

# Chapter 1

# Foundations of AI- Driven Education

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## **ABSTRACT**

*AI in education has evolved from rule-based systems to generative AI, enabling personalized learning and adaptive instruction. While AI enhances education through intelligent tutoring and automated feedback, challenges remain, including ethical concerns, data privacy, and accessibility gaps. This chapter traces AI's historical development, examines key milestones, and explores solutions for equitable integration. Balancing innovation with ethical responsibility is crucial for AI's future in education.*

DOI: 10.4018/979-8-3693-8382-7.ch001

# 1. INTRODUCTION TO AI IN EDUCATION

## Context

The integration of technology into education has undergone a remarkable transformation over the past six decades (Harry, 2023; Holmes et al., 2022, Zhai et al., 2021), evolving from rudimentary computer-assisted instruction systems (Blok et al., 2002) to advanced generative AI tools (Baidoo-Anu et al., 2023). This evolution reflects broader technological advancements and shifting educational paradigms, as educators and technologists have sought to harness the potential of AI to enhance learning experiences. From the early days of static, rule-based systems to the dynamic, adaptive, and generative AI tools of today, the journey of AI in education has been marked by both breakthroughs and challenges. Understanding this historical progression is essential for appreciating the current state of AI in education and envisioning its future trajectory.

## Problem Statement

Despite the significant advancements in AI technologies, their integration into educational settings has not been without challenges (Pedro et al., 2019). Early AI systems, such as expert systems (Khanna et al., 2010) and rule-based models (Alevin, 2010), were limited in their ability to adapt to individual learners' needs, while modern AI tools, including generative AI, face ethical, practical, and accessibility concerns (Al-kfairy et al., 2024). Key questions arise:

- How has the role of AI in education evolved from its inception to the present day?
- What are the key technological milestones that have shaped the development of AI in education?
- What challenges have hindered the widespread adoption of AI in educational contexts, and how can they be addressed?

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