

APPLICATION OF ARTIFICIAL INTELLIGENCE IN VOCABULARY TEACHING FOR NON ENGLISH MAJORS AT THAI NGUYEN UNIVERSITY OF AGRICULTURE AND FORESTRY - THAI NGUYEN UNIVERSITY

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ARTICLE INFO	ABSTRACT
Received: 26/8/2025	With the rapid development of technology, artificial intelligence is increasingly transforming how teaching and learning are conducted worldwide. In English language teaching, artificial intelligence offers significant opportunities to enhance vocabulary acquisition for non-English major students. This study explores the application of artificial intelligence in vocabulary teaching for non-English major students at Thai Nguyen University of Agriculture and Forestry - Thai Nguyen University and evaluates its impact on students' vocabulary development. This study adopted an action research approach involving 120 first-year students who were not majoring in English. The participants were divided into two groups: an experimental group, which used artificial intelligence tools such as vocabulary-learning applications, pronunciation software, and educational games, and a control group, which followed conventional teaching methods. Results indicated that the experimental group performed noticeably better in vocabulary assessments and expressed greater satisfaction with the use of artificial intelligence -supported instruction. These findings suggest that incorporating artificial intelligence into vocabulary teaching can enhance learning outcomes and promote student engagement. Nevertheless, the study also highlights certain challenges, particularly regarding access to technology and user-friendliness. Based on these insights, the research recommends integrating artificial intelligence tools into vocabulary instruction, especially for non-English major students, to improve teaching effectiveness.
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ỨNG DỤNG TRÍ TUỆ NHÂN TẠO TRONG GIẢNG DẠY TỪ VỰNG CHO SINH VIÊN KHÔNG CHUYÊN TIẾNG ANH TẠI TRƯỜNG ĐẠI HỌC NÔNG LÂM – ĐẠI HỌC THÁI NGUYÊN

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THÔNG TIN BÀI BÁO	TÓM TẮT
Ngày nhận bài: 26/8/2025	Với sự phát triển nhanh chóng của công nghệ, trí tuệ nhân tạo ngày càng tạo ra những thay đổi đáng kể trong cách dạy và học trên toàn thế giới. Đặc biệt, trong lĩnh vực giảng dạy tiếng Anh, trí tuệ nhân tạo mang lại nhiều cơ hội tiềm năng nhằm nâng cao hiệu quả học từ vựng cho sinh viên không chuyên ngữ. Nghiên cứu này tập trung tìm hiểu việc ứng dụng trí tuệ nhân tạo trong giảng dạy từ vựng cho sinh viên không chuyên ngành tiếng Anh tại Trường Đại học Nông Lâm - Đại học Thái Nguyên, đồng thời đánh giá tác động của công nghệ này đến quá trình phát triển vốn từ vựng của người học. Phương pháp nghiên cứu hành động đã được áp dụng với sự tham gia của 120 sinh viên năm nhất không chuyên tiếng Anh. Các sinh viên được chia thành hai nhóm: nhóm thực nghiệm sử dụng các công cụ trí tuệ nhân tạo như ứng dụng học từ vựng, phần mềm luyện phát âm và trò chơi giáo dục; trong khi đó, nhóm đối chứng tiếp tục học theo phương pháp truyền thống. Kết quả cho thấy nhóm thực nghiệm đạt kết quả cao hơn đáng kể trong các bài kiểm tra từ vựng và tỏ ra hài lòng hơn với hình thức học có hỗ trợ bởi trí tuệ nhân tạo. Những phát hiện này cho thấy việc tích hợp trí tuệ nhân tạo vào giảng dạy từ vựng có thể cải thiện kết quả học tập và tăng cường sự hứng thú của sinh viên. Tuy nhiên, nghiên cứu cũng chỉ ra một số thách thức, chủ yếu liên quan đến khả năng tiếp cận thiết bị công nghệ và mức độ thân thiện của các công cụ với người dùng. Trên cơ sở đó, nghiên cứu khuyến nghị nên đưa các công cụ trí tuệ nhân tạo vào quá trình giảng dạy từ vựng cho đối tượng sinh viên không chuyên, nhằm nâng cao hiệu quả giảng dạy.
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1. Introduction

In recent years, the rapid development of technology has brought significant transformations across various sectors, with education being one of the most profoundly impacted. Among the many advancements, the application of artificial intelligence (AI) has notably redefined teaching and learning methodologies globally [1]. AI's transformative potential in education lies in its capacity to personalize learning experiences, facilitate real-time feedback, and offer interactive tools tailored to individual learning needs. In the domain of English language teaching, AI has emerged as a particularly valuable tool for non-English major students, enhancing vocabulary acquisition and fostering overall language proficiency [2]. AI-powered learning environments can transcend the limitations of traditional pedagogical approaches by providing individualized learning pathways, addressing diverse learning styles, and delivering real-time interventions - features that are challenging to replicate with conventional methods [3].

