Other 2023 studies examined ChatGPT within digitized learning environments. Castillo et al. ((2023) investigated the effect of Changes on digitized learning processes in higher education using a quantitative descriptive approach. Based on students' self-reported data, the study reported improvements in learning efficiency and task completion speed. At the same time, the authors raised concerns about diminished critical thinking and potential threats to academic integrity resulting from excessive reliance on the tool. As research progressed, scholars began to focus on discipline-specific applications of ChatGPT, particularly in mathematics education. Asare et al. (2023) examined the im- pact of ChatGPT on mathematics performance among undergraduate and postgraduate students. The results showed no statistically significant direct effect of ChatGPT usage on academic achievement; however, student interest played a significant moderating role, indicating that ChatGPT is more effective when learners are motivated and actively engaged. In 2024, research expanded both methodologically and contextually. In mathematics education, Delima et al. (2024) investigated the influence of ChatGPT on mathematics self-regulated learning and mathematics anxiety using a correlational survey design. Their findings revealed higher levels of self-regulated learning among students who used ChatGPT, while no significant differences were observed in mathematics anxiety. Broader investigations of ChatGPT adoption in higher education were also conducted in 2024. Zafar et al. (2024) examined the use of ChatGPT and other generative AI tools among university students using a large-scale survey. The study reported perceived im- provements in learning efficiency, academic performance, and access to personalized learning support. Nevertheless, participants also expressed concerns regarding overre- liance on ChatGPT, reduced independent thinking, and academic integrity issues. Like- wise, Youssef et al. (2024) examined the relationship between ChatGPT usage and student engagement, critical thinking, and academic achievement using a quantitative survey- based approach. Their findings indicated positive associations between ChatGPT usage and all three outcomes, suggesting that ChatGPT may function as a supportive learning tool when used appropriately. More recent 2024 studies extended ChatGPT research to specialized academic disci- plines. ? investigated the impact of ChatGPT-assisted instruction in physics education using a quasi-experimental design with experimental and control groups. The results demonstrated statistically significant improvements in students' higher-order thinking skills, particularly in analysis, evaluation, and creativity, when ChatGPT was integrated within project- based learning strategies. Faculty perspectives were also addressed during this stage of research. El- Seoud et al. (2023) explored instructors' perceptions of ChatGPT in university teaching using survey data collected from faculty members. The findings indicated that ChatGPT may enhance student engagement, writing quality, and problem-solving skills, while also raising con- cerns related to plagiarism, reduced independent thinking, and ethical challenges asso-ciated with AI-assisted learning.

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