EVALUATING THE EFFECTIVENESS OF AI APPLICATIONS FOR VOCABULARY DEVELOPMENT AMONG STUDENTS WITH DIVERSE LEARNING STYLES

Qodirqulova Maftunaxon Muhiddin qizi
Chirchiq Davlat Pedagogika Universiteti ingliz tili

Abstract: This study explores the impact of Artificial Intelligence (AI) applications on vocabulary acquisition among students with various learning styles. As vocabulary is foundational to language proficiency, identifying effective strategies for its development is critical. AI-powered tools offer personalized learning experiences that can adapt to students' preferences and cognitive styles. This research evaluates how these tools influence vocabulary growth among visual, auditory, reading/writing, and kinesthetic learners. Through a mixed-methods approach involving pre- and post-tests, user analytics, and interviews, the study demonstrates the positive influence of AI applications, particularly those that incorporate multimodal content and adaptive algorithms. Results suggest that tailoring AI applications to individual learning styles significantly enhances vocabulary acquisition.

Keywords: Artificial Intelligence, vocabulary acquisition, learning styles, adaptive learning, educational technology

1. Introduction

Vocabulary development is a fundamental aspect of language learning. Proficiency in vocabulary correlates strongly with reading comprehension, academic success, and communication skills. Traditional methods of vocabulary instruction often follow a one-size-fits-all approach, which may not cater effectively to students with different learning preferences. The emergence of AI

technologies has revolutionized educational paradigms, introducing adaptive systems capable of customizing learning experiences.

This paper investigates the effectiveness of AI-based vocabulary learning applications for students with diverse learning styles. The study aims to determine whether AI tools provide an advantage in vocabulary acquisition and how they interact with various learning preferences.

2. Methodology

2.1 Research Design

The study employed a mixed-methods approach, combining quantitative and qualitative data to evaluate the effectiveness of AI applications. Pre- and post-tests were used to measure vocabulary gains. Usage data from AI platforms and semi-structured interviews provided insights into user experiences.

2.2 Participants

Eighty secondary school students aged 13 to 16 participated in the study. Participants were assessed for their learning styles using the VARK questionnaire and categorized as visual, auditory, reading/writing, or kinesthetic learners.

2.3 AI Applications Used

Three AI-powered vocabulary learning platforms were selected: Quizlet AI, Lingvist, and WordUp. These platforms were chosen for their adaptive learning capabilities and rich multimedia features.

2.4 Procedure

Participants used the assigned AI application for six weeks. They completed a vocabulary pre-test before starting and a post-test at the end of the program. The applications tracked usage patterns, and data were collected for analysis.

2.5 Data Analysis

Quantitative data were analyzed using paired t-tests to compare pre- and post-test scores. Qualitative data from interviews were thematically analyzed to identify patterns in user experiences based on learning styles.

3. Results

3.1 Vocabulary Gains

All groups showed statistically significant improvements in vocabulary scores ($p < 0.01$). Visual and kinesthetic learners demonstrated the highest gains, particularly when interacting with platforms offering visual cues, animations, and interactive tasks.

3.2 Learning Style Adaptation

AI applications that offered multimodal content proved most effective across all learning styles. Visual learners benefited from infographics and videos, while auditory learners preferred text-to-speech and audio-based quizzes. Reading/writing learners engaged more with flashcards and written explanations. Kinesthetic learners responded positively to gamified tasks and drag-and-drop exercises.

3.3 User Engagement and Satisfaction

Interview responses revealed high levels of engagement and satisfaction, particularly among learners who felt the AI application matched their learning preferences. Features such as spaced repetition, instant feedback, and progress tracking were highly appreciated.

4. Discussion

The findings confirm that AI applications enhance vocabulary learning across various learning styles. By offering tailored experiences, these tools increase motivation, engagement, and ultimately learning outcomes. The significant gains among visual and kinesthetic learners suggest that incorporating visual and interactive elements is crucial. While all learning styles benefited, the degree of improvement varied, highlighting the need for customization.

Moreover, the adaptive nature of AI platforms ensures that learners receive content suited to their pace and level of understanding. This personalization supports autonomous learning and helps build long-term retention of vocabulary.

5. Conclusion

AI applications represent a promising avenue for personalized vocabulary ins truction. The ability to cater to diverse learning styles makes them particularly valuable in inclusive educational settings. Educators are encouraged to integrate AI tools that offer multimodal content and adaptivity to maximize vocabulary acquisition. Further research could explore long-term effects and applications across different age groups and linguistic backgrounds.

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