At Thai Nguyen University of Agriculture and Forestry, where a substantial number of students pursue non-English majors, the challenge of delivering effective and engaging English vocabulary instruction has become increasingly evident. While traditional methods serve as a foundation, they often fail to sustain student interest or meet diverse learning needs adequately. These approaches, which are largely reliant on rote memorization and repetitive exercises, may not align with the learning preferences of modern students, who are accustomed to technology-enhanced educational experiences [4]. Consequently, there is a growing demand for dynamic and interactive teaching strategies that promote deeper engagement with and comprehension of English vocabulary. This study aims to investigate the potential benefits of integrating AI into vocabulary instruction and assess its impact on non-English major students at Thai Nguyen University of Agriculture and Forestry. By examining how AI can complement and enhance existing instructional strategies, the research seeks to demonstrate the role of innovative technology in reshaping vocabulary instruction.

Recent advances in AI research have introduced promising applications for enhancing vocabulary acquisition. According to Nguyen et al. [5], AI tools, such as intelligent tutoring systems and adaptive learning platforms, have proven effective not only in improving vocabulary retention but also in boosting student motivation through personalized learning experiences. These systems utilize natural language processing (NLP) algorithms to analyze students' language patterns and provide real-time corrective feedback, which facilitates better retention and understanding of vocabulary. Additionally, Pham et al. [6] assert that AI-based vocabulary learning tools contribute to learners' cognitive development by presenting vocabulary in varied contextual settings. This approach aligns with cognitive learning theories that stress the importance of contextual learning for long-term retention.

Despite the promising potential of AI in education, its integration into vocabulary instruction presents several challenges. A key factor affecting the success of AI-assisted language learning is the accessibility and usability of AI tools. Although AI offers substantial advantages, it may remain underutilized if students and educators lack the necessary technological infrastructure or expertise to leverage these tools effectively [7]. Furthermore, as Jomaa et al. [8] highlights, the effectiveness of AI in language learning is contingent upon its seamless integration into the curriculum and the extent to which educators are trained to incorporate AI tools into their teaching strategies. It is thus imperative for institutions to provide the requisite resources and professional development to ensure successful AI integration in vocabulary teaching.

While AI is often associated with vocabulary acquisition, its role extends beyond this domain to encompass other aspects of language learning. Recent studies indicate that AI tools can substantially enhance speaking skills by offering learners virtual conversational partners and speech recognition systems [9]. These tools not only assist students in practicing pronunciation but also provide immediate feedback on their speaking performance, thereby accelerating language acquisition. Given the interdependent nature of language skills, incorporating AI into

vocabulary teaching may also facilitate the development of speaking skills, particularly when students engage with AI in context-rich environments.

In the context of Thai Nguyen University of Agriculture and Forestry, where students frequently have limited exposure to English outside the classroom, the use of AI tools provides a unique opportunity to bridge the gap between classroom learning and real-world language use. This study seeks to explore whether AI tools can facilitate the transfer of vocabulary knowledge to real-world communication contexts, thereby enhancing students' ability to use new words and phrases in practical scenarios. This emphasis on practical application aligns with the growing trend towards communicative competence in language education, which aims to prepare students for authentic interactions where English is used [10]. Overall, the integration of AI in vocabulary instruction offers numerous benefits, including increased student engagement, improved retention, and enhanced overall satisfaction. AI tools such as vocabulary learning applications, pronunciation software, and interactive educational games enable students to practice vocabulary within context and receive immediate feedback on their performance [11]. These tools are designed to adapt to individual learning paces, allowing students to revisit and reinforce challenging words or concepts. Additionally, AI usage allows educators to monitor student progress more efficiently and provide personalized support to those who require extra assistance. By making learning more individualized and interactive, AI tools have the potential to foster a more effective and enjoyable learning experience. This research is to evaluate both the academic performance of students and their satisfaction levels with AI-assisted learning techniques, providing valuable insights into the effectiveness of these tools in the classroom. Through this study, the research aims to explore the potential of AI in transforming English vocabulary instruction for non-English major students at Thai Nguyen University of Agriculture and Forestry, Thai Nguyen University, with the objective of offering recommendations for future educational practices.

2. Method

2.1. The population of the study

The population of this study consists of 120 first-year students from non-English major at Thai Nguyen University of Agriculture and Forestry - Thai Nguyen University. These students were selected to participate in the study based on their enrollment in various non-English programs at the university. The participants were divided into two groups: the experimental group and the control group, with each group consisting of 60 students.

The experimental group engaged with AI-based tools such as vocabulary learning software, pronunciation applications, and educational games to enhance their vocabulary learning experience. Meanwhile, the control group continued to follow traditional vocabulary teaching methods, which did not incorporate AI technologies.

