**Review Article**

**Assessing the Effect of AI-Driven Technology on the Competency Base of Students in Higher Learning Education**

**Abstract**

The rapid integration of Artificial Intelligence (AI) technologies in higher education has significantly transformed learning processes. While AI has introduced personalized feedback, intelligent tutoring systems, and enhanced access to resources, concerns have arisen about its implications on the development of student competencies. This study examines whether students in higher learning institutions can independently generate quality content and effectively defend acquired knowledge without AI assistance. This study employed a systematic literature review approach. Peer-reviewed articles published from 2021 to 2025 were retrieved from databases including Scopus, ERIC, and Google Scholar. A total of 38 articles were reviewed, out of which 24 were selected for in-depth analysis based on relevance, methodological rigor, and focus on competency development. The analysis of selected literature reveals that AI-driven technologies have profoundly reshaped educational dynamics in higher education, particularly concerning student competence. On one hand, the integration of AI tools such as ChatGPT, Grammarly, and adaptive learning platforms has contributed positively to student productivity, learning personalization, and accessibility. The study concludes that AI-driven technology offers both opportunities and risks in shaping student competencies in higher education. While it facilitates access to information and enhances writing output, unmoderated use undermines core competencies such as critical thinking, originality, and autonomous learning. The ability of students to “stand alone” in generating and defending academic work is compromised when AI becomes a surrogate for intellectual effort. Educational institutions should therefore adopt balanced AI integration strategies, ensuring that these tools complement rather than replace human cognition. This study recommends that Educators should design assignments that require personal reflection, critique of AI-generated outputs, or real-time presentations to assess independent competence.

**Keywords:** AI, Higher Education, Student, Competence, AI tools in learning, Critical Thinking.

1. **INTRODUCTION**

Artificial Intelligence (AI) has become a cornerstone of educational innovation, offering tools that can personalize instruction, automate assessments, and provide real-time feedback (Ayeni et al., 2024). In higher learning institutions, AI applications, such as ChatGPT, Grammarly, Turnitin, and adaptive learning platforms; are widely adopted to support academic productivity (Dockens & Shelton, 2025; Mwakapina, 2024). However, there is growing concern about whether such technologies enhance or erode the competency base of students (Stanford, 2025). Competence in this context refers to a student’s ability to think critically, generate original content, and defend knowledge independently without external technological intervention.

The core question that frames this study is: Can students in AI-supported educational environments stand alone in generating and defending their learning outcomes? The study interrogates this through a critical review of literature published from 2021 to 2025, focusing on student autonomy, cognitive skill development, and academic integrity.

1. **Literature Review**

AI tools have redefined instructional models in higher education, particularly through intelligent tutoring systems, writing aids, automated feedback mechanisms, and recommendation algorithms (Karam, 2023; Kazimova et al., 2025). The use of technologies such as ChatGPT, Grammarly, and adaptive learning platforms has been widely adopted to streamline academic tasks and improve educational outcomes (Naznin et al., 2025). While these tools enhance efficiency and provide on-demand support, the literature suggests a dual-edged effect on student competence, particularly concerning critical thinking, originality, and independent learning capacity.

**2.1 Positive Contributions**

AI promotes individualized and responsive learning environments. Platforms like Squirrel AI in China use machine learning algorithms to tailor instruction to each student’s unique learning patterns and weaknesses, significantly improving academic performance (Li & Mohammad, 2025; Luo & Hsiao-Chin, 2023). Similarly, Grammarly and ChatGPT aid students in drafting, editing, and refining academic work, increasing productivity and enhancing linguistic accuracy (Naznin et al., 2025). Venter, Coetzee and Schmulian (2024) found that students who received AI-generated feedback demonstrated measurable improvements in writing quality, task completion rates, and time management.

In a separate study, Wongmahesak, Karim and Wongchestha (2025) highlighted that AI-facilitated learning platforms improved learner engagement by providing timely responses and adaptive exercises, which are crucial for maintaining student interest. Furthermore, Chopra et al. (2024) demonstrated that AI-supported personalized feedback enhanced the learning experience for students with learning disabilities, thereby promoting inclusivity.

**2.2 Emerging Concerns**

Despite these benefits, several studies caution against the overdependence on AI tools, citing potential erosion of critical academic competencies. Szmyd and Mitera (2024) observed that students who heavily relied on AI for content generation often exhibited weakened critical thinking and problem-solving abilities. Their work emphasized a worrying decline in students’ ability to analyse complex information and synthesize original arguments.

