ABSTRACT

Computational Thinking (CT) is recognized as a fundamental skill essential for effective problem-solving. This ability, encompassing analytical skills, allows individuals to generate efficient solutions to complex issues. According to the National Research Council, CT proficiency is imperative for all individuals, extending beyond the realm of programming. Its applications are evident in the effective management of information and form an integral part of problem-solving strategies. Moreover, CT plays a pivotal role in cognitive development across diverse educational domains. Comprising five key components—decomposition, pattern recognition, abstraction, algorithms, and evaluation/debugging—CT skills not only motivate students to engage with computer science but also extend to other STEM-related disciplines. Despite its significance, the teaching of CT remains a complex challenge due to discrepancies in its definition and varied instructional approaches. Additionally, prevalent issues in schools, such as students' lack of motivation and interest in learning, further compound the challenge. A meta-review of existing studies examining the impact of educational games on CT skills reveals that while educational games can enhance these skills, meticulous planning and utilization of technology are crucial for their effectiveness. This study aims to enhance students' CT skills, particularly in the decomposition and abstraction components, through the implementation of educational games. Subsequently, a descriptive analysis will be conducted to discern potential significant differences in the CT proficiency of students who engage with educational games in their learning journey and those who do not. The findings of this study corroborate the significance of Computational Thinking (CT) as an essential skill for effective problem-solving, particularly evident in the observed improvement in students' computational thinking scores. Moreover, the discernible enhancement, especially notable in the group engaged with educational games, underscores the efficacy of employing such interactive learning methods in bolstering students' abstraction and decomposition skills. Additionally, the disparity in motivation levels between the groups, as revealed in the analysis of the motivation survey, aligns with the broader discourse on the potential of game-based learning approaches to cultivate higher levels of student engagement and motivation.

Keywords: educational games, computational thinking, problem-solving skills, STEM education, CT components, student motivation, technology in education, cognitive development, innovative learning methods, student engagement