

## The Role of Ai in Improving Student Learning Outcomes: Evidence in Vietnam



Nguyen Thi Quynh Trang<sup>1</sup>, Phan Thi Thu<sup>2</sup>

<sup>1,2</sup>National Academy of Public Administration, Vietnam

**ABSTRACT:** This study delves into the transformative role of AI in enhancing student learning outcomes in Vietnam, examining both the effectiveness of AI-driven educational technologies and their inclusivity across various learning environments. The research reveals that personalized learning systems and automated assessment tools substantially boost student engagement and learning efficiency. However, significant challenges remain, notably the digital divide and the substantial infrastructure and professional development investments to support widespread AI adoption. The implications of these findings underscore the necessity of strategic management in AI integration to ensure equitable access and effective utilization across all educational sectors. Contributing a nuanced perspective to the discourse on AI in education, this study underscores the potential of AI to revolutionize educational practices while highlighting the critical barriers that must be overcome. It offers concrete recommendations for policymakers, educators, and technology providers to optimize AI's benefits while addressing its challenges. This research provides a foundational analysis for future explorations into strategic AI integration, emphasizing the need to balance technological advancements with equitable educational practices in developing contexts like Vietnam.

**KEYWORDS:** Artificial Intelligence in Education; Educational Technology Vietnam; AI-driven Learning Outcomes; Digital Divide in Education; Personalized Learning Systems; Automated Assessment Tools

### INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative force across various sectors, with education no exception. The potential of AI to personalize learning experiences, automate administrative tasks, and provide real-time feedback is revolutionizing educational practices. By leveraging AI, educators can adapt their teaching methods to meet students' individual needs, enhancing both learning outcomes and efficiency (Nguyen et al., 2024). Technologies such as adaptive learning systems, AI tutors, and data-driven insights enable a more engaged and practical educational experience, preparing students for a future where digital literacy and adaptability are crucial (Pham et al., 2019). In the diverse educational landscape of Vietnam, AI has the potential to significantly enhance learning outcomes, making it a crucial area of study for educational stakeholders in the country (Dao et al., 2023).

In Vietnam, the educational sector has witnessed significant growth in technology adoption, spurred by governmental support and increasing investments in educational technology (EdTech). Initiatives to enhance digital infrastructure and promote STEM education have paved the way for integrating AI technologies in classrooms nationwide (DeJaeghere et al., 2023). Despite the disparities in adoption rates, there is a clear trend toward a growing interest and gradual implementation of AI tools within the educational system (Srinivasan & Murthy, 2021). This progress is a beacon of hope, promising to improve accessibility and the quality of education for all students.

This study seeks to evaluate the role of AI in improving student learning outcomes in Vietnam, focusing on the effectiveness and inclusiveness of these technologies. The objectives include assessing the impact of AI-driven educational tools on student engagement and academic performance, exploring the accessibility and adoption of AI technologies across different educational settings in Vietnam, and identifying the challenges and opportunities for AI integration within the Vietnamese educational sector (Tuoi & Thanh, 2023). The practical implications of these findings are not just theoretical. However, they can guide educational policymakers, educators, curriculum developers, and technology providers in their efforts to enhance learning outcomes through AI integration. Through this research, we aim to offer valuable insights into the evolving role of AI in education and its potential to enhance learning outcomes within the diverse educational landscape of Vietnam.

# The Role of AI in Improving Student Learning Outcomes: Evidence in Vietnam

## LITERATURE REVIEW

The global integration of AI in education has demonstrated a broad spectrum of applications, ranging from personalized learning environments to automated administrative systems. These AI-driven technologies have proven to be instrumental in enhancing students' engagement and learning outcomes by providing customized learning experiences that adapt to the pace and style of individual learners (Nguyen et al., 2024). Furthermore, AI's ability to analyze vast data has enabled educators to effectively identify and address learning gaps (Pham et al., 2019).

Numerous studies have validated the effectiveness of AI in education, highlighting significant improvements in student performance and teacher efficiency (Dao et al., 2023). For instance, AI systems that provide real-time feedback and assessments have been shown to significantly reduce the time teachers spend on grading, allowing more time for interactive and personalized teaching (DeJaeghere et al., 2023). Similarly, AI-driven analytics tools help predict student performance, enabling early interventions for students needing additional support (Srinivasan & Murthy, 2021).

