Chapter 4
Demystifying the Dynamic Determinants of Generative Artificial Intelligence (AI) Literacy for Adaptable Sustainable Education:
Multistage Structure Equation Remodeling

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ABSTRACT

This research aims to demystify the dynamic determinants of generative artificial intelligence (AI) literacy for adaptable sustainable education (ASE) through the application of multistage structural equation modeling (SEM). Utilizing a quantitative approach, a structured questionnaire distributed via Google Forms is employed to gather data from a convenient sample of 260 teachers in higher education. The study unfolds over a specified period, incorporating rigorous data filtering techniques to enhance the reliability of responses. Smart-PLS serves as the primary tool for data analysis, allowing for an in-depth exploration of relationships among variables such as generative AI literacy, digital split, computational intelligence, and cognitive inclusion. Dependent variables include teacher perceptions, technological proficiency, and cognitive inclusion, while independent variables encompass awareness of AI and the perceived usefulness of AI in achieving ASE. The outcomes of this research carry significant policy implications for AI, ICT, and educational professionals, providing insights to shape informed strategies for integrating AI literacy into higher education to meet the goals of adaptable sustainable education.

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INTRODUCTION

Artificial intelligence (AI) in education is reshaping traditional learning paradigms by leveraging technology to provide personalized, adaptive, and efficient educational experiences (Aggarwal et al., 2023; Golab-Andrzejak, 2022). Through the implementation of AI-driven tools such as personalized learning platforms, intelligent tutoring systems, and automated grading, education becomes tailored to individual student needs, fostering a more effective and engaging learning environment. Virtual classrooms, language processing applications, and educational games enriched with AI enhance interactivity and inclusivity (Bhatt & Muduli, 2023; Kar et al., 2022). Additionally, AI aids educators by offering predictive analytics for early intervention and personalized professional development opportunities. While promising, the integration of AI in education necessitates careful consideration of ethical implications and the importance of maintaining a harmonious balance between technology and human guidance.[1]

In the words of (Celik, 2022; Kamalov et al., 2023; Segbenya et al., 2023), Generative Artificial Intelligence literacy involves a comprehensive understanding of AI technologies capable of creating new content, such as text, images, and music. This literacy extends beyond technical proficiency, encompassing awareness of the applications, ethical considerations, and potential societal impacts of generative AI. It requires individuals to critically analyze and interpret outputs generated by these models, fostering a nuanced understanding of their strengths and limitations. Moreover, generative AI literacy involves navigating legal and regulatory frameworks, acknowledging ethical concerns related to bias and privacy, and cultivating the ability to communicate complex AI concepts to diverse audiences (Wibowo et al., 2023). In essence, being generative AI literate equips individuals with the knowledge and skills needed to navigate the ethical, social, and technological dimensions of this rapidly advancing field, fostering responsible engagement and decision-making in an AI-driven world.

Adaptable Sustainable Education (ASE) is a dynamic approach that recognizes the ever-evolving nature of learning needs and the imperative to balance environmental, social, and economic considerations (Cheng & Wang, 2023). Inherent in this philosophy is the commitment to adaptability, acknowledging the rapid pace of technological advancements and societal changes. This involves continuous curriculum updates, integration of cutting-edge technologies, and the creation of versatile learning spaces that cater to diverse student needs (Bouteraa et al., 2024; Dadhich et al., 2023). By embracing adaptability, educational systems can better prepare individuals for the uncertainties of the future, fostering a mindset of lifelong learning and resilience in the face of change.

Sustainability, within the context of ASE, extends beyond environmental concerns to encompass broader societal impacts. This entails fostering inclusivity, equity, and social responsibility within educational structures. It also involves a commitment to resource efficiency, minimizing environmental footprints, and ensuring economic viability in a manner that promotes long-term resilience (Chiu, 2024; Rohde et al., 2024). By intertwining adaptability and sustainability, this educational approach not only equips learners with relevant skills but also instills a sense of responsibility towards the environment and society, contributing to the development of conscientious global citizens. Having studied the extensive literature, the following research questions can in designated.

RQ.1 What are the key factors shaping generative AI literacy among educators and students, and how do these factors impact adaptable and sustainable educational practices?