The students were selected randomly from different faculties to ensure a diverse representation of non-English major students. All participants were informed about the purpose of the study, and their consent was obtained prior to their involvement. The study aimed to assess the effectiveness of AI in improving vocabulary acquisition and student satisfaction in comparison to conventional teaching methods.

2.2. The research instruments

To evaluate the effectiveness of AI-based tools in teaching vocabulary to non-English major students, three key instruments were employed in this study: vocabulary tests, student satisfaction surveys, and observation logs.

Vocabulary tests: Three vocabulary tests were administered at different stages: a pre-test at the beginning, a mid-term test, and a post-test at the end of the intervention. Each test contained both receptive tasks (multiple-choice and matching questions) and productive tasks (fill-in-the-blank and sentence writing). The items were developed based on the vocabulary topics aligned with the course content and AI-integrated activities. These tests were used to compare the vocabulary development between the experimental and control groups over the study period.

Student satisfaction surveys: At the end of the study, the students completed a satisfaction survey regarding the use of AI-based vocabulary learning tools. The survey included 12 items on a 5-point Likert scale, ranging from "strongly agree" to "strongly disagree", and a few open-ended questions. It aimed to capture learners' perceptions of the tools' effectiveness, ease of use, and their impact on motivation and interest in vocabulary learning.

Observation logs: During the implementation, the researchers kept regular observation logs to record students' behaviors, reactions, and engagement while using the AI tools. These logs helped identify any technical or pedagogical issues and provided insights into how students adapted to and interacted with the AI-supported vocabulary learning environment.

These three instruments ensured a comprehensive evaluation of vocabulary acquisition, learner satisfaction, and the overall learning experience with AI integration.

2.3. Data collection

The research was carried out through a series of organized steps to ensure consistency and reliability in the data collection process:

Step 1: Pre-test administration

In the first week of the course, both the experimental and control groups were given a vocabulary pre-test to determine their initial proficiency levels.

Step 2: Orientation and student analysis

During the initial lesson, students were introduced to the study and their learning preferences and expectations were discussed to foster better engagement throughout the process.

Step 3: Intervention phase

Over a three-month period, the experimental group used AI-powered tools such as vocabulary apps, pronunciation software, and gamified learning platforms. Meanwhile, the control group followed traditional methods without technological support. Both groups studied similar vocabulary themes. Periodic progress was monitored using vocabulary worksheets and class activities.

Step 4: Post-test administration

At the end of the study, a vocabulary post-test was administered to both groups. The results were compared with pre-test scores to evaluate the impact of the AI-integrated approach on vocabulary acquisition.

Step 5: Satisfaction survey

After the post-test, a questionnaire was distributed to all participants to assess their satisfaction and attitudes towards the instructional methods, particularly focusing on the effectiveness and user experience of the AI tools used in the experimental group.

2.4. Data analysis

To assess the impact of AI-based tools on students' vocabulary acquisition, the collected data from the pre-test, mid-term test, and post-test were analyzed by calculating mean scores and comparing the performance of the control and experimental groups. The statistical analysis was conducted using SPSS version 20. Paired sample t-tests and independent sample t-tests were used to examine any significant differences in vocabulary performance within and between groups. Additionally, descriptive statistics were used to analyze the responses from the student satisfaction survey, while qualitative feedback from open-ended questions and observation logs was reviewed to provide further insights into students' experiences and engagement with the AI tools.

3. Results and Discussion

3.1. Vocabulary test results

The data presented in Table 1 provides an overview of the average vocabulary test scores for both the experimental group (AI-based learning) and the control group (traditional learning) at three distinct stages: pre-test, mid-term test, and post-test.

At the pre-test stage, the average scores of the experimental group (5.2) and the control group (5.3) were identical, indicating no significant difference in vocabulary proficiency at the outset. Both groups began with comparable levels of knowledge.

By the mid-term test, a notable discrepancy emerged, with the experimental group showing a more substantial improvement, reaching a score of 7.5, compared to 6.2 for the control group. This difference suggests that the AI-based learning tools provided more effective support for vocabulary acquisition, possibly due to their interactive and personalized features, which may have contributed to more engaged and efficient learning.

The post-test results further reinforced this trend, with the experimental group attaining a score of 8.9, while the control group reached 7.1. This demonstrates the continued efficacy of AI-based learning tools in enhancing vocabulary learning over time.

In total, the experimental group showed an overall improvement of 3.7 points, significantly outperforming the control group, which only improved by 1.8 points. These results suggest that AI-based tools offer more effective support in vocabulary acquisition compared to traditional teaching methods, likely due to their ability to provide immediate feedback, adaptive learning paths, and engaging, interactive content.