In Vietnam, the use of AI in education is still nascent but rapidly gaining momentum with several initiatives and pilot projects (Tuoi & Thanh, 2023). The government's active role in digitalizing the education sector and promoting AI literacy reflects a solid commitment to incorporating advanced technologies into the learning process. Schools in urban centers, particularly in Hanoi and Ho Chi Minh City, have begun experimenting with AI tools for language learning and problem-solving exercises. These developments are part of a broader trend toward creating more technologically adept educational environments that can cater to the needs of a digitally evolving society.

This integration of AI into Vietnamese educational systems points towards a future where technology-driven teaching and learning processes become commonplace, ensuring that students are not only consumers of information but also skilled navigators of a technology-infused world. As these AI applications continue to evolve, they offer a promising horizon for educational advancements in Vietnam, setting a benchmark for other developing nations in Asia.

## METHODOLOGY

In this study, we adopted a mixed-methods approach to exploring the role of AI in enhancing educational outcomes in Vietnam. The methodology combines document analysis with qualitative interviews, providing a robust framework for understanding the theoretical and practical implications of AI technologies in education.

We systematically reviewed a range of sources, including academic literature, policy documents, and case studies that discuss the application and implications of AI in educational settings globally and within Vietnam. These sources were meticulously selected based on their relevance to the implementation of AI technologies, academic rigor, and contribution to the broader discourse on educational technology. The analysis was conducted through a thematic approach, where we identified and categorized key themes regarding AI's effectiveness, challenges, and developmental trajectories in education.

To complement the document analysis, we conducted semi-structured interviews with stakeholders directly engaged with AI in educational contexts. This included two educators and thirty students from universities in Hanoi, chosen to represent diverse experiences and perspectives concerning the use of AI in learning. The selection aimed to capture varied insights across different types of educational institutions and locations within the city, mainly focusing on areas with heightened concern about AI's impact. The interview format allowed for in-depth discussions, providing flexibility to probe interesting themes as they arose. Data from these interviews were analyzed using thematic analysis, aiming to extract significant patterns and narratives that could inform an understanding of the practical impacts of AI, the barriers to its wider adoption, and anticipated future trends in AI application within the educational sector.

This methodological framework ensures a comprehensive exploration of AI's role in education, grounding theoretical insights in real-world experiences to provide a detailed picture of AI's current state and future potential in enhancing learning outcomes in Vietnam.

## FINDINGS

### AI-Driven Personalized Learning Systems:

During our interviews with educators and students at various Vietnamese institutions, several examples of AI-driven personalized learning systems were highlighted, illustrating the progressive integration of this technology in local educational settings.

One educator from a university in Hanoi shared their experience with an AI-based platform that dynamically adjusts instructional content and assessments based on individual student responses and learning behaviors. This system personalizes the learning experience and uses predictive analytics to help educators preemptively identify potential learning difficulties, allowing for timely intervention.

## The Role of Ai in Improving Student Learning Outcomes: Evidence in Vietnam

Students reported increased engagement with their coursework, attributed to the personalized nature of their learning experiences. They appreciated how the system adapted to their unique learning speeds and styles, aligning the education process with their personal needs. This tailored approach has enhanced their interest in the subjects and their overall academic performance.

Moreover, measurable improvements in learning efficiency were observed through enhanced course completion rates and improved scores on standardized tests. Students particularly valued the immediate feedback and corrective guidance provided by the AI system, as these features helped maintain a continuous learning loop and kept them actively involved in their education.

These findings underscore the substantial impact of AI-driven personalized learning systems on student engagement and learning efficiency within Vietnamese educational institutions. The consistent theme across interviews was a strong endorsement of AI's potential to transform traditional learning environments into more adaptive, responsive, and student-centered spaces.

### Automated Assessment Tools:

In our interviews, educators and students highlighted the widespread use of automated assessment tools within Vietnamese academic settings. These tools have become integral for testing and providing feedback.

One educator explained how these tools are employed during examinations to automatically grade student responses, significantly reducing the time teachers spend on manual grading. This automation streamlines the assessment process and ensures timely and consistent feedback for students, which is crucial for their academic development.

Students expressed appreciation for the immediate feedback provided by these automated systems. This real-time response allows them to understand their mistakes and learn from them promptly, which is particularly beneficial during revision periods. Additionally, the objectivity of automated assessments was noted as a critical benefit, removing any potential bias in manual grading.

Both teachers and students highlighted several broader benefits of using automated assessment tools. The reduced grading workload allows teachers more time to focus on instructional design and individual student support. They can also easily track the entire class's progress and identify common areas where students struggle, enabling targeted interventions.