Bermeo et al. (2024) and Stanford (2025) similarly documented a decrease in active class participation and debate quality when students prepared class materials using AI tools. These students reportedly lacked the confidence and depth to engage in spontaneous intellectual discourse. Supporting this, Basha (2024) and Umeanwe (2024) found that students who extensively used AI assistants showed reduced performance in open-book and oral examinations, suggesting a dependency on pre-structured knowledge over adaptive reasoning.

Moreover, AI tools may inadvertently create a false sense of mastery. A study by Hammond and Barber (2024) and Kostanek and Li (2025) noted that students who received high grades on AI-assisted written assignments often failed to perform at the same level in independent evaluations, revealing gaps in comprehension and critical engagement.

**2.3 Independence and Assessment Authenticity**

A central concern echoed across multiple studies is the challenge of verifying true student competence in AI-mediated learning environments. Basha (2024), Umeanwe (2024) and Szmyd and Mitera (2024) explored how AI usage blurred the boundary between authentic student output and algorithmic assistance. They found that in face-to-face assessments, students accustomed to AI struggled to defend ideas or adapt their responses to new contexts.

The findings of the study conducted by Kiryakova and Angelova (2023) show that 73.6% of university professors (out of 87 professors) from Trakia University in Bulgaria reported that, most severe problem for them is the danger that learners will completely trust AI tools like ChatGPT without checking the authenticity of the generated texts, which can negatively affect the acquisition of knowledge and skills. This observation was echoed in a longitudinal study by Bermeo et al. (2024) and Szmyd and Mitera (2024), who found that the rise in AI-supported learning correlated with a measurable drop in students’ ability to construct logically sound arguments without assistance.

**2.4 AI as a Double-Edged Pedagogical Tool**

Despite the risks, the literature also identifies strategies that leverage AI's potential without compromising competence. Er et al. (2024) and Usher (2025) showed that when educators integrated AI critically, by requiring students to critique AI-generated content or revise it based on instructor feedback, students displayed higher analytical and evaluative thinking skills. Similarly, Yang and Xia (2023) emphasized that structured classroom activities involving AI use, followed by reflection exercises, significantly improved students’ metacognitive awareness.

Furthermore, integrating AI literacy into the curriculum has shown promise. In a study by Evangelista (2025) and Southworth et al. (2023), students taught how to evaluate AI outputs for bias, accuracy, and relevance performed better in independent assignments and demonstrated stronger academic integrity.

**2.5 Ethical and Pedagogical Implications**

The findings also raise critical ethical and pedagogical questions. Overuse or misuse of AI may compromise not only student competence but also academic integrity. The boundary between legitimate support and academic dishonesty is increasingly blurred. This concern is reflected in studies by Basha (2024), Umeanwe (2024), and Szmyd and Mitera (2024), who noted that extensive reliance on AI tools often obscures the line between original student output and algorithmic assistance, raising doubts about authenticity in academic submissions. This ambiguity contributes to increased anxiety and confusion among students regarding expectations for independent work.

As such, scholars advocate for clear institutional policies on AI use. Kiryakova and Angelova (2023) emphasized that many educators are alarmed by students’ uncritical acceptance of AI-generated content, which may hinder genuine knowledge acquisition. To address these concerns, Evangelista (2025) and Southworth et al. (2023) recommended embedding AI ethics and literacy into academic programs. Their studies demonstrated that students trained to evaluate AI outputs for bias, accuracy, and relevance exhibited stronger academic integrity and performed better in independent assessments.

1. **Methodology**

This study employed a systematic literature review approach. Peer-reviewed articles published from 2021 to 2025 were retrieved from databases including Scopus, ERIC, and Google Scholar. Keywords used in the search included “AI in higher education,” “student competence and AI,” “AI tools in learning,” and “critical thinking and artificial intelligence.” A total of 38 articles were reviewed, out of which 24 were selected for in-depth analysis based on relevance, methodological rigor, and focus on competency development.

1. **Findings and Discussion**

The analysis of selected literature reveals that AI-driven technologies have profoundly reshaped educational dynamics in higher education, particularly concerning student competence. On one hand, the integration of AI tools such as ChatGPT, Grammarly, and adaptive learning platforms has contributed positively to student productivity, learning personalization, and accessibility. Venter, Coetzee, and Schmulian (2024) reported that students using AI-generated feedback demonstrated improvements in writing clarity, time management, and task completion. Similarly, studies by Li and Mohammad (2025) and Luo and Hsiao-Chin (2023) showed that adaptive platforms like Squirrel AI, which tailor instruction to individual learning patterns, significantly enhanced students’ academic performance. These findings suggest that when appropriately harnessed, AI technologies support the development of certain competencies, such as linguistic precision and time efficiency, by offering students tailored feedback and learning scaffolds.

