Chapter 9
AI for Data-Driven Decision Making in Education

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ABSTRACT

This chapter will explore the role of artificial intelligence (AI) in data-driven decision-making within educational settings, highlighting how AI can enhance the process of collecting, analyzing, and interpreting vast amounts of data to inform strategic choices. By leveraging AI-powered tools, educators and administrators can gain deeper insights into student performance, engagement, attendance, and other critical metrics, enabling more informed, timely, and personalized decisions. The chapter will examine the benefits of AI in improving educational outcomes, such as identifying at-risk students, optimizing resource allocation, and supporting evidence-based policy development. Additionally, it will address the challenges and ethical considerations associated with using AI for decision-making, including data privacy, algorithmic bias, and the need for transparency and accountability.

INTRODUCTION

The advent of artificial intelligence (AI) has brought about significant changes in various sectors, and education is no exception. In recent years, AI has emerged as a powerful tool for data-driven decision-making in educational settings, offering unprecedented opportunities for institutions to enhance the way they make decisions, allocate resources, and improve overall effectiveness (Alsbou & Alsaraireh, 2024;

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Ashraf, 2024; Gade, 2021; Okokoyo & Nwachukwu, 2024). Traditional decision-making processes in education, often based on limited data or subjective judgment, are increasingly being supplemented—or even replaced—by AI-powered systems that can analyze vast amounts of data quickly and accurately. This shift is enabling educators, administrators, and policymakers to make more informed, precise, and timely decisions, ultimately benefiting students and enhancing educational outcomes.

AI's ability to process and analyze large volumes of data has the potential to revolutionize the way educational institutions operate (Ashraf, 2024). Traditionally, decision-making in education has been based on limited, often siloed data—test scores, attendance records, and anecdotal reports from teachers and staff. However, AI enables institutions to collect and analyze data from a wide range of sources, including student performance, engagement metrics, behavioral data, demographic information, and even external factors such as socio-economic background or community involvement. This holistic approach allows for a deeper understanding of student needs, enabling more personalized and targeted interventions that can significantly improve student outcomes (Alsbou & Alsaraireh, 2024).

One of the most compelling advantages of AI in education is its ability to provide real-time insights (Alsbou & Alsaraireh, 2024; Ashraf, 2024)). In traditional educational systems, decision-making can often be slow and reactive, with data collected at the end of a semester or academic year, leaving little room for timely interventions. AI, on the other hand, can process data in real-time, allowing educators and administrators to make immediate adjustments to teaching strategies, learning environments, and resource allocation. For example, if a student is struggling with a particular concept, AI-powered systems can flag this in real-time, enabling teachers to provide timely support and personalized instruction (Kavitha et al., 2025). Similarly, if a school is experiencing a drop in attendance or engagement, AI can identify the underlying causes and suggest corrective measures, preventing issues from escalating.

The chapter will explore the different types of data that AI can process and analyze, including both quantitative and qualitative data. Quantitative data, such as test scores, grades, and attendance records, has long been used in educational decision-making, but AI can now enhance this data by incorporating more complex variables. For instance, AI can analyze patterns in student performance over time, identifying trends that may not be immediately apparent to educators (Alsbou & Alsaraireh, 2024). It can also integrate data from various sources, such as learning management systems (Alotaibi, N. S. (2024), online assessments, and student feedback, to provide a more comprehensive view of student progress. Qualitative data, such as teacher observations, student surveys, and classroom interactions, can also be processed by AI to offer a more holistic understanding of the learning experience. By combining