Students benefit from the consistency and fairness of automated assessments and from the detailed insights into their performance. This feedback helps them identify specific areas for improvement and better understand the criteria for success in their courses.

The use of automated assessment tools in Vietnamese educational institutions has thus proven highly effective in enhancing the efficiency of the testing process while also improving the quality of education by providing immediate, unbiased feedback to students.

### AI Tutors and Assistance

Our interviews discussed numerous case studies of AI tutor applications, revealing their significant role in enhancing educational support across Vietnamese institutions.

One notable example involved an AI tutor used in a language learning program at a Ho Chi Minh City university. This AI tutor provided students with conversational practice and grammar exercises tailored to their proficiency levels. The technology was praised for offering 24/7 learning support, enabling students to practice at their convenience without needing teacher availability.

Both students and teachers shared their perceptions of AI assistance, with many highlighting its transformative effects on the learning environment. Students appreciated the personalized attention they received from AI tutors, which helped them progress at their own pace and according to their specific needs. They noted that the AI assistance was particularly beneficial for areas they found challenging, as the AI tutors could repeatedly address these issues without judgment.

Teachers also expressed positive views on AI assistance, noting that AI tutors are valuable support tools that complement traditional teaching methods. They appreciated the AI's capacity to handle repetitive teaching tasks, allowing them to focus more on complex educational needs and creative teaching strategies. Furthermore, teachers acknowledged the role of AI tutors in providing detailed analytics on student performance, which helped them tailor their instructional approaches more effectively.

Overall, integrating AI tutors and assistance in Vietnamese educational settings has been met with enthusiasm from both students and teachers. The technology not only augments the learning process by providing personalized and accessible support but also enhances teaching strategies by relieving educators from routine tasks and equipping them with precise student performance data.

## DISCUSSION

Integrating AI in Vietnamese educational systems has shown significant potential in enhancing learning effectiveness and student engagement. AI-driven personalized learning platforms allow students to learn at their own pace, adapting the content to

## The Role of AI in Improving Student Learning Outcomes: Evidence in Vietnam

their learning styles and needs, leading to improved academic performance and higher retention rates (Nguyen et al., 2024). Similarly, automated assessment tools provide timely feedback, enabling students and teachers to identify learning gaps more efficiently (Pham et al., 2019).

The benefits of integrating AI into Vietnamese educational systems are manifold. Teachers have noted that AI tools allow them to devote more time to interactive and problem-solving activities than routine tasks such as grading (Dao et al., 2023). Furthermore, AI technologies offer scalable solutions for personalized education, which is particularly valuable in settings with diverse student needs and limited resources (DeJaeghere et al., 2023).

However, the integration of AI also presents several challenges. Concerns about the digital divide persist, as not all institutions have equal access to the necessary technologies and infrastructures (Srinivasan & Murthy, 2021). AI systems' initial cost and maintenance can be prohibitive for some schools, especially those in rural or underfunded areas. Additionally, there is a need for ongoing professional development to ensure educators are equipped to use AI tools effectively (Tuoi & Thanh, 2023).

Several parallels and distinctions emerge when comparing the findings from Vietnam with those from other countries. Like in Vietnam, countries such as South Korea and Finland have reported positive impacts of AI on personalized learning and efficiency. However, these countries often have more robust digital infrastructures, facilitating broader and more effective AI integration. Moreover, in contexts with robust regulatory frameworks for technology use in education, such as the European Union, there are more comprehensive guidelines and support systems for implementing AI, which contrasts with the more emergent nature of such frameworks in Vietnam.

This analysis underscores AI's transformative potential in education, highlighting how its thoughtful integration can significantly enhance educational outcomes in Vietnam. It also stresses the need to address infrastructural and equity challenges to maximize AI's benefits across all educational environments.

### IMPLICATIONS

The implications of AI integration into Vietnamese educational systems are profound and multifaceted, impacting educational policy, infrastructure, educators, curriculum developers, and technology providers (Nguyen et al., 2024).

Integrating AI technologies necessitates updates and adaptations in educational policy and infrastructure. Policymakers must consider investments in digital infrastructure to ensure equitable access to AI tools across urban and rural areas. This includes hardware, software, reliable internet access, and data protection measures (Pham et al., 2019). Additionally, policies need to support the training of educators to use AI technologies effectively, which involves both initial training and ongoing professional development (Dao et al., 2023).

