematic evolution maps were conducted.

The findings indicate an annual publication growth rate of 20.93%, with a notable increase in research output observed during 2021–2022. The most frequently used keywords include “STEM education,” “artificial intelligence,” “intelligent tutoring systems,” and “computational thinking.” Co-citation and conceptual structure analyses identified works by VanLehn, D’Mello, and Graesser as intellectual anchors within the field. Thematic evolution analysis highlights a recent shift toward user-centered and ethically oriented concepts such as “AI ethics,” “personalized learning,” and “chatbots.” This study demonstrates that the literature on STEM and AI has evolved not only technically but also pedagogically, theoretically, and ethically.

*This paper was presented at the 5th International Symposium on Academic Studies in Education and Culture (November 13-15, 2025, KKTC).