Chapter 8
Pedagogical Shifts in the AI Era Toward Cultivating Critical Thinking and Transversal Skills

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ABSTRACT

The 21st century education environment necessitates pedagogical changes to develop critical thinking and transversal competencies. Traditional education systems often focus on rote learning, limiting the development of advanced thinking and versatile skills. Artificial Intelligence can be used to promote critical thinking and a broader range of transversal skills, like creativity, collaboration, problem solving, digital literacy, and adaptability. AI tools like intelligent tutoring systems, adaptive learning platforms, and immersive simulations can provide diversified instruction, real time

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feedback, and procedural learning through experience. Ethically and strategically applied, these tools can lead to the growth of transversal skills needed for lifelong learning. However, ethical issues, algorithm bias, and professional growth for educators are also discussed. The chapter recommends that AI should support human teaching and curriculum, ensuring that education not only provides knowledge but also equips students with the skills needed to adapt to the modern era.

1. INTRODUCTION

In the dynamically changing environment of the 21st-century education, teaching students to develop critical thinking and transversal competencies has become a teaching necessity. As international needs are becoming knowledge-based economies, the capacity of learners to examine, interpret, and combine data with meaning is crucial to personal, educational, and professional achievement. Specifically, critical thinking is considered one of the most important transversal skills because it empowers learners to address complicated problems, provide knowledge synthesis, and make evidence-based decisions (Saleh, 2019; Rönnlund et al., 2019). Such skills are not optional anymore; they are now necessary skills that students need to function effectively in real-world environments involving problem solving, flexibility, teamwork, and innovativeness.

The traditional education system, however, still focuses on rote learning and passive access to information. Such concentration suppresses higher-order thinking skills, including reasoning, evaluation and metacognition. The principles of Higher Order Thinking Skills (HOTS) that enable more profound knowledge and learning in life have not been fully developed and applied in most teaching activities. The structural constraints of global education systems include training too many students per teacher and using assessment based on rote learning. According to UNESCO (2023), the pupil-teacher ratio in low-income countries averages more than 30:1, and does not allow personal attention and teaching focused on critical thinking. At the same time, the data provided by OECD (2018) identify that a small percentage of students can complete tasks involving higher-order thinking, demonstrating the inefficiency of conventional assessment practices in measuring a range of cognitive abilities. These structural obstacles produce conditions under which students can leave school with factual expertise but not the analytical and reflective abilities to allow academic or professional involvement (Saleh, 2019).

In addition, the subjectivity of critical thinking creates serious challenges for instructors regarding teaching and evaluation. Since metacognition also contributes to the growth of critical thinking, students will be asked to think and reflect on the thinking processes (Saleh, 2019). This dual demand needs pedagogical practices that