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Global Trends of Educational Data Mining in Online Learning

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Abstract

Educational data mining (EDM) in online learning involves data mining techniques to analyze data from online environments to gain insights into student behavior, performance, and engagement. This study explored EDM in online learning publication trends and focuses. It involved a bibliometric analysis of 615 scholarly works related to EDM in online learning as recorded in Scopus, the largest peer-reviewed citation database, on February 1, 2023. The study examined EDM in online learning publications regarding its evolution and distribution, key focus areas, impact and performance, and prominent authors and collaborations in the last decade, in which the timespan is the period from 2012 to 2022. This bibliometric analysis shows that EDM in online learning is a dynamic area of scientific research as related publications grow steadily throughout the years and involve worldwide collaborations. The study reveals current research trends, offering valuable insights for future researchers to guide their investigations in this field.

Introduction

Over the last decade, the rapid advancement of information and communication technology has led to significant growth in online learning or e-learning. Online learning became crucial when COVID-19 struck in March 2020. The pandemic has caused educational institutions to operate remotely, which has resulted in a massive increase in online learners. The proliferation of various online learning environments and student information systems has produced tremendous educational data (Bakhshinategh et al., 2018; Romero & Ventura, 2020). A typical online learning system tracks and records many educational activities that capture the continuous interaction of teaching and learning in databases and log files (Estacio & Raga, 2017). Similarly, a typical student information system records vast volumes of data such as student enrolment, student demographics, attendance records, examination results, and so forth (Dutt et al., 2017). Bienkowski et al. (2012) highlight the challenge of extracting knowledge and patterns from such huge repositories of educational data to benefit stakeholders, improve learning outcomes, and support relevant decision-making. Educational data mining (EDM) emerged as a research field in the 1990s (Romero & Ventura, 2007). It uncovers meaningful insights, hidden patterns, and relationships among a large amount of educational data (Huebner, 2013). It also aids in solving various educational problems and affords the implementation of more interactive, adaptive, and personalized educational environments (Papamitsiou & Economides, 2014). Clustering, classification, sequential patterns, machine learning models, and association rule analysis are some of the most prevalent techniques employed in EDM (Salloum et al., 2020).