Chapter 21
Boosting Learning Through AI in STEM for Socioeconomic Development in Emerging Economies

María E. Raygoza L.
https://orcid.org/0009-0000-5969-6602
Universidad Autónoma de Baja California, Mexico

Diego Bonilla G.
https://orcid.org/0000-0003-1131-2635
Universidad Autónoma de Baja California, Mexico

Jesús Heriberto Orduño-Osuna
https://orcid.org/0009-0004-4850-7481
Universidad Politécnica de Baja California, Mexico

Abelardo Mercado
https://orcid.org/0000-0001-8166-106X
Universidad Politécnica de Baja California, Mexico

Gabriel Trujillo Hernández
https://orcid.org/0000-0003-1556-387X
Universidad Politécnica de Baja California, Mexico

Fabian N. Murrieta-Rico
https://orcid.org/0000-0001-9829-3013
Universidad Politécnica de Baja California, Mexico

ABSTRACT

This chapter explores the transformative potential of artificial intelligence (AI) in STEM education, focusing on its role as a driver of socioeconomic development in emerging economies. By integrating AI with STEM disciplines, educational processes can be optimized, personalized, and made more inclusive, thereby reducing educational gaps and preparing future generations to face global challenges. From a psychological perspective, the chapter examines how AI enhances learning

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and memory, contributing to deeper cognitive engagement. It also addresses the challenges of AI implementation, including technological, economic, and ethical barriers, highlighting the importance of public policies that promote equitable and sustainable growth, the challenges and opportunities in R&D projects, and how the development of emerging economies requires further exploration of AI's potential to innovate in STEM fields and its broader implications for socioeconomic development.

INTRODUCTION

Science, Technology, Engineering, and Mathematics (STEM) education was first initiated by the National Science Foundation (NSF) in the United States (US) in 1986, with the goal of developing a highly skilled workforce in science and technology. With the rapid development of technology, STEM professionals are needed in many fields that support national economic prosperity, including emerging industries such as electric vehicle production (Liu et al., 2024).

To understand how to develop STEM skills, this research was introduced with the psychological perspective of learning and memory as the fundamental processes of the human mind. The learning and memory processes are under continuous study by neuroscientists who seek various methods and strategies to complete this process (Cowan, 2014).

Many theories suggest that the execution of something is a result of learning, as well as that learning affects our way of doing things in a positive way, even the educational system has been designed following this concept, the teaching methodology is influenced by this thought. There are foundations to the theory that states that performance is primarily a result of our learning, it is important to explain that the relationship between learning and action is not as simple as it has always been presented in previous research. The differences between learning and performance are deeper than this simple explanation, since learning something is not the same as performing it. Learning is all about mastering new skills and developing a greater understanding of things that are not known, instead performance is a goal that is attainable through learning and is determined by opportunity, motivation, and sensory and motor abilities, in addition to learning (Wrenn & Wrenn, 2009).

Learning is closely related to practice and motivation, sociocultural theory applied to practice motivation suggests that motivation does not reside in the individual, but in the realm of social and cultural contexts linked by shared action and activity (Nolen & Ward, 2011). Therefore, motivation to practice is not simply within the individual's place, but rather the place is the activity and its specific contexts of which the individual is a participant. Motivation affects learning and performance in four ways: it increases an individual's level of energy and activity, it directs an