Chapter 4
AI-Powered Personalization:
Redefining Learner Pathways in Blended Classrooms

Mustafa Kayyali
https://orcid.org/0000-0003-3300-262X
Maaref University of Applied Sciences, Syria

ABSTRACT

The fusion of artificial intelligence with blended learning is reshaping how we define educational journeys. This chapter explores how AI-driven personalization enables more fluid, learner-centered pathways that adapt in real time to individual needs, habits, and aspirations. Moving beyond static models, AI offers the potential for dynamic interventions that respond to learner data with nuance and precision. But this transformation brings profound questions: How do we preserve student agency amid algorithmic influence? Where does ethical responsibility lie when data defines direction? Through a critical yet hopeful lens, the chapter unpacks the evolving role of personalization, not merely as a technological function but as a philosophical shift in pedagogy. In reimagining blended classrooms, we find both promise and provocation—an invitation to redefine what meaningful learning could truly look like in a digital age.

INTRODUCTION

Education, at its heart, is a deeply personal journey—one shaped not only by curriculum and pedagogy but also by the intricate weave of a learner's background, pace, interests, and struggles. For centuries, education systems have wrestled with a

DOI: 10.4018/979-8-3373-3815-6.ch004

singular challenge: how to honor the individuality of learners within the constraints of a standardized framework (Fraile-Martinez et al, 2025). While blended learning—an integration of face-to-face instruction with digital technologies—promised to add flexibility and autonomy to this structure, it still often fell short of truly adapting to the unique rhythms of each student. Now, with the emergence of artificial intelligence (AI), we are on the brink of a paradigm shift: a move from generalized instruction toward finely-tuned, dynamically adaptive learner pathways.

Personalization in education is not a new aspiration. Educators have long tried to adjust content and pace to meet the needs of individual students, whether through differentiated instruction, project-based learning, or formative assessments. Yet the scale and complexity of personalization often rendered it an unattainable ideal in traditional settings. Enter AI—capable of processing vast datasets, identifying subtle learning patterns, predicting needs, and offering targeted interventions in ways no human teacher could manage alone (Ravichandran, 2024). With AI embedded in learning management systems, intelligent tutoring platforms, and real-time analytics dashboards, we are beginning to witness the contours of a new educational architecture: one where learner experience is continuously shaped and reshaped in response to their evolving interactions, challenges, and preferences.

Blended learning environments are particularly fertile ground for this transformation. These hybrid models already carry within them the digital scaffolding that allows AI to operate: a repository of learner data, flexible content delivery systems, and opportunities for both synchronous and asynchronous engagement (Almusaed et al, 2023). What AI adds is a kind of silent, responsive intelligence—a way of tailoring the journey in real time, gently nudging the learner toward deeper engagement, offering support at just the right moment, and adapting content to match their cognitive and emotional states. Instead of treating all learners as if they move at the same pace or respond to the same methods, AI-powered personalization creates a more humane and realistic map of learning progressions. But with this opportunity comes a profound responsibility. What does it mean when algorithms begin to shape the routes learners take? Can personalization become too prescriptive, narrowing learning rather than enriching it? Where do we draw the ethical boundaries when AI systems use predictive analytics to determine who needs remediation—or who gets enrichment? And what happens to the teacher's role in this landscape—do they become mere facilitators of pre-programmed pathways, or can they reclaim agency in directing how AI supports rather than replaces pedagogical intent?

This chapter delves into these critical questions, weaving together research, case studies, and theoretical perspectives to examine the promise and perils of AI-powered personalization in blended classrooms. We begin by revisiting the theoretical underpinnings of personalization and blended learning, then explore how AI reconfigures these frameworks in practice. Through this lens, we consider not only the technical