Adopting AI presents opportunities to enhance the learning experience for educators and curriculum developers. Educators can leverage AI to provide more personalized learning experiences and free up time from administrative tasks, allowing for greater focus on interactive and creative teaching methods (DeJaeghere et al., 2023). Curriculum developers are tasked with integrating AI tools to complement traditional learning methods, ensuring that curriculums remain robust and compelling even as technological tools evolve (Srinivasan & Murthy, 2021).

Technology providers and developers also play a crucial role in this ecosystem. They need to ensure that AI solutions are accessible and user-friendly for educators who may not have a technical background. Furthermore, they must work closely with educational institutions to tailor AI tools to the specific needs of the academic sector. Continuous feedback loops between educators and technology providers are essential to refine AI applications and ensure they meet the practical needs of the classroom (Tuoi & Thanh, 2023).

Overall, the integration of AI in education in Vietnam suggests a need for comprehensive strategies that encompass policy adjustments, infrastructure development, educator training, curriculum adaptation, and collaborative engagements with technology providers. Addressing these areas effectively will be crucial in maximizing the benefits of AI for all stakeholders in the educational landscape.

### CONCLUSION

The study on the role of AI in enhancing educational outcomes in Vietnam has highlighted several key findings. AI-driven technologies, exceptionally personalized learning systems, and automated assessment tools have demonstrated significant potential to improve student engagement and learning efficiency (Nguyen et al., 2024). However, integrating these technologies also presents challenges, primarily related to the digital divide and the need for substantial investment in technology and teacher training (Pham et al., 2019).

Based on these findings, several recommendations for future research have been identified. There is a need for longitudinal studies to assess the long-term impacts of AI on educational outcomes (Dao et al., 2023). Additionally, research should

## The Role of Ai in Improving Student Learning Outcomes: Evidence in Vietnam

explore the socio-economic barriers to AI adoption in education to develop more inclusive strategies and policies (DeJaeghere et al., 2023). Another critical area for future research is the psychological and social effects of AI interactions in educational settings, which remain underexplored (Srinivasan & Murthy, 2021).

The study suggests several potential directions for policy and implementation. Policymakers should prioritize the development of a robust digital infrastructure that ensures equitable access to AI technologies across different regions and educational institutions (Tuoi & Thanh, 2023). Policies that support continuous professional development for educators enabling them to integrate AI tools effectively in their teaching practices, are also urgently needed. Moreover, a collaborative approach involving government, educational institutions, and technology providers is crucial to tailoring AI solutions that meet the specific needs of the academic sector in Vietnam.

By addressing these recommendations and potential policy directions, Vietnam can harness AI's full potential to enhance educational outcomes and prepare students for a future where technology plays an integral role in all aspects of life..

### REFERENCES

- 1) Dao, X. Q., Le, N. B., Phan, X. D., & Ngo, B. B. (2023). Can ChatGPT pass the Vietnamese National High School Graduation Examination?. arXiv preprint arXiv:2306.09170.
- 2) DeJaeghere, J., Dao, V., Duong, B. H., & Luong, P. (2023). Learning inequities in Vietnam: Teachers' beliefs about and classroom practices for ethnic minorities. *Compare: A Journal of Comparative and International Education*, 53(3), 399-416.
- 3) Nguyen, A., Kremantzis, M., Essien, A., Petrounias, I., & Hosseini, S. (2024). Enhancing Student Engagement Through Artificial Intelligence (AI): Understanding the Basics, Opportunities, and Challenges. *Journal of University Teaching and Learning Practice*, 21(06). <https://doi.org/10.53761/caraaq92>
- 4) Pham, L., Limbu, Y. B., Bui, T. K., Nguyen, H. T., & Pham, H. T. (2019). Does e-learning service quality influence e-learning student satisfaction and loyalty? Evidence from Vietnam. *International journal of educational technology in higher education*, 16(1), 1–26.
- 5) Srinivasan, V., & Murthy, H. (2021). Improving reading and comprehension in K-12: Evidence from a large-scale AI technology intervention in India. *Computers and Education: Artificial Intelligence*, 2, 100019.
- 6) Tuoi, N. T., & Thanh, N. N. (2023). The Impact of Digital Capabilities on the Work Performance of Provincial Civil Servants in Vietnam. *Journal of Law and Sustainable Development*, 11(4), e560-e560.



There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non Commercial 4.0 International (CC BY-NC 4.0) (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.