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AI-ENHANCED MICROLEARNING IN LOW-RESOURCE EFL CLASSROOMS: A MIXED-METHODS STUDY FROM UZBEKISTAN

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Abstract: The integration of artificial intelligence (AI) into English as a Foreign Language (EFL) education has attracted significant scholarly attention in recent years. However, limited research has explored its application in low-resource classroom contexts. This study investigates the effectiveness of combining AI tools with microlearning strategies in a vocational college in Uzbekistan. Using a mixed-methods design, data were collected from 25 students over four weeks through pre- and post-tests, classroom observations, and learner feedback. The results indicate statistically significant improvements in student engagement, vocabulary acquisition, and speaking confidence. The findings suggest that AI-enhanced microlearning provides a scalable and cost-effective solution for improving language learning outcomes in resource-constrained environments.

Keywords: Artificial Intelligence, Microlearning, EFL, Student Engagement, Low-Resource Classrooms, Uzbekistan.

Introduction

The rapid evolution of artificial intelligence (AI) technologies has transformed various sectors, including education. In language learning, AI-powered tools such as chatbots, speech recognition systems, and adaptive learning platforms have introduced new possibilities for personalized instruction. Recent studies highlight that AI can significantly improve learners' speaking performance, motivation, and self-regulation.

Despite these advancements, many educational institutions—particularly in developing regions—continue to operate under low-resource conditions. These classrooms often lack advanced technological infrastructure, access to digital tools, and sufficient pedagogical support. Uzbekistan, while actively reforming its education system, still faces such challenges in vocational and rural education settings.

Microlearning has emerged as an effective pedagogical approach that delivers content in short, focused segments. It reduces cognitive overload and enhances retention, making it particularly suitable for students with limited access to extended learning resources. When combined with AI tools, microlearning can create a flexible and personalized learning environment even in constrained settings.

This study aims to bridge the gap between advanced educational technologies and low-resource classroom realities by examining the combined impact of AI and microlearning.

Literature Review

2.1 AI in EFL Education

Artificial intelligence has become increasingly influential in EFL contexts. A comprehensive review of recent studies shows that AI improves writing accuracy, speaking fluency, and learner engagement. Similarly, experimental research demonstrates that AI-assisted instruction significantly enhances pronunciation, vocabulary, and overall speaking performance.

AI tools also contribute to psychological aspects of learning. They increase learner motivation, reduce anxiety, and support self-regulated learning processes. For instance,

studies indicate that AI-based applications improve both engagement and enjoyment in language learning environments.

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2.2 Microlearning in Language Education

Microlearning focuses on delivering educational content in small, manageable units. Research suggests that this approach enhances retention and learner attention while reducing cognitive overload. It is particularly effective in mobile learning environments where students engage in short learning sessions.

Microlearning aligns well with modern learner preferences, especially among younger generations who are accustomed to consuming information in short formats. It also supports continuous learning by allowing students to practice regularly without experiencing fatigue.

2.3 Research Gap

Although both AI and microlearning have been extensively studied, there is limited research on their combined application in low-resource EFL classrooms. Most existing studies focus on technologically advanced environments, leaving a gap in understanding how these approaches can be adapted to contexts with minimal resources.

This study addresses this gap by providing empirical evidence from Uzbekistan.

Methodology

3.1 Research Design

This study employed a mixed-methods approach, integrating quantitative and qualitative data to ensure a comprehensive analysis.

3.2 Participants

The participants were 25 vocational college students aged 16–18. Their English proficiency ranged from elementary to pre-intermediate.

3.3 Instruments

Vocabulary pre-test and post-test

Classroom observation checklist

Student feedback questionnaire

Speaking confidence self-assessment

3.4 Procedure

The intervention lasted four weeks and included:

Daily microlearning tasks (5–10 minutes)

AI-assisted speaking practice using mobile tools

Vocabulary exercises supported by AI feedback

Weekly reflective discussions

Students primarily used smartphones, making the approach feasible in low-resource environments.

Results

4.1 Student Engagement

Participation increased significantly over the study period:

Week 1: 52%

Week 2: 65%

Week 3: 78%

Week 4: 85%

This trend indicates that AI-enhanced microlearning effectively motivates students.

4.2 Vocabulary Acquisition

The results of vocabulary assessments showed notable improvement:

Pre-test: 56%

Post-test: 78%

This 22% increase demonstrates the effectiveness of repeated microlearning and AI-assisted feedback.

4.3 Speaking Confidence

Students reported increased confidence in speaking tasks:

Low confidence: decreased from 60% to 20%

High confidence: increased from 10% to 30%

These findings align with previous research showing that AI reduces language anxiety and enhances communication skills.

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Discussion

The findings of this study confirm that AI-enhanced microlearning has a significant positive impact on EFL learners in low-resource environments.

First, the increase in student engagement can be attributed to the short and interactive nature of microlearning tasks. Students are more willing to participate when tasks are manageable and less time-consuming.

Second, AI tools provide immediate feedback, which is crucial for language acquisition. Unlike traditional methods, AI allows students to practice independently while receiving real-time corrections.

Third, the improvement in speaking confidence highlights the psychological benefits of AI integration. Students feel less pressure when interacting with AI compared to speaking in front of peers or teachers.

These findings are consistent with global research trends indicating that AI enhances both cognitive and affective dimensions of learning.

Implications

This study has several important implications:

AI tools can be effectively used even in low-resource classrooms

Microlearning is a practical strategy for improving engagement

Teachers do not need expensive equipment—smartphones are sufficient

Educational policymakers should support AI integration in developing regions

Limitations and Future Research

Despite its contributions, this study has several limitations:

Small sample size

Short duration (4 weeks)

Limited generalizability

Future research should:

Include larger and more diverse samples

Extend the duration of the intervention

Explore long-term learning outcomes

Conclusion

This study demonstrates that the integration of artificial intelligence and microlearning strategies significantly enhances English language learning outcomes in low-resource classrooms. The results highlight improvements in engagement, vocabulary acquisition, and speaking confidence.

Importantly, this approach is both practical and scalable, making it highly suitable for developing educational contexts such as Uzbekistan.

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