Chapter 11
AI-Driven Decision-Making Applications in Higher Education

Retno Lestari
https://orcid.org/0000-0003-4568-9596
Universitas Brawijaya, Indonesia

Heni Dwi Windarwati
Universitas Brawijaya, Indonesia

Ridhoyanti Hidayah
Universitas Brawijaya, Indonesia

ABSTRACT

Artificial intelligence (AI) systems have become ubiquitous daily, yet many are unaware of their presence. The advancements in artificial intelligence have contributed significantly to higher education by changing how we approach problem-solving. The transformative potential of AI technology in education and training cannot be overstated. Currently, educators are utilizing AI systems to identify individual learning needs and experiences, make data-driven decisions and allocate resources more effectively. This chapter aims to equip readers with a comprehensive knowledge of the application of AI-powered decision-making in higher education. With the valuable insights and resources provided, readers can confidently integrate and leverage the potential of AI in their decision-making processes. To fully realize the potential of AI, educators, and leaders must have a fundamental understanding of its capabilities and ethical considerations. This knowledge will enable them to engage confidently and critically with AI technology and maximize its benefits.

DOI: 10.4018/979-8-3693-0639-0.ch011

INTRODUCTION

Artificial Intelligence (AI) is the simulation of human intelligence in machines. It is a rapidly evolving field of computer science that involves the development of software systems that can perform tasks that typically require human cognitive abilities, such as learning, reasoning, and problem-solving. AI algorithms and statistical models enable machines to analyze large amounts of data, recognize patterns, and make predictions, among other things. The potential applications of AI are vast and span numerous industries, including healthcare, finance, and transportation. The development of AI requires expertise in fields such as computer science, mathematics, and engineering, as well as a deep understanding of human cognition. AI is a topic of great interest and importance in both academic and business settings, and it is expected to continue to drive innovation and change.. It utilizes various techniques and approaches, such as machine learning, natural language processing, and neural networks, to process and analyze complex data sets, recognize patterns, and make informed decisions based on the data. AI has become increasingly prevalent in various industries, such as healthcare, finance, and transportation, due to its ability to improve efficiency, accuracy, and productivity. Its applications range from predictive maintenance and fraud detection to autonomous vehicles and virtual assistants (Davenport & Kalakota, 2019). The education field is undergoing a massive transformation with the rise of Artificial Intelligence (AI). Innovative solutions are being developed using AI technology to enhance the teaching and learning experience for students, teachers, parents, and educational institutions worldwide. The aim of AI in education is not to replace human teachers with machines but to use computer intelligence to aid them in creating a more efficient and effective education system (JavaTPoint, 2021).

AI uses various techniques to generate predictions, content, recommendations, and decisions. It is important to note that the techniques consist of machine learning, including supervised, unsupervised, and reinforcement learning, logic and knowledge-based methods such as knowledge representation, expert systems, and inductive programming. Statistical approaches also form an integral part of these techniques (such as Bayesian estimation, search, and optimization methods). The software is specifically designed to achieve human-defined objectives and interacts with the environment accordingly (Xu, 2021; Sarker, 2022).

AI has the potential to improve teaching and learning practices significantly, as well as the organization and operation of higher education institutions. Despite the limited evidence-based research on the impact of AI in education, a critical and supervised approach is necessary to fully realize its potential (Zawacki-Richter *et al*., 2019; Huang *et al*., 2021). AI systems can be utilized in various ways to support teaching and learning, categorized as "student-facing," "teacher-facing," and "system-facing" AI systems. Through four use cases, including Student Teaching, Student Supporting, Teacher Supporting, and System Supporting, educators and learners can utilize AI systems to enhance the teaching, learning, and assessment process with confidence (Zawacki-Richter *et al*., 2019). Implementing AI-powered decision-making in higher education is crucial for achieving better results. This chapter provides readers with the necessary guidance to accomplish this goal. A comprehensive study by Crompton and Burke in 2023 reveals that AI is increasingly utilized across higher education institutions for multiple purposes, including assessment and evaluation, prediction, AI assistance, intelligent tutoring systems (ITS), and managing student learning. The report also indicates that AI is primarily geared towards students, accounting for 72% of its usage, while instructors and managers follow at 17% and 11%, respectively.