In addition, AI tools have proven instrumental in promoting inclusivity and learner engagement. The research by Wongmahesak, Karim, and Wongchestha (2025) highlighted that AI-enhanced learning environments improved student motivation by delivering immediate, adaptive responses. Chopra et al. (2024) further demonstrated that students with learning disabilities benefited from personalized AI feedback, thus enhancing equity and engagement across diverse learner profiles. This implies that AI technologies, when strategically employed, foster an environment conducive to active learning and academic inclusiveness. However, while these benefits are notable, they tend to focus on surface-level competencies; such as productivity and grammar accuracy, raising questions about deeper cognitive outcomes.

Conversely, a notable body of literature raises critical concerns about the erosion of core academic competencies due to AI overreliance. Szmyd and Mitera (2024) observed that students frequently depending on AI for content generation exhibited diminished critical thinking and independent reasoning skills. This concern was echoed in the work of Bermeo et al. (2024) and Stanford (2025), who found that AI-assisted students often demonstrated lower levels of spontaneous intellectual engagement and classroom participation. Basha (2024) and Umeanwe (2024) similarly reported declines in performance during oral and open-book assessments among students who relied heavily on AI tools, indicating a weakening of adaptive learning and problem-solving capacities. These studies suggest that while AI may enhance surface competence, it risks undermining the deeper cognitive abilities essential for authentic academic growth.

Moreover, concerns about academic authenticity and independence emerged strongly across the literature. Kiryakova and Angelova (2023) reported that 73.6% of professors at Trakia University in Bulgaria viewed uncritical dependence on AI tools as a major threat to genuine knowledge acquisition. This was corroborated by studies from Szmyd and Mitera (2024) and Bermeo et al. (2024), which indicated a measurable decline in students’ capacity to construct and defend arguments independently. The risk here is that AI tools, while convenient, may create a false sense of mastery, where students achieve superficial success without truly internalizing the knowledge or developing the analytical faculties required for complex academic tasks. Such findings emphasize the urgent need for educational stakeholders to differentiate between AI-facilitated learning and AI-dependent performance.

Nonetheless, the literature also points to promising strategies that balance the benefits and risks of AI in education. Er et al. (2024) and Usher (2025) advocated for instructional models that require students to critique or revise AI-generated content. This practice was found to improve evaluative and analytical skills, bridging the gap between AI support and independent competence. Similarly, Yang and Xia (2023) demonstrated that structured classroom activities that incorporate AI followed by reflective exercises enhanced students’ metacognitive awareness—a key dimension of academic competence. These pedagogical innovations suggest that AI can be used not merely as a crutch, but as a catalyst for deeper learning, provided it is framed within critical thinking tasks.

Furthermore, embedding AI literacy into curricula has emerged as a vital strategy to ensure ethical and effective AI use. Evangelista (2025) and Southworth et al. (2023) reported that students trained to evaluate AI-generated content for accuracy, bias, and relevance exhibited stronger academic integrity and performed better in independent assessments. These findings align with the ethical concerns raised by Basha (2024), Umeanwe (2024), and Szmyd and Mitera (2024), who emphasized that blurred boundaries between student authorship and algorithmic assistance compromise both competence and integrity. Clearly defined institutional policies and structured AI literacy programs can mitigate such risks and foster responsible AI engagement in academic contexts.

In summary, the reviewed literature underscores the dual-edged nature of AI integration in higher education. While AI technologies enhance certain aspects of student learning, such as efficiency, inclusivity, and engagement, they also pose significant risks to critical competencies like independent reasoning, authenticity, and metacognitive awareness. The key lies in the intentional and reflective integration of AI into pedagogical practices—where students are not passive consumers of algorithmic support but active agents in critiquing, refining, and learning from AI-generated inputs. Thus, AI-driven technologies, when used critically and ethically, can serve not as replacements for student competence, but as tools to develop and deepen it.

1. **Conclusion**

The study concludes that AI-driven technology offers both opportunities and risks in shaping student competencies in higher education. While it facilitates access to information and enhances writing output, unmoderated use undermines core competencies such as critical thinking, originality, and autonomous learning. The ability of students to “stand alone” in generating and defending academic work is compromised when AI becomes a surrogate for intellectual effort. Educational institutions should therefore adopt balanced AI integration strategies, ensuring that these tools complement rather than replace human cognition.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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