Table 1. Average vocabulary scores of students

Test Stage	Experimental Group (AI)	Control Group (Traditional)
Pre-test	5.2	5.3
Mid-term Test	7.5	6.2
Post-test	8.9	7.1

3.2. Student satisfaction survey results

Table 2 presents a comparative overview of student satisfaction concerning the vocabulary learning methods employed in this study. The data reveal that the experimental group, which received vocabulary instruction supported by artificial intelligence tools, reported a markedly higher level of satisfaction. Specifically, 80 percent of students in this group expressed being either satisfied or very satisfied, whereas only 70 percent of the control group reported similar sentiments. Notably, 45 percent of the experimental group indicated they were very satisfied, more than double the 20 percent observed in the control group.

These results provide compelling evidence that AI-integrated instructional approaches contribute not only to improved academic outcomes but also to enhanced learner satisfaction. The capacity of AI tools to deliver instant feedback, personalize content based on individual proficiency levels, and support interactive engagement likely played a crucial role in boosting learners' motivation and perceived autonomy. The feature aligns with self-determination theory, which posits that autonomy, competence, and relatedness are foundational to intrinsic motivation and overall learner engagement.

Conversely, the relatively higher dissatisfaction rate among control group participants suggests that traditional instructional methods may lack the adaptability and responsiveness required to meet the evolving expectations of contemporary students. Static, one-size-fits-all approaches are often insufficient for addressing the diverse learning styles and motivational needs present in today's classrooms.

Overall, the elevated satisfaction levels reported by students exposed to AI-enhanced learning underscore the transformative potential of intelligent educational technologies. By cultivating a more engaging, adaptive, and cognitively enriching learning environment, these tools offer meaningful contributions to both the affective and academic dimensions of vocabulary acquisition.

Table 2. Student satisfaction with vocabulary learning methods

Satisfaction Level	Experimental Group (%)	Control Group (%)
Very satisfied	45	20
Satisfied	35	50
Not satisfied	20	30

3.3. Insights from observation logs

The observation logs revealed significant differences in the engagement and learning behaviors of students between the experimental and control groups. Students in the experimental group demonstrated greater involvement with the AI-based tools, often utilizing them outside of class hours. They exhibited higher levels of autonomy and intrinsic motivation, with frequent engagement in activities such as exploring features like pronunciation support and contextual examples. These tools appeared to foster sustained curiosity and deeper learning by providing immediate feedback and offering personalized learning paths. The individualized nature of the AI tools may have contributed to an enhanced sense of ownership over their learning process.

In contrast, students in the control group were more reliant on traditional teacher guidance and showed less initiative in their learning. Their engagement with the learning material outside of class was limited, and their learning behavior was less independent compared to the experimental group. These findings suggest that AI-assisted learning environments not only facilitated vocabulary development but also encouraged a shift towards a more proactive and self-directed learning mindset.

These results underscore the potential of AI to enhance student motivation and autonomy in vocabulary acquisition. By offering tailored feedback and interactive features, AI tools can create an environment conducive to more independent learning, which traditional methods may not fully provide. This distinction highlights the transformative potential of integrating AI into language learning, offering both immediate and long-term benefits for student engagement and learning outcomes.

4. Conclusion

This study has empirically examined the efficacy of artificial intelligence (AI) based tools in facilitating vocabulary acquisition among non-English major students at Thai Nguyen University. The findings clearly demonstrate that the experimental group, which was exposed to AI assisted instructional interventions, outperformed the control group in all post intervention assessments. Moreover, students in the experimental group reported greater levels of autonomy, motivation, and engagement, reinforcing previous research that highlights the pedagogical benefits of educational technology in second language acquisition [1], [5].

The integration of AI into English language instruction presents significant potential for pedagogical innovation by enabling personalized and adaptive learning pathways. Through real-time feedback and context-aware content delivery, AI facilitates deeper engagement with lexical materials, supporting cognitive processing and long-term vocabulary retention [2], [6]. Moreover, AI-powered platforms promote interactive learning environments aligned with constructivist approaches, enhancing learner autonomy and overall satisfaction.

Despite these benefits, the successful adoption of AI in language instruction requires overcoming several practical challenges. Effective implementation depends on technological infrastructure, digital literacy among both teachers and students, and the meaningful integration of AI tools into the curriculum [7], [8]. These considerations highlight the need for institutional investment in teacher training, curriculum redesign, and accessible digital resources to ensure sustainable use.

Future research should examine the long-term impacts of AI-supported instruction across broader language skills such as listening, speaking, and writing. Cross-contextual studies involving diverse learner populations may also provide insights into the adaptability and scalability of AI tools. Furthermore, ethical concerns, accessibility, and equity must remain central in the development of AI-driven language learning environments [11].

In conclusion, the study contributes empirical evidence to the growing literature on AI in language education by demonstrating its positive impact on vocabulary instruction, especially for non-English major students navigating increasing linguistic and technological demands.

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